



AMBIDEXTROUS LEADERSHIP, ABSORPTIVE CAPACITY AND INNOVATION
ADOPTION:
BASED ON EVIDENCE DRAWN FROM HEAVY EQUIPMENT
MANUFACTURING FIRMS IN CHINA

by

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Abstract

The aim of this thesis is to explore the relationship amongst Ambidextrous Leadership, Innovation Adoption and Absorptive Capacity by investigation on heavy equipment manufacturing firms in China. The theoretical model proposed in this thesis addresses the relationship between senior managers' ambidextrous leadership and the process of innovation adoption from the perspective of Absorptive Capacity.

Ambidextrous Leadership is defined by Rosing, Frese and Bausch (2011, p.956) as a unique style of innovation leadership, which utilises *opening* and *closing* leader behaviours along with *switches between them* to address contradicting requirements embedded in the innovation process. Innovation Adoption refers to a process of organisational innovation that emphasises the development of innovation primarily through the adoption of external knowledge. Absorptive Capacity is fundamentally a learning process that enables organisations to innovate through absorbing knowledge from the external environment.

This thesis uses a multiple-case study strategy, and collects data through semi-structured interviews, non-participating observation and company documents. Furthermore, data triangulation is employed to confirm factors in the theoretical model and to identify emerging factors.

This thesis contributes to the development of the Ambidextrous Leadership theory that centres on the senior manager level in the targeted industry. To my best knowledge, this is also the first study to focus on the relationship between the senior manager's ambidextrous leadership and innovation adoption in China.

The results produced by this thesis give value to future Innovation and Ambidextrous Leadership researchers and proffers further insight for practitioners in the heavy equipment manufacturing industry in China.

Keywords: *Ambidextrous Leadership, Innovation Adoption, Absorptive Capacity and Heavy Equipment Manufacturing*

Dedication

To Mum and Dad!

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List of Abbreviations

Terms	Abbreviations
Absorptive Capacity	AC
Ambidextrous Leadership	AL
Departmental Manager	DM
General Manager	GM
Heavy Equipment Manufacturing	HEM
Innovation Adoption Process	IAP
Senior Manager Ambidextrous Leadership	SMAL
Transformational/Transactional	T/T

CHAPTER 1 INTRODUCTION

1.1 Introduction

The aim of this chapter is to introduce the research topic and the motivation behind this research. In section 1.1, the significance and the rationale of the study are justified. In section 1.2, the research questions are proposed, and the corresponding objectives are specified. Section 1.3 clarifies the adopted research approach along with the scope of the study. Section 1.4 highlights the key contributions of this research. Section 1.5 lists all the chapters that make up the thesis. The conclusion provided in section 1.6 ends this chapter.

1.2 Research Rationale

Innovation is one of the most intensely studied topics across the various disciplines (Anderson, Potočnik and Zhou, 2014; Crossan and Apaydin, 2010; Fagerberg, Mowery and Nelson, 2005). In the field of management studies, innovation is often viewed as a critical source of competitive advantage for organisations (Betz, 2003; Damanpour and Wischnevsky, 2006; Gopalakrishnan and Damanpour, 1996; Leonard-Barton, 1995; Dess and Picken, 2000; Tushman and O'Reilly, 1996), and a key determinant for their long-term success and survival (Cohen and Levinthal, 1990; D'Aveni, 2010; Florida, 2002; Mone, McKinley and Barker, 1998; Mumford, et al., 2002; Taplin and Schymyck, 2005). Given the significance of innovation regarding its impact on organisations' performance, a significant amount of time and energy have been devoted, by both academics and

industrial practitioners, to explore factors that shape innovation in organisations (Bhattacharya and Bloch, 2004; Damanpour, 1991; Kleinknecht, 1996; Mohr, 1969; Mumford et al., 2002). In this pursuit, innovations have been studied with respect to various factors from quite diversified perspectives, such as that of organisational strategy (Hitt et al., 1996; Parnell, Lester and Menefee, 2000), structure (Burns and stalkers, 1961; Pierce and Deblecq, 1977), team climate (Amabile and Gyskiewicz, 1989; Isaksen, Laver, Ekvall, Britz, 2001), dissemination practices (Abrahamson, 1991; Rodgers and Adhikurya, 1979), group interactions (King and Anderson, 1990; Mumford et al, 2001), individual performance capabilities (Mumford et al., 1998; Runco & Sakamoto, 1999), and leadership (Aragón-Correa, García-Morales and Cordón-Pozo, 2007; Bledow, Frese and Anderson, 2009a, 2009b; Jansen, Vera and Crossan, 2009; Johnston and Marshal, 2016; Sun and Anderson, 2010).

Amongst all the factors that have been explored, leadership is believed to have the highest potential in facilitating innovation in organisations (Anderson and King, 1993; Aragón-Correa, García-Morales and Cordón-Pozo, 2007; Crossan and Apaydin, 2010; Gumusluoglu and Ilsev, 2006; Jansen, Van Den Bosch and Volberda., 2009; Jung, 2001). As observed by Crossan and Apaydin (2010, p.1170), “the role of leadership is paramount for spearheading innovation as a process and maintaining its momentum until innovation as an outcome ensues”. However, this exploration also reveals that empirical results regarding the relationship between leadership and innovation in extant literatures are remarkably inconsistent (Bledow et al., 2009) and sometimes even beyond interpretation (Rosing, Frese and Bausch, 2011). In their endeavour to explain the heterogeneities regarding those relationships identified in leadership-innovation studies, Rosing, Frese and Bausch (2011), suggested that the primary cause for such inconsistency is that the established leadership styles are insufficient to accommodate the complexities associated

with innovation. As explained by Rosing, Frese and Bausch (2011) from the process view, innovation comprises two different stages, creativity and implementation, which are facilitated by respective learning activities that are fundamentally different and contradict to one another¹. However, they are both necessary for developing innovation (Amabile, 1996; Axtell et al., 2000). In light of this specifically identified feature, Rosing, Frese and Bausch (2011) and Bledow et al. (2009) further suggested that Ambidexterity² is a key feature in innovation processes. Subsequently, Rosing, Frese and Bausch (2011) developed the construct of Ambidextrous Leadership (AL), and provided an integrative model suggesting that AL can effectively facilitate innovation through the learning process. The validity of this construct is further verified by empirical studies, e.g., Tung (2016), and Zacher, Robinson and Rosing (2016). As revealed by these authors, managers' engagement in AL can positively influence employees' self-reported innovation performance (Tung, 2016; Zacher, Robinson and Rosing, 2016).

However, as AL is an emerging concept, empirical studies regarding this concept are quite limited and are dominated by the use of quantitative research methods. Moreover, amongst these limited empirical studies, the sole focus of their research is the discussion on the relationship between the shop-floor managers' AL and the innovation at individual level³, whilst leaving the relationship between senior managers' AL and innovations at organizational level unexplored.

¹ Bledow et al. (2009a, 2009b) and Rosing, Frese and Bausch (2011), proposed *creativity* requires exploration and *implementation* pertains to exploitation. However, as revealed by March (1991), exploration and exploitation are two fundamentally different and contradicting learning processes.

² As suggested by Bledow et al. (2009a, 2009b), Rosing, Frese and Bausch (2010), Rosing, Rosenbusch and Frese (2011). Ambidexterity in innovation refers to the fact that both exploration and exploitation learning activities are required to facilitate innovation.

³ In one exception, Zacher and Rosing (2015) published an article named "Ambidextrous Leadership and Team innovation". However, as revealed in their Method section (p.58), data are collected from architectural and interior design firms, and the authors used the sum of individual innovation as the indicator of team innovation. Given this specific feature, we would argue that what has really been revealed in that research, is still the correlation between AL and innovation, at individual level.

1.3 Research Questions and Objectives

In light of the identified research deficiencies, this thesis is therefore organised to explore the following overarching research question:

How might organisational innovation be facilitated by senior managers' ambidextrous leadership?

Inspired by the analytical logic adopted by Bledow et al. (2009) and Rosing, Frese and Bausch (2011) (see details in section 2.4.1), this research develops a theoretical model to address the overarching research question proposed from the perspective of learning. In the proposed theoretical model, organisational innovations are specified as the innovation adoption process (IAP), and the learning processes underlying organisational innovations are specified as the Absorptive Capacity (AC) Learning process (the rationale for adopting these two specific constructs into the theoretical model are explained in section 3.4 and 3.5). Subsequently, following the sequence of analysis in the theoretical model (section 3.6.3), the overarching proposed research question can then be broken down into the following two sub questions:

Question 1: *How does the Absorptive Capacity learning process facilitate the Innovation Adoption Process?*

and,

Question 2: *How does the Senior Managers' Ambidextrous Leadership facilitate the Absorptive Capacity Learning process ?*

Subsequently, the corresponding objectives of this research are:

1. To systematically review innovation literature; to explore the relationship between leadership and innovation in extant literature;
2. To develop a theoretical model using insight generated from related studies;
3. To identify an appropriate research methodology and method, and to collect data;
4. To validate the theoretical model based on the data collected;
5. To revise the theoretical model based on findings generated from this research

1.4 Research Approach and Context

As suggested by Saunders, Lewis and Thornhill (2009) and De Vaus (2001), management studies are open to two research approaches, namely *deductive* theory testing and *inductive* theory building. This research adopts the *inductive* theory build approach and the *case study* strategy, as the primary goal is to generate rich information to explain the relationship in organisations between senior managers' Ambidextrous Leadership (AL), the Absorptive Capacity (AC) learning process and the Innovation Adoption process (IAP). Through reviewing available literature, a theoretical model is first developed, proposing the relationship between these three key constructs. Then a case study protocol (section 4.4.4) is developed to guide the field work. Prior to the start of the field work, research ethical issues have also been considered, and a pilot study is carried out to further refine the interview guidance (section 4.4.4) that is used in this research.

Empirical studies are carried out in Heavy Equipment Manufacturing (HEM) firms based in China to explore the AL, AC and IAP correlation. Data are collected through company documents analysis, real time observation of operations and semi-structured interviews. In total, 32 interviewees are involved, covering the General Manager, the Deputy General

Manager, and Departmental Managers in each of the case companies. The field work in this research covers a period of 5 months, with 36 interviews collected, each lasting between 60 to 150 minutes. Data collected from the fieldwork are then analysed by the following two steps. Firstly, within the case analysis, which covers three stages, data condensation, data display along with drawing and verifying any conclusions. Then, the findings generated from each of the case firms are compared and contrasted in the cross-case analysis, so as the commonalities and peculiarities regarding findings generated from each case firms might be identified, along with the emergence of any patterns regarding any correlation between these three constructs.

1.5 Research Contributions

The outcomes of this research are stated in the form of future testable propositions. This study investigates the relationships between the senior managers' Ambidextrous Leadership, the Absorptive Capacity learning process, and organisational innovation adoption, leading up to the following major contributions:

- The theoretical model proposed in this research is the first theoretical model that comprehensively explains the how senior managers' AL can facilitate organisational through the perspective of learning.
- The developed theoretical model provides an integrative analytical lens for academics in the future pursuit of senior managers' AL and its relationship with innovation at organisational level. As revealed in Chapter 2 (section 2.4.1), the original AL-Innovation model proposed by Rosing and her colleagues (2011) is an extremely simple. In fact, this point is even acknowledge by the authors

(Rosing, Frese and Bausch, 2011) (see details in section 2.5). In contrast, the development of the theoretical model in this research is inspired by the themes derived from extant literature and validated by data collected from fieldwork. Thus, this integrative model that has been developed provides a solid foundation for innovation management scholars to further develop a more comprehensive AL-Innovation model in future studies.

- Through using data collected from field work, this research successfully approved the validity of the Innovation Adoption process model in the context of Heavy Equipment Manufacturing industry in China. This provides some useful thoughts for future innovation management scholars in pursuing their own innovation studies in related industries. Additionally, through using a case study approach, this research successfully revealed the multi-level nature of the AC learning process in great detail. In so doing, this research provides solid evidence to support the conceptual affinity between the Absorptive Capacity and the Organisational Learning process as proposed in previous research (Lane, Koka and Pathak, 2006; Sun and Anderson, 2010; Vera et al., 2011).
- Moreover, although the correlation between AC learning process and organisational innovation has already been pointed in previous studies, empirical evidences that validate this argument are quite limited, with the exception of Sun and Anderson (2012). Thus, by proving the validity of the AC learning process model and its correlations with organisational innovation through using data collected from the Heavy Equipment Manufacturing industry in China, this research significantly contributed to the future development of the learning process view of AC, and its related literature.

1.6 Thesis Structure

The remaining part of this thesis proceeds as follows:

Chapter 2 reviews the literature concerning Innovation and Leadership-Innovation. It also provides the justification regarding the adoption of Ambidextrous Leadership, an emerging concept of innovation leadership, in this study.

Chapter 3 proposes the theoretical model. This chapter starts with the provision of definitions regarding three key terms used in this research. Then, the following concepts, Absorptive Capacity and Innovation Adoption Process, are introduced. Rationales are also provided justifying the incorporation of these two concepts into the theoretical model.

Chapter 4 explains the methodological considerations in this research. The following aspects are discussed: the philosophical position, the justification of the case study research design, along with the fieldwork in terms of data collection and the analysis approach that were adopted.

The findings are presented in Chapters 5 and 6. In Chapter 5, the details of the empirical findings, regarding the relationship between the senior managers' AL, the AC learning process and the IAP from each case firm, are provided. In Chapter 6, findings from Chapter 5 are consolidated into cross-case deductions and a comparison of findings from each case will be orchestrated. This is so as the overall pattern regarding the relationship amongst the three key constructs, as revealed from case firms, can emerge.

In Chapter 7, the theoretical model is revised based on findings from the cross-case analysis. A comparison of these findings to the literature is undertaken, leading to the development of seven propositions.

Chapter 8 provides an overview of this thesis, as well as the contributions of this study to literature and practice. The chapter also reveals the limitations of this research and provides suggestions for future research.

1.7 Conclusion

In this chapter, the research rationale is firstly explained. Then the proposals of research questions along with their corresponding objectives are elaborated upon. Subsequently, the context of this research and the overall research approach adopted are clarified. Finally, an overview of each subsequent chapter in this thesis is provided. In the succeeding chapter, extant literature regarding innovation, leadership-innovation, and Ambidextrous Leadership will be reviewed.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to review the literature that informs the relationship between Leadership and Innovation. This chapter is divided into four primary parts. Section 2.2 explores the existing body of knowledge regarding the concept of innovation. It is revealed, due to the proliferation of definitions and typologies developed regarding the concept, that the field of innovation studies is quite fragmented (Anderson, Potočnik and Zhou, 2014). Moreover, the dominance of the outcome-view adopted by academics in investigating innovation also hindered the development of innovation studies significantly (Crossan and Apaydin, 2010). It then argues, in order to address these deficiencies, this research adopts the process view of innovation. Subsequently, the two constituting elements regarding the process view of innovation, namely *creativity* and *implementation*, along with the *ambidexterity* associated with them, are introduced.

Section 2.3 reviews the relationship between leadership and innovation identified in the extant literature. However, given the proliferation of leadership styles proposed, the discussion will be limited to the most often discussed leadership styles, namely Transformational and Transactional (T/T) leaderships. The empirical results reveal that the relationships between T/T leaderships and innovation are extremely inconsistent. Explanations are provided, suggesting that the primary reason regarding the existence of such inconsistency is that neither transformational nor transactional leadership is sufficient in facilitating both *creativity* and *implementation* in innovation simultaneously. Therefore, in section 2.4, the concept of Ambidextrous Leadership (AL) is introduced, along with the originality and distinctive features associated with it. Through referencing

the integrative AL-Learning-Innovation model proposed by Rosing, Frese and Bausch (2011), it reveals that in comparison to the T/T leaderships, AL offers a better opportunity to address the *ambidexterity* that embedded in innovation process. In section 2.5, a critical review of AL-Innovation studies will be provided. Then research gaps in existing AL-Innovation literature will be identified. Subsequently, the overarching research question for this research will be proposed, indicating how the research gaps identified can be addressed in this study. Finally, in Section 2.6, a conclusion is given to summarize the key points in the overall literature review section.

2.2 Innovation

Innovation is one of the most intensely studied topics in various disciplines (Anderson, Potočník and Zhou, 2014; Crossan and Apaydin, 2010), though the analytical perspectives adopted by academics in approaching this concept, and its related studies, differ quite significantly from each other (Pavitt, 2005; Fagerberg, Mowery and Nelson, 2005; Kline and Rosenberg, 2005).

However, despite these disciplinary differences, it is still widely acknowledged by researchers that the Austrian economist Joseph Schumpeter is the founding father of modern innovation studies (Pol, and Carroll, 2006; Fagerberg, Mowery and Nelson, 2005). In his 1934 work, Schumpeter challenged the old wisdom that innovation often happens as exogenous phenomenon that happens external to socioeconomic system, and proposed that innovation actually happens as a result of active interactions between a wild arrays of actors (Schumpeter, 1934; Pol, and Carroll, 2006; Fagerberg, Mowery and Nelson, 2005; Kline and Rosenberg, 2005). This insight was then taken up by a group of pioneering economists in the development of their own work in explaining the

heterogeneity of innovation performances observed from different countries during the late 80's and early 90's (i.e., the "*National System of Innovation*" Lundvall (1992), the "*National Innovation Systems: A Comparative Analysis*" Nelson (1993) and the "*Technology Policy and Economic Performance: Lessons from Japan*" Freeman (1987)). Through adopting the institutional approach, these authors successfully revealed the significance of institutions, and its correlations, with respect to firms' and national economies' innovation performances (Pavitt, 2005; Kline and Rosenberg, 2005; Lundvall, 2010; Fagerberg, Mowery and Nelson, 2005). Taken together, their pioneering works also significantly contribute to the development of National System of Innovation (NSI) literature (Nelson and Rosenberg, 1993; Freeman, 1995; Kline and Rosenberg, 2005; Lundvall, 2010; Mowery, Nelson and Fagerberg, 2011). However, it is worth noting that although Lundvall (1992), Nelson (1993) and Freeman (1987) are often cited as the key authors in NSI literature, the perspectives adopted by these authors in envisaging the construct of NSI differ from each other quite significantly. A closer examination of their work revealed that, in Freeman's (1987) work, the focal points of the analysis are inter-firm relationship and, most importantly the central role of government institutions, with respect to a nation's innovation performance. Whereas, Nelson's (1993) research focused on the analysis on the interactions between firms, government and universities, in the development of new technology. More specifically, Freeman's (1987) work, mainly, discussed innovation from a relatively broad social-political perspective (i.e., the correlations between a country's innovation performance and the policies adopted by its government); whilst, Nelson's (1993) study analysed innovation in a much narrower sense (i.e., the approaches that can be adopted by different industrial sectors to enhance its own technological advancement) (Freeman, 1995; Lundvall, 2010; Mowery, Nelson and Fagerberg, 2011). In contrast to the other two authors, the perspective adopted by

Lundvall (1992) is, arguably, the most comprehensive one, as in his study, innovation is discussed with respect to institutional factors in broad terms, covering social, political, economic and organisational perspectives (Lundvall, 1992, p.12). Complementary to each other, these three authors successfully developed a NSI framework that explains the role of institutions and its impacts on innovation at national, regional and sector level (Fagerberg, 2004, p.9).

Additionally, their studies (especially those of Lundvall and Nelson) also successfully revealed that innovation is, fundamentally, a process of social and interactive learning between different actors (Lundvall, 1992; Lundvall, 2010; Nelson, 1993; Kline and Rosenberg, 2005; Mowery, Nelson, and Fagerberg, 2011). However, although Lundvall (1992) and Nelson (1993) revealing this insight, these authors restrained their discussions regarding this issue to inter-organisation level only, whilst leaving innovation and its corresponding learning process within organisations largely unexplored.⁴

Indeed, as pointed out by Pavitt (2005, p.87) and Fagerberg (2004), economists tend to concentrate on the incentives for, and the effects of, innovation from macro perspectives, whilst largely ignoring what happens in between. In contrast, managerial scholars are more interested in topics such as innovation management within organisations (Pavitt, 2005, p.87; Fagerberg, 2004, p.3). Therefore, given this research is primarily innovation management oriented (as elaborated in section 1.4), in the following part of this section, the review on innovation literature will be limited, mainly, to the field of management studies

⁴ As explained in Chapter 1, the primary goal of this research is to explore how senior managers' ambidextrous leadership can facilitate organisational innovations through the perspective of learning. In other words, learning is the analytical lens that employed, but not the primary focus, in this research. However, it is still worth noting that the argument that innovation is fundamentally a process of social and interactive learning (Lundvall, 1992; Nelson, 1993; Lundvall, 2010), along with similar arguments proposed by other academics, indeed enhanced the validity regarding the theoretical framework proposed in research. This will be further discussed in Chapter 3.

In the field of management studies, innovation often viewed as a critical source of competitive advantage for organisations (Betz, 2003; Damanpour and Wischnevsky, 2006; Gopalakrishnan and Damanpour, 1996; Leonard-Barton, 1995; Dess and Picken, 2000; Tushman and O'Reilly), and a key determinant for their long-term successes (Cohen and Levinthal, 1990; D'Aveni, 2010; Florida, 2002; Mone, McKinley and Barker, 1998; Mumford, et al., 2002; Taplin and Schymyck, 2005). Moreover, given the dynamism in the market environment nowadays, which can be characterised by externalities, such as the acceleration of technological advancement, and the intensification of market competition, innovation is now considered as a necessary condition for firms to grow, to be effective, and even to survive (Bledow, Frese and Anderson, 2009a, 2009b; Damanpour and Wischnevsky, 2006; Liao, Fei and Chen, 2007). And, the past few decades witnessed a proliferation of research papers, along with the development of numerous business rankings and indices that have all been dedicated to this concept (Crossan and Apaydin, 2010, p.1174).

However, despite the enthusiasm demonstrated by academics in the pursuit of innovation-related research, till so far, the field of innovation studies is still fragmented (Anderson, Potočnik and Zhou, 2014; Crossan and Apaydin, 2010). And, the variation of the results generated from innovation studies is beyond interpretation (Dapampour, 1991; Downs and Mohr, 1976). As indicated by Anderson, Potočnik and Zhou (2014), Crossan and Apaydin (2010), Garcia and Calantone (2002) and Gopalakrishnan and Damanpour (1996), in their systematic reviews on innovation studies, the primary causes that contributed to the fragmentation regarding the field of innovation studies are: first and foremost, the absence of a universally agreed definition of innovation, and the existence of a plethora of typologies used in the operationalisation of the concept in innovation-related studies.

Therefore, given that the nature of innovation studies is fragmented, the following section of the review regarding the concept of innovation will be organised as follows. Firstly, a brief review regarding the original definition of the concept proposed by Schumpeter (1934) will be presented, along with its critics. A shortlist follows that summarises the most often cited definitions of innovation in management studies, elucidating the fact that the concept of innovation is often defined by academics in an *ad hoc* basis to suit their own purposes. Nevertheless, through the comparison of these competing definitions, it will also be revealed that despite the distinctions between them, commonality can still be identified in these definitions. And, *Newness* is one of the elements that has commonly been embraced by all of them.

Then, different innovation typologies proposed by academics will be examined. It will be revealed, through contrasting these distinguished typologies, the perspective taken by researchers regarding *newness*, and as defined in these typologies, varies substantially. Moreover, the overlap regarding these distinguished typologies will also be identified. Given the proliferation of innovation typologies developed by scholars in past decades, the discussion will be limited to the three most often cited typologies regarding only the concept. Subsequently, in view of the fact that those definitions and typologies, proposed by academics regarding the concept of innovation, are not specific enough to provide precise guidance for reviewing extant literature on innovation studies, a third category will be introduced, distinguishing the process and outcome views of innovation. The key distinction between these two different perspectives will then be briefly introduced, and a brief conclusion will be provided, explaining the rationale for adopting the process view of innovation in this research. Finally, the two constituent elements of the innovation process, namely creativity and implementation, proposed in previous literature will be introduced. A brief discussion will then be presented, demonstrating the distinction

regarding these two elements, along with those conflicting activities required to facilitate them in the innovation process.

Moreover, Innovation is a concept that has been intensively studied by academics from quite diverse disciplines, such as economics, sociology, management, engineering and finance, each emphasising a different aspect of the term; however, in the following review, the definition of innovation will be limited solely to the discipline of management.

2.2.1 Definitions of Innovation

As suggested by Hansen and Wakonen (1997), the first definition of *innovation* was proposed by Schumpeter in the late 1920s, where the novelty aspect regarding this concept is stressed explicitly. According to Schumpeter, innovation can be defined as: “*a new good or a new quality of good; a new method of production; a new market; a new source of supply; or a new organisational structure*” (cf: Crossan and Apaydin, 2010, p.1155). In other words, as laid out by Crossan and Apaydin (2010, p.1155) innovation, by following its original definition proposed by Schumpeter, can be summarised as “*doing things differently*”. However, this relatively broad definition of innovation that was coined by Schumpeter (1934) was then challenged by Hansen and Wakonen (1997, p.350), as the according to the latter “*it is practically impossible to do things identically*”. Additionally, as further clarified by Crossan and Apaydin (2010, p.1155), following Schumpeter’s definition of innovation would inevitably lead to a situation where any change might be termed, by definition, as an innovation.

Subsequently, given the relatively all-encompassing feature regarding the definition of innovation proposed by Schumpeter (1934) during its inception, the concept is then redefined by academics from quite diverse perspectives. **Table 2-1** provides a summary for alternative definitions of innovation that are often cited by management researchers.

As suggested by some academics, despite the differences between these definitions, commonality can still be identified within them, and, *Newness* (or novelty), is one of the elements that can commonly be identified in these definitions (Johannessen, Olsen and Lumpkin, 2001; Kotsemir, Abroskin and Meissner, 2013; Garcia and Canlantone, 2002). However, despite the essentials of *newness* in the concept of *innovation*, this is unanimously acknowledged, dimensions (i.e., the referent, which refers *to who*, and the magnitude, which refers *to what extent*) adopted by researchers regarding the *newness*, defined in the concept of innovation, varies considerably (Anderson, Potočník and Zhou, 2014; Crossan and Apaydin, 2010; Garcia and Canlantone, 2002). Subsequently, numerous innovation typologies are then developed by innovation scholars, all emphasising different dimensions of *newness*, as will be presented in the following subsection.

Table 2- 1 Review of Innovation Definitions

Zaltman, Duncan and Holbek (1973)	An idea, practice, or material artefact perceived as new by the relevant unit of adoption.
Kline and Rosenberg (1986, p.275)	A highly uncertain process involves creation and marketing of the new.
West and Farr (1990, p.9)	The intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society
Damanpour (1991, p.556)	Adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization system, or a new plan or program pertaining to organizational members.
Lawson and Samson (2001, p.378)	The mechanism by which organizations produce the “new” products, processes and systems required for adapting to changing markets, technologies and modes of competition
Frankelius (2009, p.49)	Something new with high-level of originality, in whatever area that also breaks in to (or obtains a foothold in) society, often via the market, and mean something revolutionary for people.
Crossan and Apaydin (2010, p.1155)	Production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production, and establishment of new management systems. It is both a process and an outcome.

2.2.2 Innovation Typologies

Despite the fact that Schumpeter clearly positioned himself in the domain of the firm when envisaging the definition of innovation (Kotsemir, Abroskin and Meissner, 2013), and explicitly outlined its extent as covering the following three categories: product, process and business model (Anderson, Potočnik and Zhou, 2014; Boer and During, 2000; Van de Ven, 1986), the debate regarding innovation typologies continues amongst academics (Anderson, Potočnik and Zhou, 2014; Bledow, Frese and Anderson, 2009a, 2009b). Numerous typologies have been proposed and advanced by researchers since the inception of the concept (Crossan and Apaydin, 2010; Garcia and Calantone, 2002). Amongst these quite distinguished typologies, three of them, namely *administrative* and *technical* innovations, *product/service* and *process* innovations, and *radical* and *incremental* innovations, are most often adopted by academics in conducting innovation-related studies (Anderson, Potočnik and Zhou, 2014; Damanpour, 1991; Dodgson, Gann and Phillips, 2013; Fagerberg, Mowery and Nelson, 2005; Garcia and Calantone, 2002; Gopalakrishnan and Damanpour, 1997). Therefore, given the constraints on space and words in this thesis, the review and discussion on innovation typologies will be limited solely to these three most often cited typologies. In the following part of this section, each of the three innovation typologies will be briefly introduced. Then, the subjectivity, associated with the element of *newness* and how it is reflected in these innovation typologies, will be elaborated upon, along with any overlap across these three typologies.

2.2.2.1 Administrative and Technical innovations

According to Crossan and Apaydin (2010, p.1168), Damanpour (1987; 1991) and Evan (1968), in comparison to the remaining two innovation typologies, the distinction between administrative and technical innovation “*reflects a more general distinction between social structure and technology*”.

As posited by Dalton, Barnes and Zaleznik (1968), technical innovations are “*those that bring change to organisations by introducing change in the technology*” (cf: Damanpour, 1987, p.677). These occur in forms such as the use of new tools, techniques, devices and systems in organisations (Crossan and Apaydin, 2010; Damanpour, 1987, 1991; Gopalakrishnan and Damanpour, 1997), and introduce changes in “*products or services, or in the way those products are produced, or services rendered*” (Crossan and Apaydin, 2010, p.1168; Damanpour, 1987, p. 677). In other words, technical innovations in organisations might be summarised as: 1) involving the product, services, and production process technology; 2) pertaining to basic work activities; 3) concerning either product or process (Damanpour and Evan, 1984; Damanpour and Wischnevsky, 2006; Knight, 1967).

In contrast to technical innovation, administrative innovations in organisations introduce changes to its structure or administrative processes (Damanpour, 1991; Damanpour and Wischnevsky, 2006). On the contrary to the former, which is directly related to basic work activities, the latter is only indirectly related to such activities, and more immediately related to its management in organisations (Kimberly and Evanisko, 1981). As clarified by Evan (1966, p.51), administrative innovations are “*the implementation of an idea for a new policy pertaining to the recruitment of personnel, the allocation of resources, the structuring of tasks, of authority, of rewards*”. Additionally, as suggested by Damanpour (1991), administrative innovations are synonymous of two other types of innovation, namely, ‘*structure innovation*’

and ‘*people innovation*’, that were proposed by Knight (1967). However, given that the relevance regarding the latter two types of innovations to this research is not significant, they will not be considered further in this thesis.

2.2.2.2 Product and Process innovations

As posited by Wang and Ahmed (2004, p.304), in organisations, *product/service* innovation is “*the novelty and meaningfulness of new products introduced to the market in a timely fashion*”, with the intention of meeting the needs of customers or markets (Crossan and Apaydin, 2010; Damanpour, 1991). Whilst *process* innovations are the “*introduction of new production methods, or new management processes*” in organisations (Wang and Ahmed, 2004, p.305). More specifically, as further elaborated by Crossan and Apaydin (2010, p.1168) and Damanpour (1991, p.561), process innovations are “*new elements introduced into an organisation’s production or services’ operations*”. And the term *new element* embedded in this definition refers to “*input material, task specifications, work and information flow mechanisms, and equipment used to produce a product or render service*”, which are new to the organisation or its sub-units that undertake such innovations (Capon et al., 1992, p.160; Damanpour, 1991, p.561; Knight, 1967, p.482; Utterback and Abernathy, 1975, p.645).

As suggested by Gopalakrishnan and Damanpour (1997, p.18), the distinction between product and process innovations might be demonstrated through comparisons regarding the areas and activities that these two innovations affect. Process innovations are more related to the throughput technology (i.e. tools, devices, and knowledge), which mediate between inputs and outputs in production processes (Capon et al., 1992; Utterback and Abernathy, 1975; Rosenberg, 1982). In contrast, *product* innovations, as emphasised by Utterback and

Abernathy (1975, p.643), pertain to outputs or services that are introduced to serve the emerging needs of customers, or markets, by organisations.

Additionally, as elaborated by Crossan and Apaydin (2010, p.1168), the *referents*, regarding the element of *newness*, adopted in defining *product/services* and *process* innovations differ significantly. In the former, *newness* is defined from the following perspectives, such as to the organisation (Davila, Epstein and Shelton, 2006), to the customer (Wang and Ahmed, 2004), or to the market (Lee and Tsai, 2005). Whilst in the latter, *newness* is defined essentially from the firms' perspective, as it is considered as an internal phenomenon for organisations.

2.2.2.3 Radical and Incremental innovations

In addition to the aforementioned two typologies, the third most often adopted innovation typology categorises innovations through measuring *novelty* (which refers to the magnitude of *newness*) associated with them (Crossan and Apaydin, 2010; Damanpour, 1997; Ettlie, Bridges and O'keefe, 1984; Freeman and Soete, 1997). As specified by Crossan and Apaydin (2010, p.1168), Freeman and Soete (1997), and Tushman and Romanelli (1985), the *novelty* of innovation reflects the degree, or magnitude, of change it introduces to existing practices of an organisation. Therefore, through using this specific typology, innovations are then categorised into the following two categories, namely, *radical* and *incremental*⁵(Crossan and Apaydin, 2010; Damanpour, 1991; Damanpour and Wischnevsky, 2006; Ettlie, Bridges and

⁵ As a matter of fact, various categories of innovation radicalness have been developed by academics, such as variation vs reorientation innovations (Norman, 1971), routine vs non-routine innovations (Nord and Tucker, 1987), and ultimate vs instrumental innovations (Grossman, 1970), technological vs marginal (Tushman and Romanelli, 1985; Von Stamm, 2008), to name but a few. However, as demonstrated in meta-analysis of organisational innovation studies conducted by Damanpour (1991, p.561) and Crossan and Apaydin (2010, p.1168), reorientation and nonroutine and ultimate innovations are essentially radical innovations, whilst variation, routine and instrumental innovations resemble incremental innovation. Therefore, given the similarity of these innovation categories, the review on this specific innovation typology will be organised focusing on the discussion regarding the nature and distinctions between radical and incremental innovations only.

O'keefe, 1984; Tushman and Romanelli, 1985; Freeman and Soete, 1997; Gopalakrishnan and Damanpour, 1997).

As suggested by Tushman and Anderson (1986) and Meyer, Allen and Gellatly (1990), innovations that contain a high level of *novelty* are competence-destroying, which not only induces a significant increase of environmental uncertainty, but also results in the transformation of organisations or industries. In line with these arguments, a comprehensive definition of radical innovation was then coined by Gopalakrishnan and Damanpour (1997, p.18), defining radical innovations as innovations that “*induce fundamental changes in activities of an organisation or an industry, and represent clear departures from existing practices*”. In other words, radical innovations are characterised as the creation, or introduction, of a new type of product, service or technology that are totally new to organisations or even industries (Von Stamm, 2008).

In contrast to *radical* innovations, which are characterised by features such as competence-destroying and a clear departure from existing practices in organisations, the level of *novelty* associated with *incremental* innovations, are much less than in its counterpart (Crossan and Apaydin, 2010; Damanpour, 1991; Dewar and Dutton, 1986; Ettlie, Bridges and O'keefe, 1984). As incremental innovations are innovations that mainly reinforce the capabilities of organisations (Dewar and Dutton, 1986; Henderson and Clark, 1990; Ettlie, Bridges and O'keefe, 1984), which “*merely call for marginal departure from existing practices*” in it (Gopalakrishnan and Damanpour, 1997, p.18). More specifically, it refers to a continuous stream of incremental improvement or adaptations to the status quo of the organisation's operations and management (Tushman and Romanelli, 1985; Von Stamm, 2008).

As demonstrated in preceding discussions, despite the fact that these three innovation typologies are most frequently adopted by academics in innovation studies (Crossan and

Apaydin, 2010; Gopalakrishnan and Damanpour, 1997), clear distinctions amongst these typologies are yet to be achieved (Anderson, Potočnik and Zhou, 2014; Crossan and Apaydin, 2010; Damanpour, 1991; Gopalakrishnan and Damanpour, 1997; Garcia and Calatone, 2002). For instance, as pointed out by Crossan and Apaydin (2010) and Tushman and Romanelli (1985), *process* innovations are often closely related to *incremental* innovations; whilst *product* innovations can be either *incremental* or *radical* innovations, depending on the level of novelty associated with them. Moreover, by referring to definitions provided in Sections 2.2.2.1 and 2.2.2.2, both product and process innovations are covered under the category of technical innovations (Crossan and Apaydin, 2010; Gopalakrishnan and Damanpour, 1997). Subsequently, as observed by Garcia and Calatone (2002, p.117) *the bouncing point of view of newness, creates distinctive, unique studies that never achieve the status of 're'-search in innovation studies.*

Given the problems associated with the definitions and typologies developed regarding the concept of innovation, a relatively new perspective in analysing the concept will be adopted in this research, so that unnecessary ambiguity might be avoided in the subsequent part of this thesis. In the following subsection, the new perspective is adopted, the process view, along with its counterpart, the outcome view, of innovation (Anderson, Potočnik and Zhou, 2014; Cooper, 1998; Crossan and Apaydin, 2010; Gopalakrishnan and Damanpour, 1997; Kotsemir, Abroskin and Meissner, 2013), will be introduced first. Then, the rationale for adopting this specific view of innovation, in this research, will be explained.

2.2.3 Distinguishing Process view with Outcome view of Innovation

Although *innovation* is specified as an outcome in its initial conceptualisation by Schumpeter (1929, 1934) (cf: Kotsemir, Abroskin and Meissner, 2013, p.7), such commitment is not universally embraced by innovation scholars. Subsequently, views held now by researchers regarding the concept of innovation differs significantly, covering the *process* view (Damanpour, 1991; Lawson and Samson, 2001; Kline and Rosenberg, 1986; West and Farr, 1990; Zaltman, Duncan and Holbek, 1973), the *outcome* view (Aragón-Correa, García-Morales and Cordón-Pozo, 2007; Jansen, Vera and Crossan, 2009; He and Wong, 2004), and the view that considers it as both (Crossan and Apaydin, 2010).

As posited by Copper (1998), Gopalakrishnan and Damanpour (1997) and Kotsemir, Abroskin and Meissner (2013), these two distinguished views of innovation may be summarised as follows:

- the *process* view represents emphasis on the details of the innovation process and how changes are encouraged and eventually occur in organisations;
- the *outcome* view gives emphasis on innovation as a result, event, or a discrete product which is characterised by *newness* (novelty).

Following this line of argument, Anderson, Potočník and Zhou (2014) and Crossan and Apaydin (2010), suggested that the distinction between these two distinguished views might best be captured with regard to specific types of questions they are aiming to address in their innovation studies. Studies pertaining to viewing innovation as an outcome focused on the *what* question and often operationalised innovation with objective measures, such as patterns. In contrast, studies relating to innovation as a process addressed the *how* question, aimed at revealing the complex nature associated with the innovation processes (Crossan and Apaydin,

2010, p.1166). Moreover, as pointed out by Crossan and Apaydin (2010, p.1167), in the field of innovation studies, “*the main focus of scholars is on innovation as an outcome*”, whilst leaving the process view of *innovation* significantly under-developed. In a similar vein, as stated by Anderson, Potočnik and Zhou (2014, p.1319), the dominance of the *outcome* view held by academics in innovation studies has resulted in “*a quite notable paucity of research exploring the process inherent in innovation, in comparison with the plethora of studies evaluating the multitude of so-called antecedent factors to innovation*”.

In this research, the process view of innovation will be adopted, and the rationale for adopting this specific analytical perspective are twofold. Firstly, by referring to preceding discussions, the process view offers a better opportunity for this study to address the overarching *how* research question as proposed in section 1.3. Furthermore, the adoption of this view enables the study to contribute to the accumulation of knowledge regarding the complex nature that is associated with innovation.

In the following subsection, some general definitions of innovation, as process, will be introduced. Then, the two constituting elements of innovation process, namely creativity and implementation will be introduced. Finally, the *ambidexterity* associated with innovation processes will be discussed.

2.2.4 Creativity-Implementation and Ambidexterity in Innovation Processes

Despite the dominance of the outcome view in innovation studies, previous research has already suggested that innovation is fundamentally a social-psychological process (Angel and Van de Ven, 2000; Axtell et al., 2000). For instance, Aiken and Hage (1971, p.64) define innovation as “... *the generation, acceptance, and implementation of new ideas, processes,*

products, or services.... for the first time within an organization setting". In a similar vein, West and Farr (1990, p.9) view innovation as "*the intentional introduction and application within a role, group, organisation of ideas, processes, products or procedures, new to the relevant unit of adoption*". Furthermore, as observed by Rasul (2003), innovation is "... *the process whereby ideas for new (or improved) products, processes or services are developed and commercialized in the marketplace*" (cf: Kotsemir, Abroskin and Meissner, 2013, p.6).

As revealed in previous research, innovation as a process can be viewed as constituted by the following two elements, *creativity* and *implementation* (Amabile, 1988; Staw, 1990; Unsworth, 1999; Unsworth and West, 1998; Van de Ven, 1986; West, 2002; Wolfe, 1994). In this highly conceptualised construction of an innovation process proposal, *creativity* is defined as the generation or adoption of original and useful ideas (Amabile, 1996; Mumford et al., 2002; Unsworth, 1999; Unsworth and West, 1998; Van de Ven, 1986; West, 2002), whilst *implementation* refers to the application of these original and useful ideas that are generated or adopted, within organisations (Axtell et al., 2002; Van de Ven, 1986; West, 2002). In other words, innovation is more than simply introducing, generating, or adopting creative ideas that are new to the adopting unit, as without being successfully implemented, the transformation of these ideas into final innovation results will be unattainable (Axtell et al., 2002; Lewis et al., 2002; Bledow, Frese and Anderson, 2009a, 2009b; Rosing, Frese and Brausch, 2011; West, 2002). However, as suggested by Amabile (1996), Axtell et al. (2002), Bledow, Frese and Anderson (2009) and Crossan and Aapydin (2010), *creativity* and *implementation* represent fundamentally different and even opposing, but also interrelated, processes in innovation. Moreover, *creativity* and *implementation* in the innovation process comprise different sets of activities that are linked to very different requirements (Amabile, 1996; Bledow, Frese and Anderson, 2009a; Rosing, Frese and Bausch, 2011). Additionally, they are facilitated by

fundamentally different, and quite often contradicting, activities and conditions in organisations (Amaible, 1996; Mumford et al., 2002; Sun and Anderson, 2010; Vera and Crossan, 2004).

2.2.4.1 Creativity and Implementation

Creativity

As revealed in previous research, *creativity* requires employees' endeavouring to think "outside of the box", and to go beyond common assumption (Andriopoulos and Lewis, 2009). According to Bledow, Frese and Muller (2011) and Rosing, Frese and Bausch, (2011), *creativity* is closely linked to exploration learning as proposed by March (1991). Moreover, it is often facilitated with people-oriented leader behaviours demonstrated by managers, such as granting autonomy to employees (Amaible, 1996; Mumford et al., 2002; Shalley, Zhou and Oldham, 2004).

Implementation

According to Andriopoulos and Lewis (2009), *implementation* requires efficiency and goal orientation that are linked to exploitation learning as defined by March (1991). As revealed by Amaible (1996) and Keller (2006), *implementation* in the innovation process is often promoted by task-oriented behaviours, such as emphasising deadlines, pre-set goals, etc., that are demonstrated by leaders.

Moreover, as revealed by Bledow, Frese and Muller (2011, p.308), "*the maximisation of factors that facilitate the development of new ideas is likely to simultaneously cause conditions that may inhibit idea implementation and thus innovation overall*", and vice versa.

Given the features associated with *creativity* and *implementation*, along with a linkage to exploration and exploitation, Bledow, Frese and Anderson (2009a) then proposed that Ambidexterity is a central feature in the innovation process.

2.2.4.2 Ambidexterity and Innovation Processes

Ambidexterity

Ambidexterity literally means the ability to use both hands equally well. As revealed from previous researches, Duncan (1976) was the first to use the term *ambidexterity* in organisation studies (Raisch and Birkinshaw, 2008; Gibson and Birkinshaw, 2004; Mom, Van Den Bosch and Volberda, 2009; O'Reilly and Tushman, 2013). However, as pointed out by Raisch and Birkinshaw (2008, p.375), despite Duncan (1976) being the first to use the term organisational ambidexterity, *“it is March’s (1991) landmark article that has frequently been cited as the catalyst for the current interest in the concept”*.

In his 1991 article, March (1991) proposed that exploration and exploitation are two fundamentally different learning activities on which firms divide their attention and resources (cited from Raisch and Birkinshaw, 2008, p.375). As explained by the author, exploration pertains to variance seeking, experimentation, alternative searching, and risk taking, whereas, exploitation involves variance reduction, adherence to rules, efficiency and risk avoidance (March, 1991, p.71). Subsequently, given the differences between them, exploration and exploitation may often requires fundamentally different organisational strategies, structures and contexts (Ancona et al., 2001; Floyd and Lane, 2000; Levinthal and March, 1993; March, 1991). Therefore, early researches often claim that it is impossible to address efficient exploitation and effective exploration simultaneously in organisations (i.e., Hannan and Freeman, 1977; McGill, Slocum and Lei, 1992; Miller and Friesen, 1986). Consequently, a

large number of organisational and management theories were developed focusing on the discussion regarding the trade-off that need to made by organisations in between exploration and exploitation (Burns and Stalker, 1961; Denison, Hooijberg, and Quinn, 1995; Ghemawat and Ricart Costa, 1993) (cited from Raisch and Birkinshaw, 2008, p.378).

However, this specific view is then challenged by March. In his paper, the author conversely argued that organizations need both exploitation and exploration not just one of them (March 1991). As explained by the author, the sole focus on exploitation may be able to benefit firms in the short run, but it also can create a competency trap (Leonard-Barton, 1992) that jeopardise firms' capabilities in responding to environmental changes (March, 1991; Leonard-Barton, 1992). Conversely, although exploration enables organisations to renew its knowledge reserve continuously, excessive exploration may also lead organizations into an endless cycle of search without generating any rewarding change (Volberda and Lewin, 2003; Raisch and Birkinshaw, 2008). Therefore, March (1991) subsequently proposed, in order to be successful, firms need both exploration and exploitation, in other words, to be ambidextrous (Eisenhardt, 2000; Lewis, 2000). Following this line of argument, Levinthal and March (1993, p.105) further concluded, in order to achieve success in the long run, firms need to *“engage in enough exploitation to ensure the organization's current viability and to engage in enough exploration to ensure future viability”*.

Inspired by March's (1991) argument that firms need to be ambidextrous so as to secure long-term success, the research focus in the field of organisational studies subsequently shifted from the trade-off view (either/or) to paradoxical thinking (both/and) (Eisenhardt, 2000; Raisch and Birkinshaw, 2008; Lewis, 2000). And, the importance of balancing seemingly contradictory tensions, along with the concept of ambidexterity, has then became topical issues amongst academics from various disciplines, such as organisational studies, innovation

and strategic management (Tushman and O’Riley 1996; Lewis, 2000; Benner and Tushman, 2003; Raisch and Birkinshaw, 2008). Moreover, different analytical perspective are then deployed by academics in their analyses regarding the concept of ambidexterity.

As suggested by Birkinshaw and Gibson (2004, p.209), in early organisational and management studies, ambidexterity is often addressed in the structural term. For instance, Duncan (1976) proposed that in order to be ambidextrous, organisations should adopt the “dual structure” design, in which certain business units focus on alignment (exploitation), while others concentrate on adaptation (exploration). As summarised by Gibson and Birkinshaw (2004, p.209), this specific proposition developed by Duncan (1976) refers to the *structural ambidexterity*. However, as pointed out by Gibson and Birkinshaw (2004, p.209) this specific proposition is quite problematic as it actually failed to explain the phenomenon that *desired balance of conflicting demands are actually achievable within a single business unit*. In light of this deficit identified, Gibson and his colleague proposed a new concept: *contextual ambidexterity*, and defined it as *behaviour capacity to simultaneously demonstrate alignment and adaptability across an entire business unit* (Gibson and Birkinshaw, 2004, p.209). Moreover, as argued by the authors, in order to be ambidextrous, the imperative for organisations is to develop *contextual* rather than *structural ambidexterity* (Gibson and Birkinshaw, 2004).

Nevertheless, despite diversified terms proposed with respect to the concept of *ambidexterity*, its core remains intact in management and organisational studies (Bledow, Frese and Muller, 2009a; Benner and Tushman, 2003; Raisch and Birkinshaw, 2008; Tushman and O’Reilly, 1996; Volberda, 1996). As revealed by Raisch and Birkinshaw (2008)⁶ in their review

⁶ According to Raisch and Birkinshaw (2008), the concept ambidexterity has been adopted by management scholars to describe quite distinguished phenomena, such as incremental vs radical innovation, continuity vs change, induced vs autonomous organisational strategies, and organic vs. mechanical organisational structures.

regarding the concept of *ambidexterity* and its connotations, the key feature of *ambidexterity* in these studies is the integration of conflicting or even contradictory activities, strategies or features in organisations.

The concept of *ambidexterity* has also successfully attracted large group of audience in the field of innovation studies. For instance, by explicitly linking exploration to radical innovation and exploitation to incremental innovation, Birkinshaw, Hamel and Mol (2008) argued that, in order to achieve long-term, survival and development, organisations need to engage both *radical* and *incremental* innovations. Similar arguments have been proposed by a large group of academics such as Benner and Tushman (2003), Birkinshaw and Gibson (2004), Lavie, Stettner and Tushman (2010), and Tushman and O’Riley (1996), to name a few.

However, as pointed by Andriopoulos and Lewis (2009, p.696), given *ambidexterity* is a relatively new term in innovation studies, related discussions are quite limited and largely conceptual. Moreover, as elaborated by the authors, although *achieving exploration and exploitation enables success, it also raises challenging tensions* (Andriopoulos and Lewis, 2009). And, according to them, this topic has been largely overlooked in previous studies (Andriopoulos and Lewis, 2009, p.696). This argument may be valid, but only in a quite limited scale. In fact, although indeed largely conceptual, the discussions of tensions has been an ongoing theme in organisational and management studies with respect to the concept of ambidexterity (Raisch and Birkinshaw, 2008; Raisch et al., 2009; O’Reilly and Tushman, 2013). As elaborated in previous paragraphs, early organisational researches propose that organisations can mediate tensions associated with its’ simultaneous pursuit of exploration and exploitation through the adoption of dual structural design (the *structural ambidexterity*) (Duncan, 1976; Tushman and O’Reilly, 2002). However, as suggested by Gibson and Birkinshaw (2004), the structural ambidexterity approach is flawed as it failed to address that,

in real world, a single business unit may also need to engage exploration and exploitation simultaneously. Subsequently, in order to address this issue, Gibson and his colleague (2004) proposed that, it is the *contextual*, but not *structural*, *ambidexterity* that can significantly mediate tensions associated with firms' simultaneous pursuit of both exploration and exploitation. In their attempt to develop the construct of *contextual ambidexterity*, Gibson and his colleague (2004) borrowed heavily from the organisational context literature, and particularly, Ghoshal and Bartlett's (1994) frame work for organizational effectiveness. In their frame work, Ghoshal and Bartlett (1994, p.104) proposed the following four context elements, namely, discipline, stretch, trust and support, as the key determinants of organisational effectiveness. As suggested by the authors, discipline and stretch enables the generation of initiatives by individuals, whereas trust and discipline promotes the cooperation amongst them within organisations (Ghoshal and Bartlett, 1994). Therefore, as concluded by Ghoshal and Bartlett (1994, p.108), in order to enhance organisational effectiveness, managers need to promote the development of all the four context elements within organisations. However, as pointed out by Gibson and Birkinshaw (2004, p.213), despite Ghoshal and his colleague successfully revealing the importance of supportive environment (the co-existence of the four context elements), the latter failed to explore how can this supportive environment facilitate the contextual ambidexterity in organisations. Thus, extending from Ghoshal and Bartlett's (1994) frame work, Gibson and Birkinshaw (2004, p.214) proposed that discipline and stretch can significant enhance exploitation, whereas support and trust can remarkably boost exploration in business units. Subsequently, as concluded by Gibson and Birkinshaw (2004), the co-existence of discipline, stretch, trust and support results in *contextual ambidexterity* that can significantly mediate tensions associated with exploration and exploitation.

Ambidexterity in the Innovation process

As pointed out by several academics, the discussion of *ambidexterity* in innovation studies has predominantly focused on issues such as how organisations can simultaneously pursue different types, but equally important, innovations (i.e., radical and incremental innovations) (Lavie, Stettner and Tushman, 2010; Raisch and Birkinshaw, 2008). Whilst leaving the topic such as the *ambidexterity* (the linkages between *creativity* and *implementation*, along with exploration and exploitation) within innovation process itself systematically overlooked (Bledow, Frese and Muller, 2011; Rosing, Frese and Bausch, 2011).

Moreover, as contested by Bledow, Frese and Anderson (2009a) and Gupta, Smith and Shalley (2006), the dichotomous⁷ view regarding the concept of *ambidexterity* as observed in previous studies is quite problematic, as it fails to address the possibility that these contradicting activities are potentially reconcilable. Subsequently, the dialectic view⁸ is then introduced by Bledow, Frese and Anderson (2009a, p.309) in interpreting the *ambidexterity* associated with innovation. By referring to the dialectic view, Bledow, Frese and Muller (2011) further suggested exploration and exploitation, in the innovation process, should be perceived as thesis and antithesis that can be integrated into a higher order synthesis that combines aspects of both.

This specific argument proposed by Bledow and his colleagues (2009a) is further echoed by Rosing, Frese and Bausch, (2011). According to the latter, despite *creativity* and *implementation* comprising fundamentally different activities, *creativity* also requires

⁷ As suggested by Bledow, Frese and Anderson (2009a), the dichotomous view suggests exploration and exploitation are the two ends of a continuum, which are mutually exclusive and irreconcilable. Whilst in Gupta, Smith and Shalley, (2006), this specific view of exploration and exploitation is termed as a paradox.

⁸ As suggested by Bledow, Frese and Anderson (2009a, p.311), at the most abstract level, the formula of thesis, antithesis, and synthesis describes the process of ongoing negation central to dialectic reasoning. The synthesis that resolves the opposition of thesis and antithesis already contains a new dialect process; It becomes the next thesis that results in another antithesis, which can again be developed into a higher form of synthesis.

exploitation, whereas *implementation* also calls for exploration. In other words, the exploitation of existing knowledge is necessary for creative ideas to be generated by employees in the innovation process (Bledow, Frese and Anderson, 2009a; Rosing, Frese and Bausch, 2011). Similarly, new methods or routines may have to be explored so as to facilitate the *implementation* of new ideas in the innovation process. This specific feature indicates exploration and exploitation are important for both *creativity* and *implementation* (Bledow, Frese and Anderson, 2009a; Rosing, Frese and Bausch, 2011; Zacher, Robinson and Rosing, 2016), “*even if creativity is linked more closely to exploration, and idea implementation more closely to exploitation*” (Rosing, Frese and Bausch, 2011, p.966). Subsequently, as concluded by Rosing, Frese and Bausch, (2011, p.966) *innovation requires ambidexterity*. This argument is further acknowledged by Anderson, Potočnik and Zhou (2014) and Probst, Raisch and Tushman, (2011).

In the following section, the relationship between leadership and innovation proposed in extant literature will be reviewed. Both theoretical and empirical papers will be covered. Through consulting relevant literature, it will be revealed, despite the proliferation of leadership-innovation studies, that the relationship between established leadership styles and innovation are yet to be determined.

2.3 Leadership and Innovation

Leadership is one of, if not the, most examined phenomena in social science (Antoakis and Day, 2017, p.4). However, given the complex nature of leadership, a specific and widely accepted definition regarding the concept is yet to be achieved amongst academics (Day and

Antoakis, 2012). This phenomenon is best captured by the following statement postulated by Fiedler (1971, p.1):

“there are almost as many definitions of leadership as there are leadership theories - and there are almost as many theories of leadership as there are psychologists working in the field”.

Nevertheless, the absence of a specific and widely accepted definition regarding the construct of leadership has not constrained scholars’ enthusiasm in incorporating this construct into their innovation-related studies. As revealed in previous research, leadership is considered as one of the most influential predictors for innovation (Jansen, Vera and Crossan, 2009; Manz et al., 1989; Mumford et al., 2002; Yukl, 2009). The significance of leadership in the facilitation of innovation can be best reflected through the statement articulated by Crossan and Apaydin (2010). According to the authors, *the role of leadership at all levels of an organisation, although sometimes tacit, is paramount for spearheading innovation as a process and maintaining its momentum until innovation as an outcome ensues* (Crossan and Apaydin, 2010, p. 1155-1156).

In this section, the relationship between leadership and innovation will be reviewed. Relevant leadership styles will first be considered, in order that the distinguishing features associated with them, might be clarified. Then, through reference to extant literature, the relationships between these leadership constructs and innovation will be explored. It will reveal the empirical findings regarding the correlations between these established leadership styles and innovations that are far from consistent. Explanations will be provided suggesting these leadership styles are capable in facilitating either the *creativity* or *implementation* in innovation but not both.

2.3.1 Transformational and Transactional Leadership

2.3.1.1 Transactional Leadership

Prior to the introduction of *transformational* leadership by Bass (1985), who built his work on Burns (1978) and House (1977), the dominant paradigms in the field of leadership studies were transactional (Antoakis and Day, 2017), which “*focused on the mutual satisfaction of transactional obligations*” (Day and Antoakis, 2012, p.11). As suggested by Bass (1999), transactional leaders established exchange-based relationships with their followers, and clarified expectations and goals for the latter. They monitored the performances of their followers, rewarding them for meeting these expectations and performance goals, and punished them for not doing so (Podsakoff, Todor, and Skov, 1982; Bass and Avolio, 1990; Barling, Slater and Kelloway, 2000; Bass et al, 2003). According to Bass (1985, 1998), Avolio et al., (1999) and Judge and Piccolo (2004), transactional leadership is composed of the following two components: contingent reward and management by exception.

- Contingent reward

As clarified by Bass (1985, 1990), Howell and Avolio (1993) and Yukl and Michel (2006), contingent reward refers to leaders’ activities in clarifying the expected levels of performance to their followers, and, providing reward to the latter once these expectations are met.

- Management by Exception

Management-by-exception involves leaders’ specification of the cause of performance failure, constant monitoring of deviance and mistakes, and the punishment for non-compliance to their followers (Bass et al., 2003; Yukl and Michel, 2006; Sun and Anderson, 2012).

In general, the transactional leaders operate within an existing framework, avoid risk taking and emphasise time constraints, standards and task-oriented objectives (Bass and Avolio, 1993). In addition, they rely on rewards and punishment to promote task completion and followers' compliance.

2.3.1.2 Transformational Leadership

In contrast to transactional leadership, which can be characterised by leaders' activities such as focusing on immediate goals or performance achievement of employees, transformational leadership focuses on transcendent and far-reaching goals and ideas (Day and Antonakis, 2012, p.263). The transformational leaders inspire followers by broadening and elevating followers' goals, empowering followers by fulfilling their personal needs and promoting their personal development (Bass, 1985). Such leadership generates emotional links between leaders and followers, engages personal interest in the collective mission and interest, inspires followers' intrinsic initiatives in innovation, and in turn promotes performance beyond original expectations (Shamir, House, and Arthur, 1993; Bass, 1999; Jun, Chow and Wu., 2003).

According to Bass and Riggio (2006) the overall construct of transformational leadership can be categorised into the following four sub-categories (Four Is): Idealised Influence (or charisma, II), Inspirational Motivation (IM), Intellectual Stimulation (IS), and Individualised Consideration (IC).

- Idealised Influence (Charisma):

By referring to its original definition, idealised influence represents the emotional component of transformational leadership, such as the followers' trust, admiration and showing respect

to leaders (Bass, 1985; Day and Antonakis, 2012). And it is '*used to describe leaders who by the power of their personality have profound and extraordinary effects on their followers*' (Bass, 1985, p.35). Therefore, in theory, followers will indulge these leaders by committing their loyalty and devotion, as well as a demonstration of their willingness to give up their personal interests when they diverge from those held by their leaders (Bass, 1985, 1990; Oke, Munshi and Walumbwa 2009; Day and Antonakis, 2012).

Additionally, idealised influence can also be exemplified with leaders shifting their followers' goals from a relatively low level, such as the pursuit of personal safety, to a higher level such as self-fulfilment (Bass, 1998, p.41). This is mainly achieved through the provision of a shared vision and purpose by these leaders to their followers, who consider these leaders as their role models (Bass, 1998; Bass and Avolio, 2000).

According to Avolio and Bass (1991), charisma was the name that had been adopted initially to categorise a) leaders' successful communication of visions that promises a desirable future to their followers, and b) the consequent creation of emotional attachments between leaders and their followers. However, due to the fact that the use of the word 'charisma' may lead to the excessive connotation of idolisation, a more neutral term, 'idealised influence', was then adopted to emphasise the idealised perspective of the influence that leaders can project to their followers (Avolio, Waldman and Yammarino, 1991).

- Inspirational Motivation

Inspirational motivation represents activities or behaviours that the leader engages in, or demonstrates, in order to inspire and motivate his/her followers to think of novel ideas or opportunities, or to reach goals that had previously been deemed unachievable (Bass, 1985, 1990), or to solve problems creatively (Kanter, 1988).

As elucidated in the *Pygmalion effect* (Rosenthal and Babad, 1985; Eden, 1988; Bass, 2009), leaders' positive expectations can positively influence their follower's performance. This means leaders' can elevate their followers' level of inspiration and motivation by demonstrating confidence in them. Additionally, by anticipating that followers are capable in achieving challenging goals, and showing unshakeable belief that the desired outcome will occur, leaders can inspire their followers to realise a performance beyond expectation, along with the occurrence of a self-fulfilling prophecy to the latter (Day and Antonakis, 2012, p.266). Although both inspirational motivation and idealised influence resonates the “charismatic” perspective of the transformational leader (Bass and Avolio 1994; Bono and Anderson, 2005), the key difference between inspirational motivation and the idealised charismatic effect is, in comparison to the latter, the former *‘employs or adds non-intellectual, emotional qualities to the influence process’* (Bass, 1985, p.63).

- Intellectual stimulation

In comparison with the other member of the ‘Four Is’, intellectual stimulation is the one that is the most “rational” and “non-emotional” (Day and Antonakis, 2012). This factor represents leaders' capabilities to motivate their followers to question their long-held assumptions by creating *‘problem awareness and problem solving, of thought and imagination, and of beliefs and values’* (Bass, 1985, p.99), and eventually the adoption of new ways of approaching old situations by followers (Oke, Munshi and Walumbwa 2009).

Further, as noted by Bass (1985) that the most noteworthy impact of the deployment of intellectual stimulation by transformational leaders is the significant alteration of their *‘followers’ conceptualisation, comprehension, and discernment of the nature of the problems they face, and their solutions’* (Bass, 1985, p.99). Due to the fact that individuals are quite

predisposed to the limitation of their own cognitive and psychological paradigm, especially during the process of problem solving, they are inclined to give goal achievement a higher priority than the exploration of new and novel ways of problem solving (Levinthal and March, 1993). Therefore, Intellectual stimulation, which is aimed at challenging a follower's long-held presumptions and stereotypes, is the most relevant facet of transformational leadership in stimulating followers to seek improvement from their current performance level (Day and Antonakis, 2012, p.267).

- Individualised Consideration

As stated by Bass (1985, p. 83), by defining this component as the provision of '*individualised attention and a developmental or mentoring orientation*' towards followers, individualised consideration enables transformational leaders to: 1) provide socio-emotional support to followers, 2) facilitate the development of their followers' potential to the highest level and 3) empower them. This is mainly achieved by leaders' consistency in providing coaching and counselling to their followers through frequent contact (Bass, 1985; Bass and Avolio, 1993; Day and Antonakis, 2012).

Additionally, as revealed by Bass and Avolio (1993) and Seltzer and Bass (1990), the distinction between "individualised consideration" and "leader consideration", a term proposed by Stogdill and Coon (1957), is well worth noting. The former emphasises the leaders' engagement in coaching and mentoring activities to provide support for their followers to pursue development, achievement and growth. Whilst the latter only highlights the friendly and approachable perspective of a leader (Day and Antonakis, 2012).

The "Four Is" construct of transformational leadership has been examined by several empirical studies (Keller, 1992; Lowe, Kroeck and Sivasubramaniam, 1996; Nijstad, Berger-

Selman and De Dreu, 2014). For example, Keller (1992) conducted a longitudinal study on 462 professionals from 166 project groups in three industrial R&D organisations. The results indicate that intellectual stimulation, inspirational motivation and individualised consideration contribute to effective leadership (Keller, 1992). Transformational leadership is more effective regarding well-educated and challenge-oriented followers (Hater and Bass, 1988). In general, transformational leadership tends to bind people to a collective mission through self-reinforcing behaviours as a result of task successes and reliance on intrinsic rewards. This type of leadership is theoretically correlated with organisational cultures and structures that facilitate risk-taking and innovative activities (Bass, 1985; Bass and Avolio, 1993). The intellectual stimulation, inspirational motivation and individualised consideration components of transformational leadership alleviate both structural and human inertia and foster a culture that is innovation-friendly (Keller, 1992). Hence, it suggests that transformational leadership is better, in comparison with the transactional leadership, at stimulating and transmitting technical innovations and enhances organisational innovation performance (Bass and Avolio, 1994; Bass, 1999; Atwater and Spangler, 2004).

Moreover, despite the fact that transformational and transactional leadership are generally viewed as distinct leadership styles, they are actually more likely to be two ends of a spectrum rather than polar opposites (Bass, 1985, 1998; Judge and Piccolo, 2004; Rosing, Frese and Bausch, 2011). However, due to the predominance of the adoption of the dichotomous view in leadership-innovation studies (Bledow et al., 2006, Rosing, Frese and Bausch, 2011), transformational and transactional leadership have been predominantly utilised as polar opposites in both theory building and empirical testing over previous decades.

2.3.2 The Relationship between T/T Leaderships and Innovation

2.3.2.1 Transactional Leadership and Innovation

Studies that looked at the relationship between transactional leadership and innovation are quite limited, and, research findings generated from these studies vary significantly (Bledow, Frese and Anderson, 2009a, 2009b; Rosing, Frese and Bausch, 2011).

In an experimental study conducted by Sosik and his colleagues (1997), a positive relationship has been identified between transactional leadership and innovation. However, research findings identified by Amabile (1998) suggest otherwise. As revealed by Amabile (1998), transactional leadership is negatively associated with *creativity* in the innovation process. Similar findings have also been proposed by Lee (2008), demonstrating the relationship between transactional leadership and employees' *creativity* being the inverse. As suggested by these authors, in explaining the negative correlation found between transactional leadership and innovation, features such as the emphasis on compliance and task-oriented focus, associated with transactional leadership, significantly prohibits employees' willingness to generate creative ideas (Amabile, 1998; Lee, 2008). However, this specific view was then challenged by Jansen and his colleagues (2009). According to Jansen, Vera and Crossan (2009), the results, revealed in their empirical study, indicate a positive relationship between transactional leadership and innovation in organisations, albeit this is not particularly significant. Moreover, Dayan, Benedetto and Colak (2009) observed a positive relationship between transactional leadership and a firm's R&D performance (*creativity*), but similar results were not found regarding the relationship between transactional leadership and the *implementation* of creative ideas in the innovation process.

2.3.2.2 Transformational Leadership and Innovation

Contrary to the limited attention given by academics to transactional leadership, transformational leadership is by far the most intensively examined leadership style, in innovation-related studies (Dodgson, Gann and Phillips, 2013; Fagerberg, Mowery and Nelson, 2005; Jansen, Vera and Crossan, 2009; Rosing, Frese and Bausch, 2011). Moreover, transformational leadership is often proposed by academics as a positive force in facilitating innovation in organisations (Jansen, Vera and Crossan, 2009; Sun and Anderson, 2010; Vera and Crossan, 2004). As a matter of fact, results generated from most empirical studies reconcile with these propositions. For instance, using data collected from 53 electronic and telecommunication companies based in Taiwan, Jung, Wu and Chow (2008) revealed that the senior managers' transformational leadership style directly enhanced their firms' innovation performance through increasing employees' *creativity*. Furthermore, through analysing data collected from 168 Spanish firms, covering both chemical and manufacturing industries, García-Morales, Jiménez-Barrionuevo and Gutiérrez-Gutiérrez (2008) proved, empirically, that the firms' senior executives' transformation leadership, both directly and indirectly, enhanced the innovation performance via organisational learning. Similar results were also obtained by Aragón-Correa, García-Morales and Cordon-Pozo (2007), Avolio et al., (2004), Jansen, Vera and Crossan, (2009), Jung, Wu and Chow (2008), and Noruz et al., (2013). According to these authors, transformational leadership is positively associated with the employees' *creativity* in the innovation process. However, in their research, they also acknowledged that the relationship between transformational leadership and the *implementation* of innovation is not addressed.

Moreover, previous research also acknowledges the existence of the negative correlations between transformational leadership and innovation. For instance, Jaussi and Dionne (2003)

identified transformational leadership as being negative when correlated to employees' *creativity* and group innovation performance. In a similar vein, Eisenbeiss, van Knippenberg, and Boerner (2008) suggested that managers' engagement in transformational leadership is negatively associated with team innovation performance.

Subsequently, as concluded by Bledow, Frese and Anderson (2009a) findings regarding the relationship between transformational leadership and innovation from previous research are far from consistent. This specific point is further echoed by Rosing and her colleagues (2011) in their review of the extant literature regarding the impact of transformational leadership in organisational innovations. According to Rosing, Frese and Bausch (2011), despite the positive relationship between the two constructs being generally supported, the significance associated with such relationships varies remarkably, ranging between -0.31 (Osborn and Marion, 2009) and 0.84 (Dayan, Benedetto and Colak, 2009), in previous research.

As suggested by Anderson, Potočnik and Zhou (2014) and Rosing, Frese and Bausch (2011), the occurrence of such variations regarding findings generated from previous studies may be mainly attributed to two situations.

The first one is that of diversified operationalisation of innovation, along with only limited reflection on the complex nature of innovation itself in its operationalisation. As a matter of fact, terms such as R&D performance, and innovativeness (the generation of creative ideas) are often used interchangeably in previous innovation-related studies (Anderson, Potočnik and Zhou, 2014; Crossan and Apaydin, 2010; Rosing, Frese and Bausch, 2011). However, these terms along with the measures envisaged by academics in previous empirical studies, failed to capture the complex nature of innovation (Damanpour, 1991; Vera and Crossan, 2004). As suggested by Anderson, Potočnik and Zhou (2014) and Crossan and Apaydin (2010), by referring to the process view, in previous research, the terms R&D performance, and adopted

innovativeness, focused primarily on the *creativity* in innovation process. Similar arguments have also been contested by Keller (2006). According to the author, transformational leadership is more strongly related to *creativity* and *innovativeness*, but to a lesser extent to the overall innovation process (Keller, 2006). Moreover, as elaborated by Keller (2006), transformational leadership is more likely to facilitate research projects than development projects in organisations. In other words, transformational leadership is quite effective in facilitating employees' novel thinking (*creativity*), but to a significantly lesser extent when promoting the *implementation* of creative ideas generated in the innovation process (Andriopoulos and Lewis, 2009; Vera and Crossan, 2004). This point is echoed by Jansen and his colleagues in (2009)⁹. As suggested by these authors, transformational leadership is positively related to research-oriented projects, but such a relationship is not identified between the former and development-oriented projects in organisations.

The second point relates to the incorporation of moderators in previous research. As revealed in previous research, the positive relationship between transformational leadership and innovation is found to be contingent on several variables, such as a raised climate for excellence in the teams (Eisenbeiss, Van Knippenberg, and Boerner, 2008), high organisational learning (García-Morales, Matias-Reche, and Hurtado-Torres, 2008), high innovation-support environment, low centralisation and formalisation, as well as high uncertainty and competition (Jung, Wu, and Chow, 2008). As observed by Rosing, Frese and Bausch (2011, p.961); the specific feature that has been identified indicates that the positive effect of transformational leadership on innovation is limited to boundary conditions. In other

⁹ The research conducted by Jansen, Vera and Crossan (2009) explored the impact of both transformational and transactional leadership on exploratory and exploitative innovations respectively. However, as explained by Rosing, Frese and Bausch (2011) exploratory and exploitative innovations defined by the former, actually refers to research projects and development projects, rather than to distinguished innovation types. Therefore, in this thesis, the interpretation offered by the latter group of researchers is adopted, as it allows better clarity to be achieved in the review.

words, in order to facilitate innovation in organisations, a combination of transformational leadership and other conditions, such as high task orientation, efficient communication and an innovation-friendly environment are required (Crossan and Apaydin, 2010; Rosing, Frese and Bausch, 2011).

Therefore, as suggested by Anderson, Potočnik and Zhou (2014) and Bledow et al., (2009), given the insufficiency of transformational and transactional leadership in facilitating innovation, a new style of leadership for innovation is desired. Subsequently, in answering this call, the construct of Ambidextrous Leadership is introduced by Rosing and her colleagues in 2011.

In the following section, the key features of Ambidextrous Leadership, along with its distinctions and any overlap with regard to transformational and transactional leadership, will be discussed.

2.4 Ambidextrous Leadership

The originality of the term Ambidextrous Leadership may be traced back to Vera and Crossan (2004) in their discussion regarding the relationship between strategic leadership and organisational learning. As observed by Vera and Crossan (2004, p.226), “*at certain times, organizational learning processes thrive under transactional leadership and at other times they benefit more from transformational leadership*”. This specific feature identified by Vera and his colleague (2004) is further acknowledged by Bucci et al. (2009) and Jansen, Vera and Crossan (2009). As pointed out by the latter group of authors, exploration tends to thrive under transformational leadership, whilst exploitation is better facilitated by transactional leadership (Bucci et al., 2009; Jansen, Vera and Crossan, 2009). Subsequently, as concluded by these

authors, in order to facilitate organisational learning, strategic leaders need to be ambidextrous i.e. to be able to adapt to either transformational or transactional leadership as each situation requires (Bucic et al., 2009; Jansen, Vera and Crossan, 2009; Vera and Crossan, 2004).

Given the significance of exploration and exploitation and its linkages with *creativity* and *implementation* in innovation process, Bledow et al. (2009) further extended the arguments proposed and first coined the term Ambidextrous Leadership. As defined by Bledow, Frese and Muller (2011, p.46), Ambidextrous Leadership refers to a leadership style that “*can imply antithetical behaviours depending on the particularities of a situation*”. Moreover, “*ambidextrous leaders ensure an overall equilibrium of forces that support either part of activities (i.e., creativity and implementation) underlying innovation*” (Bledow, Frese and Muller, 2011, p.47). However, despite the rigor in their logic regarding the definition of ambidextrous leadership proposed, a comprehensive construct regarding this concept is not provided in their research (Bledow et al., 2009a; Bledow, Frese and Muller, 2011).

2.4.1 Ambidextrous Leadership

Extending the theoretical foundation laid down by Bledow et al. (2009), Rosing and colleagues (2011) further developed a construct of ambidextrous leadership and proposed a model explaining the relationship between ambidextrous leadership and innovation. By referring to ambidexterity (see detailed discussion in section 2.2.4.2) in the innovation process, Rosing, Frese and Bausch, (2011, p.966) argued that “*the requirement of ambidexterity in the innovation process implies that individuals working in an innovation context need to both explore and exploit, and switch between those two activities*”. Subsequently, as further elaborated by the authors, in order to lead the innovative workforce effectively the appropriate leadership “*needs to foster both exploration and exploitation, and has to be capable of flexibly*

switching between both” (Rosing, Frese and Bausch, 2011, p.966). Moreover, given the concept affiliation between this specific leadership and ambidexterity, Rosing and colleagues (2011) further named this leadership as Ambidextrous Leadership.

As suggested by the authors, Ambidextrous Leadership is made up of the following three elements: *opening leader behaviours* to foster exploration, *closing leader behaviours* to promote exploitation, and the *temporal flexibility* to switch between these two behaviours as required by each situation (Rosing, Frese and Bausch, 2011, p.966). The details regarding each of these elements encompassed in the construct are provided in the following sub-section.

- *Opening Leader Behaviours* to foster exploration:

Previous research reveals that the core of exploration is the increase of variance (Gupta, Smith and Shalley, 2006; March, 1991; Vera and Crossan, 2004). Therefore, in order to foster employees’ exploration, and subsequently, the generation of creative ideas (*creativity*) in innovation, managers need to facilitate and encourage the increase in variance of employees’ behaviours, such as playing with new ideas, and challenging the status quo (Amabile, 1994; Anderson, Potočnik and Zhou, 2014; Bledow et al., 2009a; Bledow, Frese and Muller, 2011; Vera and Crossan et al., 2004; Zach, Robinson and Rosing, 2016).

Following this line of reasoning, Rosing, Frese and Bausch (2011, p.966) defined “*Opening Leader Behaviours*” as a set of leader behaviours that includes “*encouraging doing things differently and experimentation, and giving room for independent thinking and acting*”. As explained by the authors, the term “opening” has been adopted and refers to the figurative illustration as the breaking up of routines and thinking in new directions, which are necessary to increase variance (Rosing, Frese and Bausch, 2011, p.967). Subsequently, as further elaborated by the author, through

reference to the figurative meaning of “*opening*”, in order to facilitate employees’ exploration, and subsequently the *creativity* in innovation process, managers need to adapt to *opening leader behaviours* (Rosing, Frese and Bausch, 2011).

- *Closing Leader Behaviours* to foster exploitation

On the contrary to exploration, the core of exploitation is the reduction of variance (Gupta, Smith and Shalley, 2006; March, 1991; Vera and Crossan, 2004). Therefore, in order to foster employees’ exploitation, and subsequently, *implementation* in the innovation process, managers need to facilitate the reduction of variance in followers’ behaviour (Amabile, 1994; Avolio, Luthans and Walumbwa, 2004; Bledow et al., 2009a; Bledow, Frese and Muller, 2011; Vera and Crossan, 2004; Zach, Robinson and Rosing, 2016).

Following this logic, Rosing, Frese and Bausch (2011, p.967) defined “closing leader behaviours” as a set of leader behaviours that includes “*taking corrective action, setting specific guidelines, and monitoring goal achievement*”. According to the authors, the term “closing” employed refers to a figurative illustration as the streamlining and narrowing down that are closely associated with the reduction of variance (Rosing, Frese and Bausch, 2011). Thus, as further concluded by the authors, by referring to the figurative meaning of “closing”, managers need to demonstrate closing leader behaviours so that employees’ exploitation and the subsequent implementation of innovation can be fostered.

In **Table 2-2**, a list of *opening and closing* leader behaviours proposed by Rosing, Frese and Bausch (2011) is summarised:

Table 2- 2 Examples of *Opening* and *Closing* Leader Behaviours

<i>Opening</i> Leader Behaviours	<i>Closing</i> Leader Behaviours
• Allowing different ways for accomplishing a task • Encouraging experimentation with different ideas • Motivating to take risks • Giving possibilities for independent thinking and acting • Giving room for new ideas • Allowing errors • Encouraging error learning	• Monitoring and controlling goal attainment • Establishing routines • Taking corrective action • Controlling adherence to rules • Paying attention to uniform task accomplishment • Sanctioning errors • Sticking to plans

Source: summarised from Rosing, Frese and Bausch (2011, p.967)

- The *temporal flexibility* to switch between *Opening* and *Closing Leader Behaviours* as situations require.

As demonstrated by Rosing, Frese and Bausch (2011, p.968), in the innovation process, the requirements *to explore and to exploit alternate in a complex manner*. In line with this argument, Bledow, Frese and Muller (2011) and Crossan and Apaydin (2010) also observed that it is difficult to precisely determine when it is useful to explore and when

it is useful to exploit in innovation. Thus, in order to be ambidextrous, managers' ability to show both *opening and closing* leader behaviours is not sufficient (Rosing, Frese and Bausch, 2011).

Following this line of reasoning, Rosing and colleagues (2011, p.968) further proposed the *temporal flexibility* as the third constituent in their construct of ambidextrous leadership. According to Rosing, Frese and Bausch (2011), *temporal flexibility* refers to managers' ability to adapt to the appropriate leader behaviours as innovation processes (i.e., *creativity and implementation*) require. Moreover, as emphasised by the authors, *it is the temporal flexibility to adapt these behaviours to the requirements of the innovation tasks that is essential for ambidextrous leadership* (Rosing, Frese and Bausch, 2011, p.968).

The overall relationship between Ambidextrous Leadership and the Innovation process is summarised in the theoretical model developed by Rosing, Rosenbusch and Frese (2010), as shown in **Figure 2-1**.

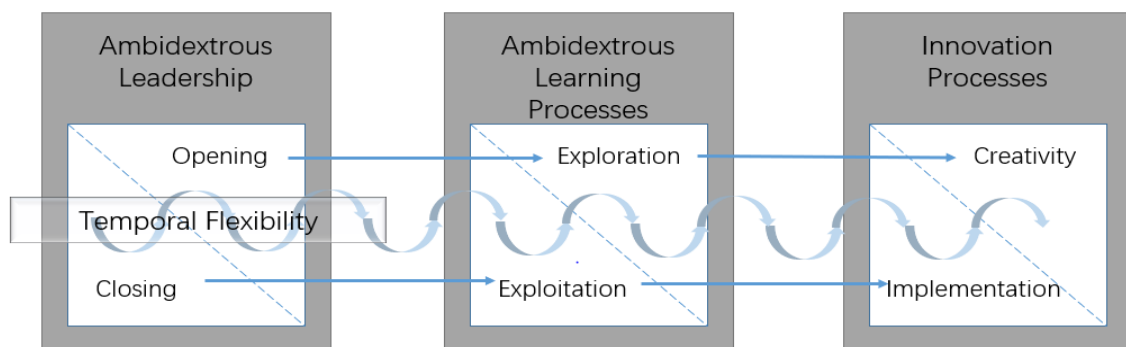


Figure 2- 1 The integrative model of Ambidextrous Leadership and Innovation

Source: adopted from Rosing, Rosenbusch and Frese (2010, p.199)

2.4.2 Distinctive Features of Ambidextrous Leadership

The distinctive features regarding the Ambidextrous Leadership construct developed by Rosing, Frese and Bausch (2011) is manifest through its emphasis on *temporal flexibility*, and the uniqueness of those *opening and closing* leader behaviours incorporated into it.

As a matter of fact, prior to the findings of Rosing and colleagues (2011), the empirical study conducted by Lewis et al. (2002) has already revealed the necessity for managers to adopt contradicting management styles to facilitate product innovation in organisations. In their study regarding the effectiveness of emergent and planned project management styles in product innovation, Lewis et al. (2002)¹⁰ revealed that emergent project management styles are positively linked to project innovation. Whilst planned project management styles are positively related to project efficiency (Lewis et al., 2002). Thus, Lewis et al. (2002) challenged the traditional view, and suggested, instead of viewing these two styles as mutually exclusive, they should be considered as potentially complementary to each other in further innovation studies. However, as pointed out by Rosing, Frese and Bausch (2011, p.968), despite the suggestion proposed by Lewis et al. (2002) being quite insightful, these authors *did not explicitly study the necessity to switch between these management styles* in their research.

In addition to the uniqueness of *temporal flexibility*, the *Opening* and *Closing* leader behaviours proposed in the model also differ significantly from established leadership styles (Kālis, Roke and Krumina, 2016; Zacher, Robinson and Rosing, 2016). As suggested by Rosing, Frese and Bausch (2011, p.970), *“the uniqueness of opening and closing leader*

¹⁰ According to Lewis et al. (2002) emergent management styles take the ambiguity of product development into account and encourage improvisation, therefore they positively facilitate project innovation. Whilst planned project management styles focus on discipline and structure, which positively enhance efficiency in innovation projects.

behaviours lies in their sole focus on increasing and reducing variance in followers' behaviour". As observed by Rosing, Frese and Bausch (2011, p.970), in comparison to *opening and closing* leader behaviours, "*other established leadership styles have very different foci or goals, therefore may or may not include the increase or reduction of variances*". Furthermore, as suggested by Rosing, Frese and Bausch (2011), regarding traditional leadership styles, depending on the specific leader behaviours used, the possible influence that one single leadership style can project varies with regard to the variance of employees' behaviours.

Rosing, Frese and Bausch (2011) further clarified this point through reference to the inspirational motivation as proposed by Bass (1985, 1990) in the construct of transformational leadership. As explained by Rosing, Frese and Bausch (2011, p.970-971), through using inspirational motivation, leaders' can motivate employees to either think creatively (which refers to the increase of variance in their behaviours), or to ensure efficiency in processes (which refers to the reduction of variance in their behaviours). Thus, it can be defined as either *opening* (in cases that it facilitates employees' exploration learning) or *closing* leader behaviours (in cases that it promotes employees' exploitation leaning). More examples are provided in **Table 2-3**, which summarises the overlap between *opening* and *closing* leader behaviours and both transformational and transactional leader behaviours.

Table 2- 3 Categorisation of Transformational and Transactional leader behaviours as *opening* and *closing* leader behaviours

	<i>Opening</i> leader behaviours	Closing leader behaviours
Transformational leadership	• A vision that motivates exploratory behaviour • Stimulation of thought in many new directions • Communication of the values of openness and tolerance	• A vision that motivates confirmatory behaviour • Stimulation of small improvements and enhancement of efficiency • Communication of the value of conscientiousness and rule adherence
Transactional leadership	• Reward experimentation • Focus on errors to learn from errors • Setting and monitoring exploration goals	• Rewarding efficiency • Focus on errors to avoid errors • Setting and monitoring exploitation goals

Source: summarised from Rosing, Frese and Bausch (2011, p.971)

As demonstrated in **Table 2-3**, individual *opening and closing* leader behaviours identified by Rosing and her colleagues (2011) overlap with traditional leader behaviours to some extent. However, as argued by Rosing, Frese and Bausch (2011, p.971), “*it is the different*

categorisation according to the specific function of opening and closing leader behaviours to increase and reduce variance in follower behaviour that makes them distinct.”

These distinctive features regarding the Ambidextrous Leadership construct is further acknowledged in follow-up empirical studies (Tung, 2016; Zacher and Rosing 2015; Zacher, Robinson and Rosing, 2016). Through using data collected from 27 architectural and interior design firms in Australia, Zacher and Rosing (2015) successfully verified the effectiveness of Ambidextrous Leadership in promoting individual innovation performances. Similar results have also been obtained by Tung (2016) and Zacher, Robinson and Rosing, (2016) through using data collected from different industrial and geographical settings¹¹. However, given ambidextrous leadership is an evolving concept, scholarly articles produced regarding this concept are quite limited.

2.5 Research Gaps and General Research Question

As demonstrated in **Figure 2-1** (section 2.4.1), in the integrative model proposed, *creativity* and *implementation* are proposed as the two constituting elements in the innovation process, whereas exploration and exploitation are contemplated as fundamental learning activities that underlie these processes (Rosing, Frese and Bausch, 2011). Moreover, as suggested by Rosing and colleagues (2011, p.985), “*creativity is closely linked to exploration learning activities as defined by March (1991) and implementation is linked to exploitation learning activities defined by March (1991).*” Thus, it is through the propositions that *opening* leader behaviours foster exploration, and *closing* leader behaviours facilitate exploitation, the authors eventually

¹¹ In Tung (2016) data are collected from 50 electronics companies based in China, whilst in Zacher, Robinson and Rosing, (2016) data are collected from online participants based in the US. However, in Tung (2016), the author only examined the effectiveness of Ambidextrous Leadership in facilitating employees’ *creativity* but not the whole innovation process.

developed the ambidextrous leadership construct. In other words, the two organisational learning processes, exploration and exploitation encompassed in the integrative model, actually served as moderators between ambidextrous leadership and innovation processes.

As explained by Rosing and colleagues (2011), the rationale for adopting exploration and exploitation as the only two constituents of organisational learning processes that are required in innovation are twofold:

- 1) It enables the clarity and consistency from a logical perspective to be achieved in the integrative model that has been developed
- 2) It is sufficient to cover those learning processes required at individual/team level innovation; given their primary focus is to develop an effective leadership that can facilitate individual innovation performances.

However, as suggested Rosing, Frese and Bausch (2011), the applicability of the Ambidextrous Leadership construct should not be constrained solely to the facilitation of individual innovation. In reference to the upper echelon theory¹² proposed by Hambrick (1989), the authors argued, in order to effectively promote innovations at organisational level, Ambidextrous Leadership is desirable for senior managers as well (Rosing, Frese and Bausch, 2011, p.970). In light of the potential value associated with the construct, this argument is further echoed by Anderson, Potočnik and Zhou (2014) and Schreuders and Legesse (2012). Nevertheless, until the present time, no empirical study has been produced to explore the correlation between senior managers' AL and organisational innovations; as the sole focus in

¹² According to Hambrick (1989, p.5), senior managers are considered as the upper echelon for organisations, as "ultimately, they account for what happens in organisations".

these limited empirical studies (as discussed in section 2.4.2) is the analysis of shop-floor managers' Ambidextrous Leadership and its relationship with individual innovation performance.

Despite Rosing, Frese and Bausch (2011) explicitly specifying the significance of Ambidextrous Leadership with respect to the promotion of innovations at organisational level, the authors also acknowledged that the current model proposed falls in short in addressing the complexity in the process of organisational innovations. Subsequently, in their recommendations, the authors suggested, in order to extend the application of this construct to organisational innovation¹³, in future researches, "*the complexity of innovation processes and learning processes underlying it should be considered*" (Rosing, Frese and Bausch, 2011, p.971). However, due the reason explained in previous section, six years after the introduction of the Ambidextrous Leadership construct, a comprehensive model explaining the correlations between AL and organisational innovation is still yet to be developed in the field of innovation management studies.

Therefore, in order to address these research deficits, and contribute to development of the innovation management literature, this research will explore the relationship of senior managers Ambidextrous Leadership along with organisational innovation. The overarching research question proposed in this research is:

¹³ According to Damanpur and Wischnevsky (2006), Woodman, Sawyer and Griffin (1993) and Gumusluoglu and Ilsev (2009), Organisational innovation is the creation of valuable and useful new products/services within an organisational context. There are cases that this term is used to describe architectural innovations, i.e., McAdam and Galloway (2005) or the implementation of Total Quality Management (TQM) in organisations (Boer and During, 2001). However, attention paid by academics to these alternative definitions are quite limited. Therefore, in this research, the definition provided by the first group of authors will be adopted.

How might organisational innovation be facilitated by senior managers' ambidextrous leadership?

Additionally, given the deficiency of the current model in addressing the complexity in the processes of organisational innovations, a new AL-Innovation model will be developed in Chapter 3. The development of the new model will follow the same analytical logic utilised in Rosing, Frese and Bausch's (2011) work, and explores the correlation between senior manager's AL and organisational innovation through the perspective of learning

2.6 Conclusion

In this chapter, the relationships between leadership and innovation identified in extant literature are explored in a gradual and systematic manner. Firstly, through reviewing the relevant literature, the dominance of the outcome view held by academics and the detrimental effects it projects to the field of innovation studies are identified. Thus, in order to more effectively contribute to the accumulation of knowledge in innovation studies, this research adopted the process view of innovation. Subsequently, the constituent elements and *ambidexterity* in the innovation process are then identified and discussed. In the following section, the relationship between Transformational and Transactional leadership and innovation are reviewed. In light of the insufficiency of Transformational and Transactional leadership in facilitating innovation, the concept of Ambidextrous Leadership is then introduced. The integrative AL-innovation model proposed by Rosing, Frese and Bausch (2011) is also presented. However, it is also revealed, despite Rosing, Frese and Bausch (2011)

explicitly suggested the significance of AL for organisational innovations, the sole focus of existing AL study is yet limited to the discussion regarding its correlation with individual level innovation performance. Therefore, in order to address these deficiencies, this research will explore the relationship between senior managers' Ambidextrous Leadership and organisational innovation. In the next chapter, a theoretical model will be proposed to allow for the exploration of the relationship between senior managers' Ambidextrous Leadership and Organisational Innovation in this research.

CHAPTER 3 THE THEORETICAL MODEL

3.1 Introduction

This chapter is dedicated to the development a theoretical model that can be utilised to address the overarching research question proposed in section 2.5. As elaborated in the end of section 2.5, inspired by the analytical logic adopted by Rosing, Frese and Bausch's (2011) work (see section 2.4.1), this study explores the correlation between senior managers' Ambidextrous Leadership (AL) and organisational innovation through the perspective of organisational learning. Therefore, the theoretical model proposed in this thesis is a three-layered construct comprising senior managers' Ambidextrous Leadership, Absorptive Capacity (AC) learning process, and Innovation Adoption Process (IAP). In this model, the IAP is employed to mirror the process of organisational innovation, whilst the AC learning process is incorporated to represent the organisational learning process that enables the former. The linkages between the three constructs can be described as follows: senior managers' AL facilitates IAP through the AC learning process.

The structure of this chapter is organised as follows: in section 3.2, three relevant terms used in this research, *Organisational Innovation*, *Newness* and *Senior Manager*, are defined so as to avoid unnecessary ambiguities.

Subsequently, in order to identify an organisational learning process that properly addresses the complexity of learning activities associated with organisational innovation, relevant literature is examined in sections 3.3 and 3.4. These will then be considered for the incorporation of AC learning process into the theoretical model.

In section 3.5, two generic innovation process models, namely innovation *adoption* and *generation* process models will be introduced. The key features associated with these models will be discussed and contrasted. It then shows that, in comparison to the innovation generation process model, the innovation adoption process model offers higher accuracy in reflecting the reality regarding how innovations are developed in most organisations. Thus, suggesting the incorporation of the innovation adoption process in the theoretical model to resemble the overall process that is required for organisational innovation. In section 3.6, the innovation and learning process models identified in preceding sections will then be incorporated into the new theoretical model. This chapter ends with a conclusion describing the rationale for the development of the theoretical model and how it might be used to address research questions proposed in chapter 2.

3.2 Defining Key Terms

This section provides definitions for relevant terms that will be used in the development of the theoretical model.

Organisational Innovation

As defined by Damanpour and Schneider (2006, p.216), organisational innovation, is:

“the adoption of a new product, service, process, technology, policy, structure or administrative system” in organisations. The rationale for adopting this relatively broad definition in this research is, it allows the research to focus on the exploration regarding the relationship between senior managers’ Ambidextrous Leadership and the processes of

innovation, whilst avoiding the danger of digression into determining types of innovation that are implemented in organisations.

Newness

As demonstrated in section 2.2.1, *Newness*, the central element in defining innovation can be interpreted from various perspectives (Damanpour, 1991; Downs and Mohr, 1976; Garcia and Calantone, 2002), such as new to the world (In this research, following Damanpour and Schneider (2006), *newness* is defined from the adopting units' perspective.

Senior Managers

The terms senior manager also incorporates the title of senior executive; the title of senior manager is often used interchangeably by academics but without specifying the difference between them (Boeker, 1997; Finkelstein and Hambrick, 1990, 1996; Wiersema and Bantel, 1992). Following the definition used by Carmeli (2003, p.788) and Finkelstein and Hambrick (1996, p.1990), in this research, senior managers are defined as a group of managers who are board members of the organisation.

3.3 Organisational Learning

In the discipline of management studies, organisational learning is often viewed as the key premise for enterprises to continuously renew their knowledge bases (Levitt and March, 1988; Easterby-Smith, 1997; Huber, 1991; Crossan and Berdrow, 2003; Crossan et al., 1995; Wang and Ahmed, 2003; Easterby-Smith and Lyles, 2011). Despite the concept of organisational learning being explicitly referred as an organisational level construct, the unit of analysis

adopted by management scholars in addressing this concept often differ from each other (Crossan et al., 1995; Kim, 1993; Easterby-Smith and Lyles, 2011).

Early work in organisational learning borrowed heavily from the psychology literature on individual learning (i.e., individual choice, decision making and information processing) (Cohen and Sproull, 1996; Vera, Crossan and Apaydin, 2011), and demonstrated a strong emphasis on the role of individual learning in organisational learning (Wang and Ahmed, 2003). At this stage, academics often argued that individuals act as agents to learn for organisations (Argyris and Schön, 1978; Shrivastava, 1983), and proposed that organisational learning comprises single-loop (learning to things right) and double-loop (learning to do the right things) individual learning processes (Argyris and Schön, 1978).

However, as revealed in latter studies, the sole focus on individual level as demonstrated in early organisational learning researches is quite problematic, as it ignored the knowledge sharing process between individuals within an organisation and its significance in organisation learning (Morgan, 1986; Hedberg, 1981).

In light of this deficit, a collective perspective was then adopted by academics in their discussions regarding the concept of organisational learning. Proponents of this perspective suggest that organisational learning is more than just the sum of individuals' learning within the organisation, but should also include the collective learning that occurs in group level (Stata, 1989; Huber, 1991; Kim, 1993; Wang and Ahmed, 2003).

However, as pointed out by Hedberg (1981), despite the collective perspective successfully promoted the analytical focus in organisational learning researches from individual to group level, this perspective itself is far from comprehensive enough to provide a holistic view for the concept. As explained by the author: *'although organizational learning occurs through*

individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of their members' learning. Members come and go, and leadership changes, but organizations' memories preserve certain behaviours, mental maps, norms and values over time' (Hedberg (1981, p. 6). Similar arguments have also been proposed by academics such as Morgan (1986), Huber (1991), and Levitt and March (1988). As indicated by these authors, organisational learning is not simply the learning arising from individuals and groups, there is a role for the organization as well (Morgan, 1986; Huber, 1991; Levitt and March, 1988). Moreover, these authors further suggest that in further organisational learning studies academics should explore the linkages between individual, group and organisational levels of learning, along with its correlations to organisational learning in a systematic way (Huber, 1991; Levitt and March, 1988).

In their endeavour to address the suggestions proposed in early studies, Crossan and her colleagues developed the *4I* Organisational Learning model in 1999 (Crossan, Lane and White, 1999).

As shown in the following **Figure 3-1**, the *4I* Organisational Learning model envisaged by Crossan and colleagues (1999) is a multi-level construct. As indicated in this model, organisational learning comprises of learning that take place across the individual, a group and at organisational levels, along with the interplay of the four social-psychological processes that enable learning to emerge from the individual to the organisational level.

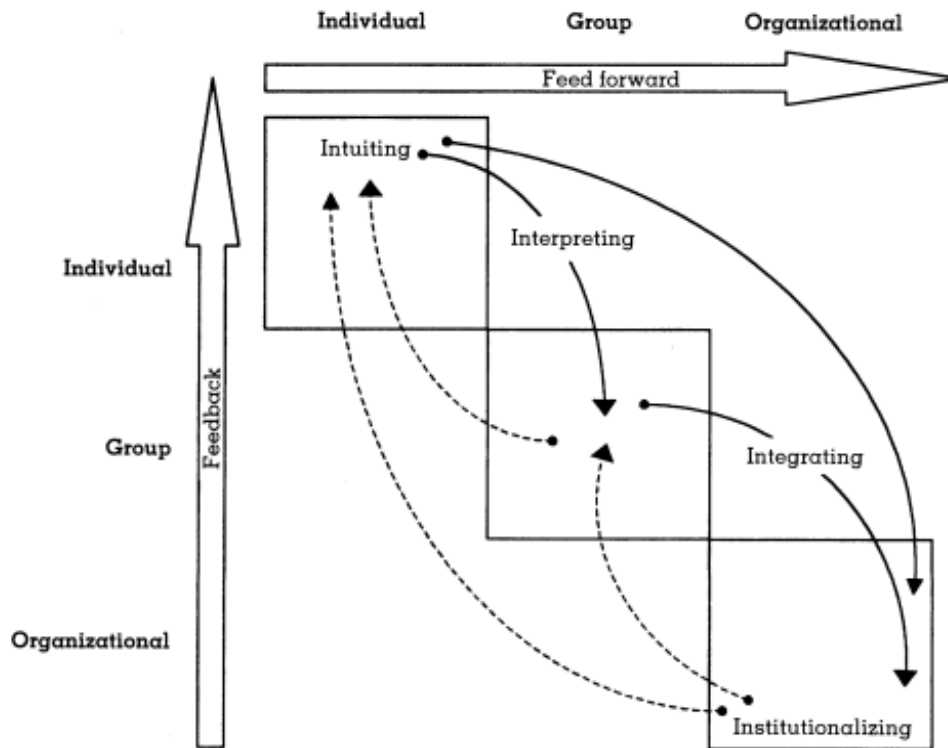


Figure 3- 1 4I Organisational Learning Model

Source: adopted from Crossan, Lane and White, (1999, p.532)

The relationship between the four social-psychological processes i.e., intuiting, interpreting, integrating and institutionalising and the three levels of learning (as demonstrated in the preceding **Figure 3-1**) are summarised in the following Table (**Table 3-1**).

Table 3- 1 Organisational Learning: four sub-processes across three levels of learning

Level	Process	Inputs/outcomes
Individual	Intuiting	Experience
		Images Metaphors
Group	Interpreting	Language Cognitive map Conversation/dialogue
	Integrating	Shared understandings Mutual adjustment Interactive systems
Organization	Institutionalising	Routines Diagnostic systems Rules and procedures

Source: adopted from Crossan, Lane and White, (1999, p.525)

As elaborated by Crossan, Lane and White (1999),

- *Intuiting* happens at individual level as the start of learning and can be viewed from the expert and entrepreneurial perspectives. Expert intuition involves a process of pattern recognition, based on experience, which supports exploitation. While the possession of an entrepreneurial view is more related to innovation and change, such as making novel connections and discerning new possibilities.
- *Interpreting* involves the process where individuals construct cognitive maps about the various domains in which they operate (Huff, 1990), they then convert the new

knowledge or ideas to the common language and share amongst individuals within the group. This process operates through conversation and dialogue.

- *Integrating* refers to the development of a shared understanding regarding new knowledge learned and creative ideas generated within the group, through continuing conversation and practice. This process requires mutual adjustment and negotiated action (Weick and Roberts, 1993) amongst individuals and groups, which bridges the group and organisational level learning.
- *Institutionalising* is a process that takes place at organisational level, where the new knowledge developed is then integrated into routine processes of operational procedures within the organisation.

As suggested by Easterby-Smith and Lyles (2011), the *4I* conceptual framework proposed by Crossan and colleagues (1999) is the most frequently cited organisational learning framework by management scholars, as it enables academics to develop comprehensive understanding regarding the interplay of learning across individual, group and organisational levels. However, given it is only a conceptual framework that developed mainly from the perspective of knowledge management, the adoption of this framework in innovation related studies is quite limited.

It is worth mentioning that, although the *4I* framework will not be incorporated into the conceptual model in this research, some valuable insights from this framework will still be considered in the development of the model. This point that will be further explained in section 3.4. Moreover, inspired by Sun and Anderson's (2012) work, this research adopts the Absorptive Capacity as the corresponding learning process for organisational innovations.

3.4 Absorptive Capacity

The concept of Absorptive Capacity (AC) was first coined by Cohen and Levinthal (1989, 1990). According to the authors, AC refers to a firm's ability to *recognize the value of external knowledge, assimilate it, and apply it to commercial ends* (Cohen and Levinthal, 1990, p.128).

In the inception of this concept, AC is considered as an organisational learning process that is essential to organisations' innovation (Cohen and Levinthal, 1990, 2000; Lane, Koka and Pathak, 2006). However, given that the boundary between the learning process and dynamic capacity (DC) is quite blurred (Vera, Crossan and Apaydin, 2011; Zollo and Winter, 2002), the concept of AC is often interpreted by academics, as a dynamic capability that enables a firm to innovate through leveraging knowledge acquired from the external environment (Van den Bosch, Volberda and Boer, 1999; Todova and Dursin, 2009; Zahra and George, 2002; Teece, 2007). As revealed in previous researches, the dynamic capability view often considers AC as an outcome of a firm's R&D activities (Easterby-Smith et al., 2008; Lane, Koka and Pathak, 2006) and operationalises it through using quantitative measures such as R&D spending or patent numbers (Kinoshita, 2000; Nooteboom, 2006; Tsai, 2001). For instance, through using firm's R&D expenditure as the proxy of its AC, Cockburn and Henderson (1998) successfully revealed the positive correlation between firms' AC and new drug discoveries in pharmaceutical industry. In a similar vein, Stock, Greis, and Fischer (2001) operationalised firm's R&D intensity as a measure of its AC, and suggested that, in computer modem industry, a firms' AC is positively correlated to its innovation performances. Similar result has also been obtained by Rothaermel and Alexandre (2009), though in an indirect way. As suggested by the authors, the higher a firms' AC (measured as the firms' R&D expenditure), the more benefit it can appropriate from external technology sources (Rothaermel and Alexandre, 2009).

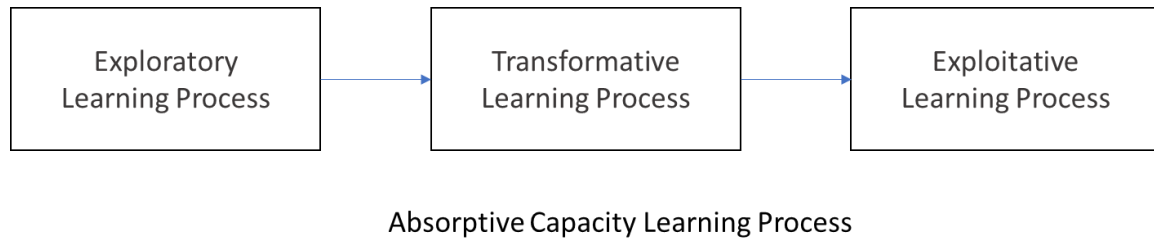
However, as demonstrated in preceding discussion, despite these empirical studies successfully divulging the significance of AC with respect to a firms' innovations, in these researches, AC is merely referred as the result of a firms' R&D activities. Thus, leaving the learning process of AC, as proposed in its initial construction, along with the multi-level nature regarding the construct significantly overlooked (Lane, Koka and Pathak, 2006; Sun and Anderson, 2010; Cohen and Levinthal, 2000).

Subsequently, in a critical review, Lane, Koka and Pathak (2006) concluded, due to the dominance of dynamic capability view hold by academics regarding the concept, AC has become significantly reified¹⁴. Thus, the authors urged researchers to return to the original definition of AC as proposed by Cohen and Letinthal (1990) so as to achieve the rejuvenation of the concept (Lane, Koka and Pathak, 2006). Moreover, in their endeavour to do so, the authors further proposed AC is fundamentally an organisational learning process that comprises the following three sequential sub-learning processes: exploratory learning process, transformative learning process and exploitative learning process (Lane, Koka and Pathak, 2006).

The learning process model regarding the concept of AC that proposed by Lane, Koka and Pathak (2006) is demonstrated in the following **Figure 3-2**.

¹⁴ As explained by Lane, Koka and Pathak (2006) and Vera, Crossan and Apaydin (2011), the concept of AC has become reified as it becomes taken for granted, general purpose concept, i.e., been considered as knowledge assets such as firms R&D spending and patents.

Figure 3- 2 Absorptive Capacity Learning Process



Source: adopted from Lane, Koka and Pathak, (2006, p.856)

As explained by Lane, Koka and Pathak, (2006):

- *Exploratory learning process* refers to learning activities that are aimed at exploration and identification of the value of new, external knowledge.
- *Transformative learning process* comprises learning activities that are aimed at the combination of externally acquired with existing knowledge, along with the subsequently developed new knowledge.
- *Exploitative Learning process* pertains to learning activities that are aimed at utilising the new knowledge developed from previous learning processes.

Moreover, Lane, Koka and Pathak (2006) also provided examples regarding learning activities associated with each learning process of AC, as summarised in the following **Table 3-2**.

Table 3-2 Examples of Learning activities associated with AC learning process

Learning process	Activities
Exploratory	• Recognition of external knowledge sources • Generation of information from the business environment • Acquisition of knowledge from various sources
Transformative	• Collegial discussion • Develop collective understanding regarding new knowledge acquired • Integration of new knowledge with existing knowledge
Exploitative	• Apply knowledge to commercial purposes • Convert creative idea to innovation • Re-use of knowledge

Source: summarised from Lane, Koka and Pathak (2006, p.856-857)

This learning process view of AC proposed by Lane and her colleagues (2006) is also acknowledged by academics such as Easterby-Smith et al., (2008), Lichtenthaler (2009), and Vera, Crossan and Apaydin (2011).

However, as suggested by Sun and Anderson (2010), despite Lane, Koka and Pathak (2006) successfully revealed the conceptual affinity between AC and organisational learning (OL), they did not specify in details regarding: a) the correlation between AC and OL, and b) the multi-level nature of AC, in their review.

Subsequently, by referring to the *4I* organisational learning framework developed by Crossan, Lane and White (1999) (detailed discussion in section 3.3), Sun and Anderson (2010) further clarified the correlation between AC and OL, along with the multi-level nature regarding the concept of AC from the perspective of OL.

The relationship between the AC and the Organisational Learning process as proposed by Sun and Anderson (2010) is summarised in the following **Figure 3-3**.

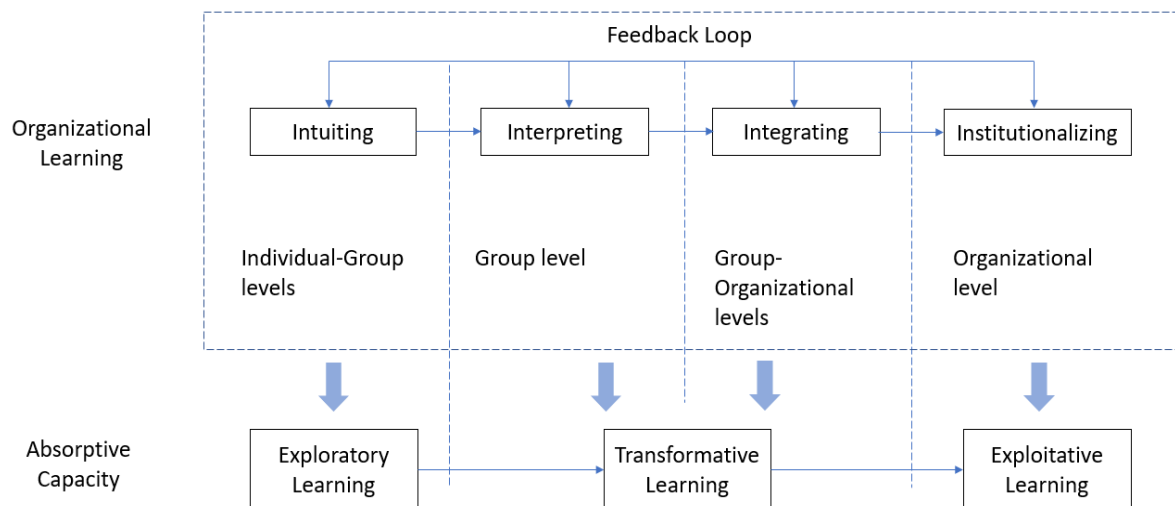


Figure 3- 3 The correlation between the Absorptive Capacity and Organisational Learning
Source: summarised from Sun and Anderson (2010, p.142), with modification.

However, due to the reasons explained in previous discussions, despite the theoretical value regarding the learning process view of AC is widely acknowledged by academics that empirical studies adopting this specific view are quite limited (Gebauer, Worch and Truffer,

2012; Daspit and D'Souza, 2013). One of the exceptions¹⁵ is the research conducted by Sun and Anderson in 2012.

In their research, Sun and Anderson (2012) proposed the adoption of AC as the corresponding learning process in organisational innovations, and used AC as the moderator to explain the correlations between T/T leaderships' and organisational innovation. However, given the primary concern of their research was to explore the impacts of different leadership styles with respect to firm's innovation, the correlation between AC learning process and organisational innovation was largely overlooked in their study.

Given the significance of the AC learning process, along with its relevance to organisational innovation (as explained in section 2.2), as detailed in the preceding discussions, this process will be incorporated into the theoretical model to encapsulate the corresponding learning process associated with organisational innovation.

3.5 Organisational Innovation Process

As suggested by Angel and Van de Ven (2000), Axtell et al. (2000) and Kline and Rosenberg (2010), organisational innovation is intrinsically a social process. Therefore, in order for those creative ideas that have been generated to eventually be actualised in the form of innovation, conditions such as support from co-workers along with the improvement and allocation of resources by managers are also required (Axtell et al., 2000; Van de Ven, 1989; Kline and

¹⁵ It is worth noting that, in Lichtenthaler (2009), the author also adopted the learning process view of AC. However, given the primary focus in that research is to measure the statistical significance between AC learning process and innovations, the multilevel nature along with the details associated with the AC learning process are excluded from its discussion.

Rosenberg, 2010). Thus, in this research, a more comprehensive innovation process will be adopted to accommodate the complexities associated with innovation at organisational level.

As revealed in previous research, organisational innovation processes proposed by academics vary considerably (Angle and Van de Ven, 2000; Axtell et al., 2000; Damanpour and Wischnevsky, 2006).¹⁶ Despite the differences between them, as suggested by Damanpour and Schneider (2006, p.272), innovation processes¹⁷ as envisaged by academics can be placed into the following two categories: the innovation generation process (IGP) and the innovation adoption process (IAP).

IGP comprises the recognition of opportunity, research, design, development, and deployment (Damanpour and Wischnevsky, 2006; Roberts, 1988; Tornatzky and Fleischer, 1990;). As indicated by Roberts (1988), IGP covers all effort and activities aimed at generating new ideas and getting them to work.

In contrast, it is perceived that IAP constitutes three sub-processes: initiation, adoption decision and implementation (Damanpour and Wischnevsky, 2006; Duncan, 1976; Rogers, 1995; Zaltman, Duncan and Holbek, 1973).

- The Initiation process:

This process consists of activities that pertain to the recognition of needs and the identification of possible solutions (Duncan, 1976; Rogers, 1995). According to (Meyer and Goes, 1988), in this process, organisational members, motivated by either

¹⁶Details regarding the innovation processes that have been developed are provided in Appendix-I.

¹⁷ The unfolding of innovation processes in organisations has been conceived as following both a unitary sequence and a multiple sequence pattern (Gopalakrishnan and Damanpour, 1994; Mintzberg, Raisinghami and Theoret, 1976; Poole, 1981). The unitary sequence pattern assumes that innovation processes take place in a linear sequence; whilst, the multiple sequence pattern suggests innovation processes occur in a random and unpredictable fashion (Gopalakrishnan and Damanpour, 1994). Both have been found to be useful when describing the innovation process (Ettlie, Bridges and O'keefe, 1984). In this study, the unitary pattern is adopted as, in comparison to the multiple sequence pattern, it allows better clarity to be achieved in the proposed theoretical model.

intrinsic or extrinsic factors, will explore new possibilities and consider their suitability for the organisation.

- The adoption decision process

This process covers the evaluation of the appropriateness regarding the solutions that have been identified, and the decision for their adoption (Damanpour and Schneider, 2006, Duncan, 1976; Rogers, 1995). According to Meyer and Goes (1988), in this process, solutions proposed will be evaluated from the technical, financial and strategic perspectives, and decisions will be made by key individuals to determine the acceptance or rejection of these solutions, along with the subsequent allocation of resources for their acquisition, alteration and assimilation in cases of acceptance.

- The implementation process

This process pertains to all events and activities that are required to facilitate the final adoption of the knowledge or solution in the organisation, along with the continuous use of it (Duncan, 1976; Glynn, 1996; Rogers, 1995). In this phase the solutions adopted will be put into use by members of the organisations (Meyer and Goes 1988).

As suggested by Duncan (1976) and Damanpour and Wischnevsky (2006), IGP leads to the creation of *inventions*¹⁸ in firms; whilst, IAP leads to the development of innovations but rarely to *inventions*, in organisations. Moreover, as summarised by Damanpour and Wischnevsky (2006, p.275), the key difference between IGA and IPA is, for organisations adopting the former, innovation is its key goal and an *end to itself*. Whilst for organisations incorporating

¹⁸ In Duncan (1978), Invention is used to describe things that are absolutely-new not only to the firm that developed it, but also to the wider society; in contrast, innovation simply means things that are new to the organisation.

the latter, innovation is only a means to facilitate and contribute to the organisation's primary goals.

By referring to the preceding discussion, in this research, the IAP will be adopted as the representative innovation process in order to develop the theoretical model. The rationale for adopting this specific process into the model are threefold:

- 1) It is the process that sufficiently reflects the complex nature associated with the organisational innovation processes; thus,
- 2) adopting this process, allows this study to explore the relationship between the senior managers' Ambidextrous Leadership and the Organisational Innovation processes in greater detail.
- 3) As revealed in previous researches, in most industries, the introduction of absolutely-new innovation is quite rare (Damanpour and Wischnevsky, 2006; Garcia and Calantone, 2002; Johannessen, Olsen and Lumpkin, 2001). As observed by Cohen and Levinthal (1990) and March and Simon (1958), most innovations are the results of borrowing. Moreover, even the most innovative firms, such as Microsoft and Apple, are often considered as imitators rather than innovators by their competitors (Chesbrough, 2003; Laursen and Salter, 2006; Garcia and Calantone, 2002, p.127). In other words, learning or borrowing from the external environment is a key vehicle for innovations that are developed in most firms, albeit the level of such learning varies in these firms. Therefore, the incorporation of IAP, instead of IGP, in the theoretical model can significantly enhance the applicability of the final model that is developed.

3.6 Integrating AL, AC, and IAP

Inspired by the analytical logic adopted by Rosing and colleagues (2011, Section 2.4.1) in proposing the integrative AL-Learning-Innovation model (see **Figure 2-1**), the development of the theoretical model will be delivered in three gradual sequences in this research. In section 3.6.1, the integration between the constructs of the organisational innovation (IAP) and the underlying organisational learning process (AC) will be proposed. In section 3.6.2, the integration between senior managers' AL and AC will be envisaged. Finally, in section 3.6.3, the integrated theoretical model will be developed, demonstrating the relationship between senior managers' AL, organisational learning (AC) and organisational innovation (IAP). Moreover, it is worth noting that, given the AL-Learning-Innovation model proposed by Rosing and her colleagues (2011) is used as the key reference in developing the theoretical model. The integrations between AC and IAP (section 3.6.1), along with AL and AC (section 3.6.2) will be revealed through referring to that model.

3.6.1 Integrating the IAP with the AC

As demonstrated in section 3.3, the *initiation* process of IAP is comprised of employees' activities such as the exploration of new possibilities and solutions, which in terms expressed by Rosing, Frese and Bausch (2011), is variance seeking. Thus, by referring to the AL-Innovation model (see **Figure 2-1**, section 2.4.1), this research envisages that initiation in IAP is facilitated by an exploratory learning process in AC for reasons provided in the preceding section (3.4). In a similar vein, this study proposes *adoption decision*, the process following *initiation* in IAP is also facilitated by the exploratory learning process.

In contrast, the goal in the *implementation* phase of IAP is variance reduction, as at this stage, the primary emphasis is to transfer adopted ideas or solutions to innovation results. Thus, this study proposes that the *implementation* phase of IAP is facilitated by transformative and exploitative learning processes in AC. The proposed overall relationship between AC and IAP is shown in **Figure 3-4**¹⁹.

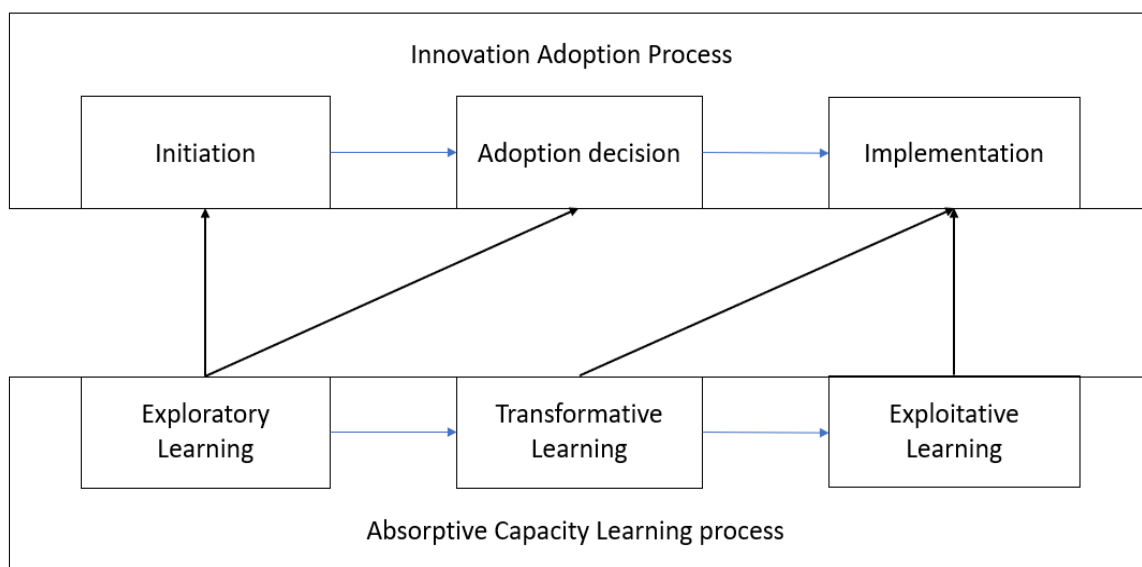


Figure 3- 4 Relationship between the Absorptive Capacity Learning Process and the Innovation Adoption Process

¹⁹ This study also wants to acknowledge that despite the overall development of the integrated theoretical model is inspired by the AL-Learning-Innovation model proposed by Rosing, Frese and Bausch (2011), the relationship proposed between AC and IAP in this research is also influenced by a PhD thesis submitted by Rezaei Zadeh (2013).

3.6.2 Integrating AL and AC

As suggested by Rosing, Frese and Bausch (2011) and Zacher, Robinson and Rosing (2016), in the construct of Ambidextrous Leadership, *opening* leader behaviours promote exploration-oriented learning activities in the innovation process, whilst *closing* leader behaviours facilitate exploitation-oriented learning activities, in innovations. Thus, by referring to examples of learning activities provided in **Table 3-2**, along with the AL-Innovation model (see **Figure 2-1**, section 2.4.1), this research proposes that, *opening* and *closing* leader behaviours facilitate exploratory and exploitative learning processes in the AC learning process respectively. Moreover, given that the key feature in the transformative learning process is knowledge integration, which is fundamentally a variance reduction process as suggested by Sun and Anderson (2012), this research proposes that the transformative learning process can also be facilitated by the *closing* leader behaviours in the construct of AL. The overall proposed relationship between the senior managers' AL and AC learning processes is demonstrated in **Figure 3-5**.

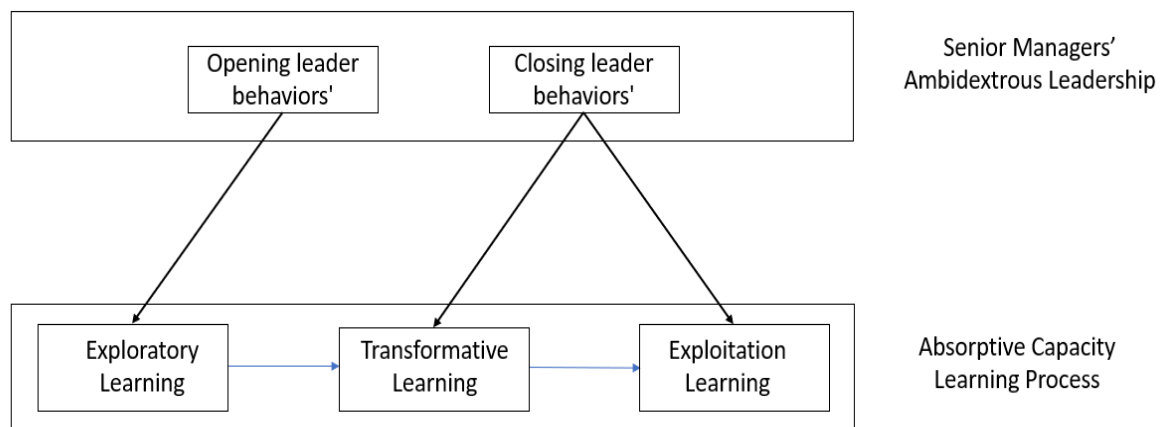


Figure 3- 5 Relationship between Senior Managers' Ambidextrous Leadership and the AC Learning Process

3.6.3 The integrated Theoretical Model

The overall theoretical model proposed is shown in **Figure 3-6**. Given the relationship proposed between AL, the AC and IAP has already been explained in the preceding subsections (3.6.1 and 3.6.2), it will not be repeated here.

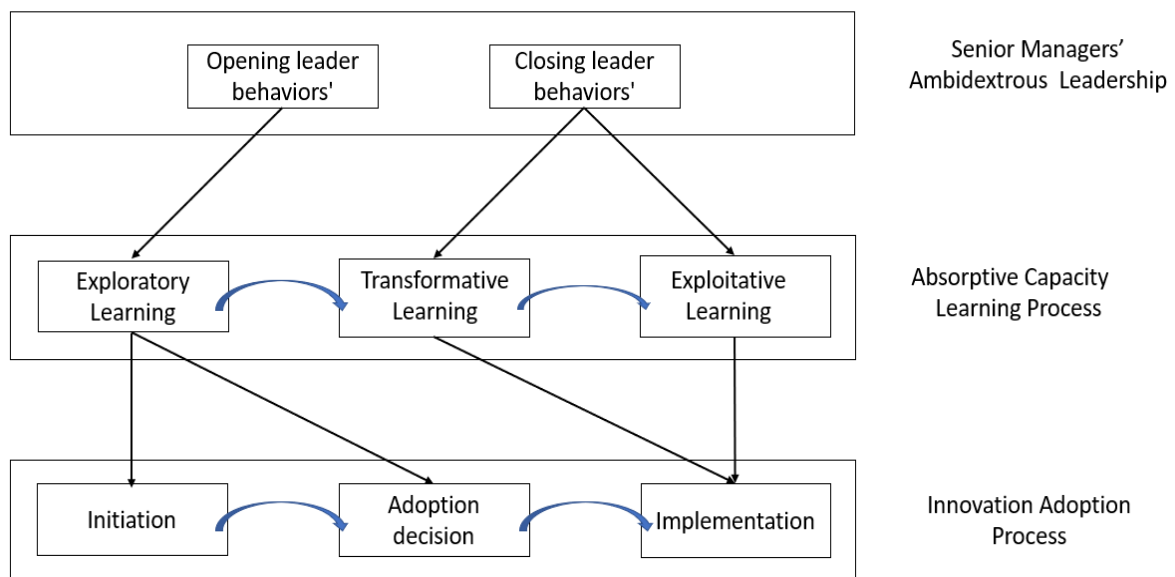


Figure 3- 6 The integrated Theoretical Model

-  indicates the sequence in AC learning and Innovation Adoption processes.
-  indicates the direction of influence between corresponding elements.

Taken together, this model proposes that senior managers' AL can facilitate IAP through influencing the AC learning process associated with it. More specifically, as suggested in the theoretical model (see section 3.5.3), it is the exploratory learning that enables the initiation and adoption decision in the IAP, whereas, the transformative and exploitative learning facilitate the implementation in the IAP. Additionally, the theoretical model suggests that it is

the senior managers' *opening* leader behaviours that facilitate the exploratory learning required in initiation and adoption decision in the IAP. Whilst, it is the senior managers' *closing* leader behaviours that promote the transformative and exploitative learning associated with implementation in the IAP.

3.7 Conclusion

In this chapter, three relevant terms used, namely, *Organisational Innovation*, *Newness* and *Senior Manager*, are defined firstly. Then the rationale for incorporation of AC in the theoretical model is explained. Subsequently, through comparing the distinctive features of the two generic innovation process models, the innovation adoption process model is adopted for the development of the theoretical model. Rationale for incorporating this specific process into the theoretical model is provided, arguing that it can accurately accommodate the reality that in most organisations innovations are developed through learning from the external environment. The overall theoretical model is presented in **Figure 3-6**, suggesting that senior managers' AL can facilitate organisational innovation through AC (hereafter, AC will be used as the learning process associated with the firm's innovations).

CHAPTER 4 RESEARCH METHODOLOGY AND DESIGN

4.1 Introduction

In this Chapter, the methodological considerations in this research are explained. The following aspects are discussed, covering the research philosophies, the research approach and design, the field work in terms of data collection and the analysis approaches adopted in this research. The following part of this chapter is organised as follows. In section 4.2 different research philosophies are consulted and compared firstly, from both the ontology and epistemology perspectives. Then the research philosophies adopted in this study is elaborated, indicating that the ontology and epistemology embraced in this study are *Constructionism* and *Interpretivism*, respectively. Additionally, the rationale is provided to justify the incorporation of these specific philosophical orientations in this research. In the following section, different research approaches, namely the inductive, deductive and abductive approaches, along with specific applications as proposed by research methodologists, are reviewed. Then, an argument is provided suggesting that given that the primary goal for this research is theory extension, the research approach adopted in this study is *inductive*. In section 4.4, details regarding the overall research design incorporated in this study is elaborated upon, covering topics such as the adoption of multiple case research design, data collection methods, case selection criteria, research protocol, along with research ethics. In section 4.5, the data analysis method used in this study is clarified. Finally, a conclusion is provided, summarising the key points in each section.

4.2 Research Philosophies

As suggested by Collis and Hussey (2014, p.43), a research paradigm is a philosophical framework that guides researchers in conducting their own scientific researches. In general, a research paradigm is composed by the following two interrelated elements, namely, Ontology and Epistemology. As revealed by research methodologists, such as Bryman (2012), Bryman and Bell (2007), and Saunders, Lewis and Thornhill (2009), researchers' ontological orientations represent their fundamental assumption about the nature of social phenomena. Whilst the epistemological orientations hold by researchers demonstrate their fundamental belief regarding what qualifies as acceptable knowledge (Bryman, 2012; Easterby-Smith, Thorpe, and Jackson, 2015; Saunders, Lewis and Thornhill, 2009).

In the following part of this section, different types of ontological and epistemological orientations will be consulted and compared firstly. Then the philosophical positions taken in this study will be presented, along with a rationale will be provided to justify the adoption of these specific philosophical positions in this study.

4.2.1 Ontological Orientations

As posited by research methodologists, in the fields of business and management studies, Ontological orientations taken by researchers reflect their fundamental beliefs regarding the nature of social phenomena (Bryman and Bell 2007; Bryman, 2012; Collies and Hussey, 2014; Easterby-Smith, Thorpe, and Jackson, 2015; Saunders, Lewis and Thornhill, 2009). More specifically, as suggested by Bryman (2012, p.20), the central point that distinguishes different ontological orientations is the question of “*whether social phenomena can and should be*

considered as objective entities that have reality external to social actors, or whether they can and should be considered as social constructions build up from the perceptions and actions of social actors”.

As revealed in previous researches, ontological stands taken by researches in the fields of business and management studies can be categorised, primarily, into the following two categories: *Objectivism* and *Constructionism* (Bryman and Bell 2007; Bryman, 2012; Saunders, 2011²⁰). Moreover, as posited by these methodologists, Objectivism and Constructionism are two ontological positions that represent the polar opposite to each other (Bryman and Bell 2007; Bryman, 2012; Saunders, Lewis and Thornhill, 2009).

As suggested by these academics, *Objectivism* represents the ontological position which asserts that social phenomena should be interpreted as existing independently and immune from the influences of related social actors and the social contexts it embedded in (Bryman and Bell 2007; Bryman, 2012). In contrast, the *Constructionism* position take the opposite view of former and argues “*social phenomena and their meanings are continually being accomplished by social actor*” (Bryman, 2012, p.32).

In this study, the ontology stand taken is *Constructionism*, and the rationale for embracing this specific research ontology are two folds. Firstly, it matches with the social phenomena under investigation is this study. As elaborated in chapters 2 and 3, the phenomena under investigation, i.e., leadership, absorptive capacity, and innovation adoption process, in this

²⁰ Saunders (2011) used slightly different terms in developing different categories of research ontologies. As suggested by the authors, the polar opposite of Objectivism ontology is Subjectivism ontology, which is defined as considers *social phenomena are created from the perceptions and consequent actions of social actors* (Saunders, 2011, p.132).

However, as revealed research methodologists such as Collies and Hussey (2014) and Lincoln et al., (2011), the terms of Constructionism, as proposed by Bryman and Bell (2007), and Subjectivism, as defined by Saunders (2011), are often used interchangeably by academics. Therefore, in this study, these two different categorisations of research ontologies will be treated as the same. And the term Constructionism, as proposed by Bryman and Bell (2007), will be adopted to represent the ontological stand that is opposite to Objectivism.

study, are fundamentally socially constructed rather than objective entities that have reality external to social actors and contexts. Secondly, it reconciles with the aim of the inquiry of this study. As revealed by Guba and Lincoln (1994, p.112), *Objectivism* ontology is often associated with scientific inquiry aimed at establishing the causal relationships between social phenomena. Whilst *Constructionism* ontology is considered as more appropriate for researches aiming at developing in-depth understanding regarding the relationships between social phenomena (Guba and Lincoln 1994, p. 112). Therefore, given the aim of this study is to understand the relationships amongst social phenomena rather than determining the causalities between them (as elaborated in section 1.3), the *Constructionism* ontology is deemed as most appropriated for this study.

4.2.2 Epistemological Orientations

Epistemological positions taken by researchers underpins the fundamental belief that he/she hold regarding *what should be considered as acceptable knowledge* in a field of study (Saunders, 2011, p.132). In the disciplines of Business and Management studies, there are four most frequently adopted epistemological positions, namely, Positivism, Realism, Interpretivism and Pragmatism (Bryman, 2012; Saunders, Lewis and Thornhill, 2009), as summarised in the following **Table 4-1**.

Table 4- 1 Comparing Research Philosophies in Business and Management Studies

	Pragmatism	Positivism	Realism	Interpretivism
Ontology: the researcher's view of the nature of reality or being	External, multiple, view chosen to best enable answering of research question	External, objective and independent of social actors	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data	Only observable phenomena can provide credible data, facts. Focus on causality and law-like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions
Axiology: the researcher's view of the role of values in research	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective
Data collection techniques most often used	Mixed or multiple method designs, quantitative and qualitative	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative

Source: adopted from Saunders, Lewis and Thornhill (2009, p.140)

- *Positivism*

The *positivism* epistemology stems from natural sciences (Bryman, 2012; Saunders, Lewis and Thornhill, 2009). The proponents of this specific epistemological orientation are

convinced that social reality can be revealed through following similar approaches that adopted by scientists in their investigations of natural phenomena (Bryman, 2012; Easterby-Smith, Thorpe and Jackson 2015; Saunders, Lewis and Thornhill, 2009). Therefore, from a *positivist* perspective, knowledge will only be deemed as acceptable if it is produced through the use of scientific approaches (Bryman, 2012; Gill and Johnson, 2010; Saunders, Lewis and Thornhill, 2009).

As summarised by researchers, the key feature associated with *positivism* epistemology is the emphasis regarding the importance and necessity for achieving law-like generalisability of the outcomes from studies (Remenyi, and Williams, 1998; Johnson and Duberley, 2000; Saunders, Lewis and Thornhill, 2009).

- *Realism*

Similar to the *positivism* epistemology, *realism* is another epistemological position that explicitly emphasising the necessity in adopting scientific methods and approaches in the pursuit of knowledge (Bryman, 2012). As suggested by Crotty (1998), the essence of *realism* epistemology is *what we sense is reality*. In other words, this philosophy suggests reality has an existence quite independent of human minds (Saunders, Lewis and Thornhill, 2009, p.136). Additionally, as revealed by Bryman (2012) and Saunders, Lewis and Thornhill (2009, the *realism* epistemology can further be divided into the following two sub-categories, namely, *direct* and *critical* realisms. The key difference between these two forms of *realism* is, the former emphasises the importance of sensing in the development of knowledge, whilst the latter believes human sensations (experience) are only the reflections of realities, but not direct ones (Saunders, Lewis and Thornhill, 2009, p.136). More specifically, *direct realism* believes knowledge can be developed through the direct observation of reality, whilst *critical realism*

disagrees with the former by arguing that what can be observed is only the reflection of reality but not the reality itself (Bhaskar 1989; Dobson, 2002).

In its counter argument against *direct realism*, *critical realism* brakes the process of recognising the reality into the two sequential steps. The first step refers to the recognition of the sensation that social reality conveys. Whilst the second step pertains to the mental processing of the sensation and the subsequent formation of individualised understanding regarding reality (Saunders, Lewis and Thornhill, 2009). Thus, *critical realism* views the development of acceptable knowledge is significantly influenced by researchers' experiences and beliefs. Therefore, despite the adoption of scientific approaches is explicitly emphasised and strictly followed in by them in developing knowledge, academics who adopt the *critical realism* epistemology also acknowledge knowledge developed in their studies are not value-free (Saunders, Lewis and Thornhill, 2009).

- *Interpretivism*

In contrast to the *positivism* and *realism* epistemological orientations, *interpretivism* epistemology challenges the credibility of the adoption of scientific approaches and methods in the pursuit of knowledge in social science studies (Saunders, Lewis and Thornhill, 2009). Through emphasising the nature of social realities as socially constructed and subject to the influence of social actors, i.e. the human interactions, *interpretivism* significantly crumbled the foundation of their counter parts (Bryman, 2012), and consequently, the value of adopting scientific methods in the study of social science (Snape and Spencer, 2003).

- *Pragmatism*

Pragmatism represents quite a unique research epistemology (Hughes and Sharrock, 1997; Reason and Bradbury, 2001; Johnson and Onwuegbuzie, 2004). As suggested by Creswell (2014), the primary concern of this specific epistemological position is what action should be

adopted in specific research contexts so as to facilitate efficiency and effectiveness in conducting academic inquiries. The philosophical divergence between *positivism* and *interpretivism* is generally ignored by pragmatists. In fact, they even suggested researchers should be flexible in adopting either *positivism* or *interpretivism* epistemologies, or both of them, in social science researches (Johnson and Onwuegbuzie, 2004). However, this so called “flexibility” in switching between *positivism* and *interpretivism* epistemologies also represents the fundamental problems associated with *pragmatism* epistemology, as it does not commit itself to any single system of philosophy and reality (Collis and Hussey, 2014, p.54; Creswell, 2014). Therefore, given the ontological and epistemological orientations associated with this specific epistemology is extremely ambiguous, it will be excluded in the further discussion in this chapter.

In addition to the distinctions amongst these distinctive epistemological positions presented in preceding discussion, *Axiology* is another worth noting category that can be deployed to further distinguish these epistemological positions from each other (Saunders, Lewis and Thornhill, 2009).

As suggested by Saunders, Lewis and Thornhill (2009, p.116), *Axiology*, is a branch of philosophy that can be deployed to study the “*judgement of values*” of researchers. As revealed by Heron (1990), individuals’ value is the primary guide for their actions. Therefore, research processes will inevitably be influenced by researchers’ value. Additionally, due to the influence of researchers’ personal values and the inherent disparity amongst their values, research findings generated by researchers can vary substantially between each other’s, even by using the same data and analytical methods (Saunders, Lewis and Thornhill, 2009). This idea resonates with the term of “*reflexivity*”, coined by Bryman and Bell (2007).

As revealed by Saunders (2011), *positivism* and *interpretivism* take the opposite positions from the *axiology* perspective. By arguing researchers only have quite limited and infrequent interactions with their research subjects, along with their faithful compliance of scientific methods and approaches in conducting research, *positivism* believes that its followers' value and its influence on both research processes and outcomes are ignorable. In other words, from the *positivism* perspective, social phenomena can be investigated independently from the influence of social actors (Saunders, Lewis and Thornhill, 2011, p.140). As suggested by research methodologists, this explicitly separation between researchers' influence and the social phenomena been investigated by positivists represent an *Objectivism* ontological positioning taken by them (Bryman, 2012; Saunders, Lewis and Thornhill, 2009). In contrast to *positivism*, *interpretivism* acknowledges, in the field of social science studies, researchers' value can and will inevitably influence research processes and its outcomes (Collis and Hussey, 2014; Saunders, Lewis and Thornhill, 2011; Bryman, 2012). Additionally, by taking the *Constructionism* ontological stand, *interpretivism* argues: since social reality itself is constructed and constantly revised by social actors, it is impossible to conduct a research that is completely value-free (Collis and Hussey, 2009; Saunders, Lewis and Thornhill, 2009; Bryman, 2012). In contrast, as demonstrated in **Table 4-1**, in contrast to the polar opposite *axiology* stands taken between *positivism* and *interpretivism* epistemologies, the *realism* epistemology adopts an *axiology* that agrees researches are intrinsically value laden and inevitably biased by the world view hold by researchers. However, it is also revealed, despite *realism* epistemology agrees with *interpretivism* epistemology regarding the fact that researches are intrinsically value laden and will be influenced by researchers' values, its ontology stand is actually *Objectivism* rather than *Constructionism* (Collis and Hussey, 2014; Saunders, 2011). Moreover, as revealed by Easterby-Smith, Thorpe and Jackson (2015, p.54)

this specific feature associated with *realism* epistemology implies it is strong affiliated with the *positivism* epistemology rather than *interpretivism* epistemology.

This study agrees with the *interpretivist* assertion and embraces the *interpretivism* epistemology. The rationale for adopting this specific epistemological orientation in this study are two folds. The first and foremost one is, as suggested by methodologist such as Saunders, Lewis and Thornhill (2011), Bryman (2012), Easterby-Smith, Thorpe and Jackson (2015), it is an epistemology that matches with the *Constructionism* ontology adopted in this study. The second one is, as demonstrated in **Table 4-1**, it reconciles with the key feature associated with this study, which is to generate in-depth understanding regarding the reality behind social phenomena.

4.3 Research Approaches

In this section, the three general research approaches, namely, *deductive*, *inductive*, and *abductive* approaches, in the field of business and management studies, will be introduced and compared firstly. Then an argument will be provided suggesting, in comparison to the *deductive* and *abductive* approaches, the *inductive* one is considered as most appropriate for this study. Moreover, it will also be revealed, given the overall research approach adopted is *inductive*, the subsequent research strategy favoured in this research is *qualitative* one.

4.3.1 The Deductive Approach

The *deductive* approach represents a research process in which the researchers firstly develop hypothesis (or tentative ideas) from existing theory, then test it through scientific methods

(Saunders, Lewis and Thornhill, 2011; Bryman, 2012; Silverman, 2013). Subsequently, as revealed by Bryman (2012), this approach can be characterised as moving from theory (general) to data (particular).

According to Blaikie (2009) and Saunders, Lewis and Thornhill (2011), the *deductive* approach progresses through the following sequential steps:

- 1) Developing a hypothesis or hypotheses from existing theory
- 2) Testing the hypothesis or hypotheses by using appropriate data collected
- 3) Rejecting or accepting the hypothesis or hypotheses based on empirical results

As observed by research methodologists, this approach is often adopted by academics who embrace the *positivism* epistemology and focus on theory testing through using quantitative research methods in their researches (Bryman and Bell, 2007; Snieder and Larner, 2009; Saunders, Lewis and Thornhill, 2011; Wiles et al., 2011; Easterby-Smith, Thorpe and Jackson, 2015). However, as suggested by Bryman (2012, p.12) and Saunders, Lewis and Thornhill (2011, p.146), despite this approach offers an effective mean for researchers to determining the causalities between variables, it also has some drawbacks. As revealed by these scholars, one of the biggest drawbacks associated with this approach is, its tendency to *construct rigid methodology*²¹, as it significantly handicaps the possibilities for alternative explanations to emerge from researches (Bryman, 2012; Saunders, Lewis and Thornhill, 2011).

²¹ As elaborated by Saunders et al., (2011, p.674) research methodology refers to the theory of how research should be undertaken, which covers both theoretical and philosophical assumptions upon which research is based. The term rigid methodology used by Saunders and Colleagues (2011) refers to the research methodology that emphasising the adoption of *positivism* epistemology and research methods developed from the studies from natural sciences only.

4.3.2 The Inductive Approach

In contrast to the *deductive* approach, the *inductive* approach represents a research strategy that moves from the specific (data) to the general (theory) (Saunders, Lewis and Thornhill 2011; Bryman, 2012). In this approach, researchers generally start from observations and the subsequent search of emerging patterns from data (Collis and Hussey, 2014). Therefore, since there is no framework that can be used initially in this specific research approach, the research focus in using this approach can only be specified after the collection of data (Flick, 2014).

As revealed by research methodologists, in contrast to the strong affiliation between the *deductive* approach and quantitative research methods, the *inductive* approach is, in general, closely associated with qualitative methods (Bryman and Bell, 2007; Saunders, Lewis and Thornhill, 2011). Moreover, as suggested by Bryman (2012), this specific feature associated with the *inductive* approach can significantly eliminate researcher's bias in overall research process, as in this approach there is no established framework to inform and dictate such process. However, it is also cautioned by Saunders, Lewis and Thornhill (2011), Bryman (2012) and Easterby-Smith, Thorpe and Jackson (2015), despite this approach does offer a promising future for researchers' to achieve theory development or extensions, the possibility of data collected through this approach only ended up echoing existing theory is also unneglectable.

4.3.3 The Abductive Approach

Abductive approach is a research process first coined by pragmatist Charles S. Peirce (1935, p.525) (Coffey and Atkinson, 1996; Haig 1995; Kelle, 2007; Locke, 2007). As elaborated by Peirce (1934, p.117) *abductive* approach refers to *an inferential creative process of producing*

new hypotheses and theories based on surprising phenomenon observed (cited from Timmermans and Tavory, 2012, p.170).

In other words, *abductive* approach starts with the observation of a surprising fact or an anomaly (Dubois and Gadde, 2002; Timmermans and Tavory, 2012), which does not match or falsifies existing theories (Timmermans and Tavory, 2012; Kirkeby, 1990; Danermark, 2001; Kovács and Spens, 2005). Subsequently, a creative iterative process is then triggered in the light of the surprising fact or the anomaly identified (Taylor et al., 2002). In this process, techniques such as “theory matching” or “systematic combining” (Dubois and Gadde, 2002; Timmermans and Tavory, 2012) are often employed. This is so as to enable the development of a new theory or the extension of existing framework that can be deployed in explaining the anomaly observed (Taylor et al., 2002; Kovács and Spens, 2005).

As suggested by Mantere and Ketokivi (2013), this specific research approach is often considered as most appropriate process for research aiming to develop new theories (Kirkeby 1990; Kovács and Spens, 2005; Timmermans and Tavory, 2012) in explaining deviating real-life observations (Alvesson, M. and Sköldberg, 1994) in the form of new hypotheses (Peirce, 1934; Andreewsky and Bourcier, 2000).

Table 4-2 briefly summaries the key distinctions regarding the logical forms associated with each of the three research approaches respectively.

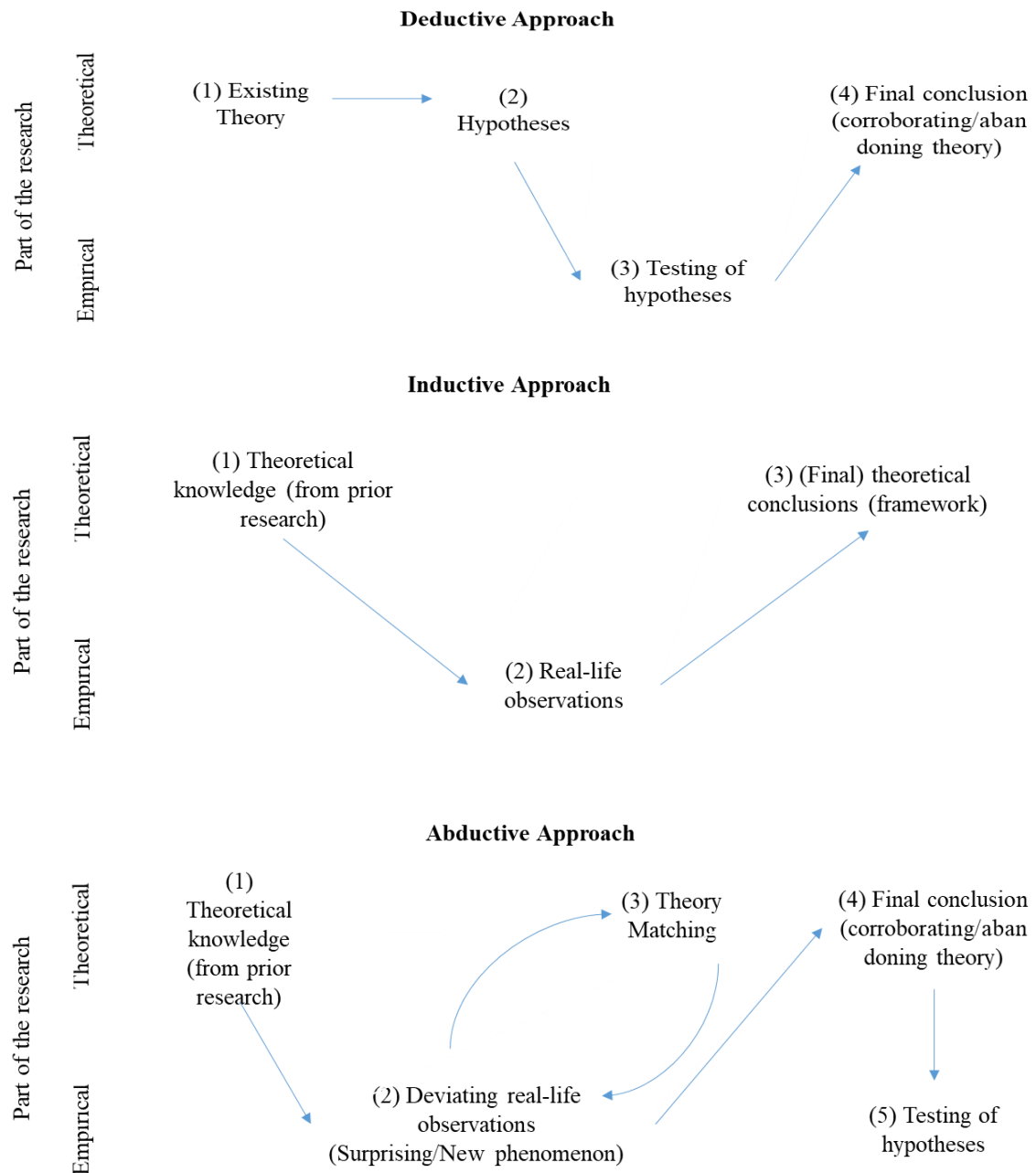
Table 4- 2 Distinctions regarding the logical forms associated with Deductive, Inductive and Abductive Approaches

	Deductive	Inductive	Abductive
General research approaches	Starts with a rule and proceeds through a case to arrive at an observed result, which either demonstrates the rule or falsifies it.	Starts with a collection of given cases and proceeds by examining their implied results to develop an inference that some universal rule is operative.	Starts with consequences, which quite often are new or surprising cases, then construct reasons to explain them.
Underlying Logic forms	ALL A are B, C is A. Thus, C is B	All observed A are C, Thus, all A are C.	The surprising fact C is observed. But if A were true, C would be a matter of course. Hence, there is a reason to suspect that A is true.

Source: summarised from Timmermans and Tavory (2012, p.171).

And, the details regarding the differences between *deductive*, *inductive* and *abductive* approaches are revealed in the following **Figure 4-1**.

Figure 4- 1 Details regarding the differences between Deductive, Inductive and Abductive Approaches



Source: adopted from Kovács and Spens (2005, p.136-140).

By referring the distinctions between the three research approaches, as demonstrated in the previous **Table 4-2** and **Figure 4-1**, in this research, the *inductive* approach is adopted. The rationale for adopting this specific approach in this research are two folds:

- 1) It reconciles with the purpose of this research, which is theory building rather than theory testing; moreover,
- 2) It reconciles with the aim of the inquiry in this research. As elaborated in Chapter 1 (section 1.2), the primary concern of this research is to develop in-depth understanding regarding the social phenomena under investigation, rather than to provide the “best explanation” for “surprising facts”.

Moreover, by following the research methodology map proposed by Bryman (2012, p.35) (as demonstrated in the following **Table 4-3**), the subsequent research method adopted in this study is *qualitative*.

Table 4- 3 Differences between quantitative and qualitative researches

	Quantitative	Quantitative and Qualitative	Qualitative
Principal Orientation	Deductive: theory testing	Abductive: theory building	Inductive: theory building
Epistemological Orientation	Positivism	Pragmatism	Interpretivism
Ontological Orientation	Objectivism	Objectivism	Constructionism

Source: summarised from Bryman (2012, p.36), and Mantere and Ketokivi (2013, p.80-86), with modifications.

4.4 Research Design

As revealed by research methodologists, research design provides the general guide of how research question(s) is (are) to be answered in research (Lewis and Thornhill, 2011). And it specifies key issues such as the source(s), and the method(s) adopted regarding the collection and analysis, of data, along with ethics, in research (Vaus, 2001; Saunders, Lewis and Thornhill, 2011). In other words, research designs address the logic rather than logistic issues in researches (Yin, 1989, p.29).

Moreover, as revealed by research methodologists, in order for research question(s) proposed to be properly addressed, the overall research design adopted in a research must be coherent with the purpose of the research (Vaus, 2001; Robson, 2011; Saunders, Lewis and Thornhill, 2011; Easterby-Smith, Thorpe and Jackson, 2015; Bryman, 2012). Subsequently, as proposed by these authors, the purpose of research can be categorised into either of the following three categories: exploratory, descriptive and explanatory, depending on the research focus developed along with the specific question(s) asked in the research (Vaus, 2001; Robson, 2011; Saunders, Lewis and Thornhill, 2011; Bryman, 2012). Details regarding each of the three distinguished research purposes identified, along with the corresponding research focuses and type of research questions associated with them, are summarised in the following **Table 4-4**.

Table 4- 4 The Comparison of Explorative, Descriptive and Explanative studies

Purpose of the study	Research Focus
Exploratory	To understand what is happening, to seek for new insight, and to assess phenomena with novel approaches or perspectives i.e. <i>how</i> is it going to
Descriptive	To establish a precise description of social phenomena i.e. <i>what</i> is going on
Explanatory	To establish and explain the causal relationship between variables that abstracted from social phenomena i.e. <i>why</i> is it going on

Source: summarised from Vaus (2001, p.1); Robson (2011, p.59), and Saunders, Lewis and Thornhill, 2011(p.139-142).

As elaborated in chapter 1, the primary goal in this study is to understand the nature of relationships between specified social phenomena from a novel perspective (details in section 1.2), thus, by referring to **Table 4-4**, the purpose of this research is *exploratory*.

According to Vaus (2001, p.10), Robson (2011), and, Saunders, Lewis and Thornhill (2011), *exploratory* studies are open to, primarily, the following four research designs, namely, experiment design, case study design, longitudinal design and cross-sectional design; and each of these distinguished research designs has its own applications (Vaus 2001; Robson, 2011; Saunders, Lewis and Thornhill, 2011), as summarised in the following **Table 4-5**.

Table 4- 5 The Comparison of Research Designs

Research Designs	Applications
Experiment design	The determination of correlation between independent variables through random sampling and data manipulation
Case study design	Empirically investigating contemporary phenomena where the separation of context and reality is impossible
Longitudinal design	To study change and development regarding social phenomena over time
Cross-sectional design	The study of specific phenomena in specific time in various contexts

Source: summarised from Vaus (2001, p.9-15), Robson (2011, p.172-180) and Saunders, Lewis and Thornhill (2011, p.142-147).

Subsequently, by referring to the differences regarding the applications of these four research designs, as listed in **Table 4-5**, case study is considered as the most appropriate research design for this study.

As revealed by Yin (2014, p.9) case study research design can potentially incorporate either of the following four research methods, namely, *experimentation*, *survey*, *case study* and *history*. Moreover, as suggested by Yin (2014), prior to the adoption of any particular method into case study research, there are three issues that need to be considered:

- 1) The type of question been asked,
- 2) The extent of control a researcher has over actual behaviours events

3) The degrees of focus on contemporary as opposed to entirely historical events

In the following **Table 4-6** summarises the different conditions associate with each of these four research methods.

Table 4- 6 Corresponding Situations for different Methods in Case Study Design

Methods	Types of research questions	Requires Control regarding social phenomena under investigation	Focuses on Contemporary events
Experimentation	How, Why	Yes	Yes
Survey	What, Where, How many, how much	No	Yes
Case Study	How, Why	No	Yes
History	How, Why	No	No

Source: adopted from Yin (2014, p. 9)

As indicated in the theoretical model (section 3.6.3, **Figure 3-6**), this research explores how senior managers' AL facilitates IAP from the perspective of AC. Thus, by referencing to the preceding Table, in this study, case study research method will be adopted, as it allows this study to answer the *how* question regarding social phenomenon under investigation which the research has no control. Moreover, by referring to the "*process of building theory from case study research*" as proposed by Eisenhardt (1989, p.533), an overall research process (as demonstrated in the following **Table 4-7**), is also developed in and followed strictly throughout this study.

Table 4- 7 Process of building a theory from Case Study Research

Step	Activity	Reason
Getting Started	Definition of research question	Focuses efforts
	Possibly a priori constructs	Provides better grounding of construct measures
Case Selection	Specified population,	Constrains extraneous variation and sharpens external validity
	Theoretical, not random, sampling	Focuses efforts on theoretically useful cases-i.e., those that replicate or extent theory by filling conceptual categories
The development of instrument and research protocols	Multiple data collection methods	Strengthens grounding of theory by triangulating of evidence;
	Qualitative and quantitative data	Synergistic view of evidence;
Filed Work	Overlap data collection and analysis, including field notes	Speeds analyses and reveals helpful adjustment to data collection;

	Flexible and opportunistic data collection methods	Allows investigators to take advantage of emergent themes and unique case features
Analysing Data	Within-case analysis	Gains familiarity with data and preliminary theory generation;
	Cross-case pattern search using divergent techniques	Forces investigators to look beyond initial impressions and see evidence through multiple lenses
Developing Propositions	Iterative tabulation of evidence for each construct;	Sharpens construct definition, validity, and measurability
	Replication, not sampling, logic across cases;	Confirms, extends, and sharpens theory
	Search evidence for “why” behind relationships	Builds internal validity
Enfolding Literature	Comparison with conflicting literature;	Builds internal validity, raise theoretical level, and sharpens constructs definitions;
	Comparison with similar literature	Sharpens generalizability, improves construct definition, and raises theoretical level
Reaching Closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small

Source: adopted from Eisenhardt (1989, p.533), with modifications

In the following part of this section, certain key issues, such as the sampling criteria, data collection methods, case study protocol, research ethics and data analysis, in this research will be further elaborated.

4.4.1 Sampling Criteria

As explained in section 3.6.3 (**Figure 3-6**), this research explores how senior managers' AL facilitates IAP from the perspective of AC. Therefore, this research incorporates the theoretical sampling strategy, and focusing on firms with both high innovation performance and ambidextrous leadership.

As suggested by Eisenhardt (1989) and Yin (2014), theoretical sampling strategy depicts the ways that case(s) is (are) selected on the basis that it (they) would allow researchers to achieve the purpose of theory building or theory extension. Therefore, the population base (i.e., number of cases selected) in case studies is quite often significantly lower than those in qualitative studies (Auerbach and Silverstein, 2003; Creswell, 2007; Vaus, 2001). However, given the case(s) in case study research is(are) selected through the theoretical sampling rather than random sampling, the generalisability regarding research findings generated from case study research is often challenged by academics in the name of scientific criticism (Eisenhardt, 1989; Yin, 2009).

On the counter argument provided by Yin (2014, p.40-42) against this specific criticism, the author pointed out, in contrast to the *statistic* generalisability, which is the primary way for quantitative researches to achieve its contribution to new knowledge, case study contribute to the development of new knowledge through *analytical* generalisation. As further elaborated by the author, the generalisability of case study findings should be valued based whether it

achieved either of the following objectives: 1) the corroboration, modification, rejection or extension of theoretical concepts that been referenced in the design of case study or 2) the development of new concepts (Yin, 2014). Similar arguments can also be identified from other distinguished case study methodologists such as Firestone (1993), Eisenhardt (1989), and Merriam (1998).

According to Eisenhardt (1989), Yin (1994) and Voss et al., (2002), there is no universally applied rules for case study sampling process, and case study researcher should not be predisposed to any particular process. Additionally, the sampling criteria/logic in case study researches should be developed on the basis that it reflects the specific nature of each research (Eisenhardt, 1989; Yin, 1994; Voss, 2002). Furthermore, as suggested by Eisenhardt (1989) and Yin (2014), case(s) should be selected in on the basis of whether it represents either of the following aspects: the literal replication (where case selected predicts similar result), and the theoretical replication (where contrary results are produced by with predictable reasons). Moreover, as revealed in previous studies, literal sampling strategy is most relevant for case studies aimed at theory building, whilst, theoretical replication is often used for theory testing (Eisenhardt and Graebner 2007; Voss et al., 2002, p.203; Yin, 2014).

Therefore, in this study, in this study, the literal replication sampling strategy proposed by Eisenhardt and Graebner (2007), Voss et al., (2002) and Yin (2014), is adopted. Case companies are selected from highly innovative Heavy Equipment Manufacturing (HEM) firms in China. Innovativeness, along with the presence of senior managers' ambidextrous leadership are the key criteria adopted for this research in the case selection process (see 4.4.3.2).

In an ideal world, where all relevant information regarding firms' innovation performance are publicly available, firm's innovativeness can be quantified by using data and sources that are

publicly available. However, information regarding firm's innovation performance in the targeted industry is not always publicly accessible, as most of them are not publicly listed firms. Therefore, in order to counter this drawback, several industrial experts in this specific industry are consulted on the early stage of data collection process. The decision to consult industrial experts to mediate the limited accessibility for industrial information is inspired by the discussion of critical role played by “*key informant*” in the famous case study “*Street Corner Society*” (Whyte, 1943, 1955; Yin, 2009, 2014). It is with the help of these industrial experts that the identification of highly innovative companies in the targeted industry could be achieved in this research. In addition, these industrial experts also helped to establish the initial contact with several firms to check their willingness in participating this research. In the following part of this section, the differences between single and multiple case designs will be revealed, and rational will be provided justifying the adoption of multiple case design in this research.

Single vs Multiple Case(s) Designs

As suggested by Yin (2014, p.51), a single-case design is acceptable if the case selected fits into the any one of the following categories: “*critical, unusual, common, revelatory or longitudinal*”, and each of them has their own distinctive advantage in contributing to the generation of new knowledge, as demonstrated in **Table 4-8**.

Table 4- 8 Types of Single Case Design

Critical case	Case critical to the theory building or theoretical proposition; and it offers unique context settings in which its propositions are supported
Unusual case (or extreme case)	Case that represent phenomena deviating from theoretical norm
Common case	Case that captures the circumstance and condition of everyday situation
Revelatory case	Case that offers the opportunity for previously inaccessible phenomena to be investigated
Longitudinal case	Case that offers opportunity for the change of specific social phenomena to be investigated

Source: summarised from Yin (2014, p.50-53)

As revealed in previous researches, in addition to these distinctive advantages associated with this specific design, as summarised in **Table 4-8**, single case research design also enables researcher to achieve deeper understanding regarding social phenomena under investigation, in comparison with other research designs (Eisenhardt, 1989; Creswell, 2013; Yin, 2014). However, the weakness of single case research design is also unneglectable, such as limited replicability for other researchers and the lack of robustness, as suggested by Herriot and Firestone (1993).

In contrast to single-case design, which is particular useful in offering comprehensive understanding for existing phenomena (Siggelkow, 2007), multiple-case design offers a solid foundation for theory building and extension (Eisenhardt and Graebner, 2007; Yin, 1994).

Additionally, it also allows a relatively high level of robustness and replicability regarding research findings generated through using this design (Eisenhardt and Graebner, 2007; Yin, 2014, p.61). Moreover, as suggested by Eisenhardt and Graebner (2007, p.27), the use of multiple cases also enables researchers to achieve more accurate definitions and appropriate level of abstraction of constructs under investigation. This is particularly relevant from the perspectives of theory building and theory extension, as in these researches accuracy of the clarification regarding the relationship and logic amongst constructs is crucial for the Construct Validity (a term that will be further elaborated in the subsequent section), a key determinant of the quality for case study researches (Eisenhardt and Graebner, 2007; Stake, 2013; Yin, 2009).

However, despite these advantages associated with multiple-case design, as listed in the preceding paragraph, it is not free from critics. As suggested by Eisenhardt (1989) and Yin (2009, 2014), given the limited resources and time available to researchers, the use of multiple cases rather than single case in case study research means that the depth of the understanding of social phenomena under investigation will be compromised to certain extent.

By referring to the preceding discussions, in this thesis, the multiple-case design will be adopted, as it can a better opportunity for the researcher for this study to explore the relationships, and the logics that underpin them, regarding targeted social phenomena.

There is no universally agreed optimal number of cases that should be selected for a multiple-case design, and suggestions offered varies amongst influential case study methodologists (Eisenhardt, 1989; Stake, 2013; Yin, 1994). As suggested by Yin (2014, p.53-63), from the case study research perspective, it is the replication logic rather than sampling logic that should be given primary concern in case selection process. Therefore, by taking the limited time and resources available to this research, in this study, three cases are included.

4.4.2 Quality of the Case Study

According to Yin (2014), the quality of case study research should be evaluated from the following four aspects: construct validity, internal validity, external validity, and reliability. As suggested by Eisenhardt (1989) and Yin (2014, p.46) specific quality concerns stemmed from each of the four aspects can be elucidated in a fairly concise manner, as summarised following:

- *Construct validity*: the identification of accurate operational measurements for constructs investigated.
- *Internal validity*: seek to establish causal relations between variables, so as the spurious relationships between variables can be distinguished.
- *External validity*: search for parameters in which the research finding can be generalised.
- *Reliability*: demonstrate the replicability of the operation of a study, with the same finding been produced.

Moreover, as suggested by Eisenhardt (1989) and Yin (2014), in case study research, these quality concerns can be addressed through the adoption of certain tactics during the process of case study. Details regarding these tactics, along with its stages for adoptions as recommend by Yin (2014) are summarised in the following **Table 4-9**.

Table 4- 9 Quality specifications, Tactics and suggested phases for adoption

	Tactics recommended	Phase for the adoption of tactics
Construct validity	Multiple source of evidence; Chain of evidence; Have key informants review draft case study report	Data collection
Internal Validity	Pattern matching; Explanation building; Address the rival explanations; Use logic models	Data analysis Data analysis Data analysis Data analysis
External Validity	Analytical generalisation	Research design
Reliability	Use case study protocol; Generation of data base	Data collection

Source: Yin (2014, p.46-50)

From a narrative perspective, each of these specifications should be addressed in accordance with the details discussion of methods, tactics adopted in different stages of the research process, so that the clarity in the demonstration of the way the how quality of this research in guaranteed can be achieved. Therefore, instead of further elaborating how each of the aforementioned aspects is enhanced in this research, a table (**Table 4-10**) will be provided, summarising tactics and activities adopted in this research to address these four quality concerns.

Table 4- 10 Tactics adopted in addressing research quality considerations

	Tactics Recommended	Tactics adopted in this research
Construct validity	Multiple source of evidence	Interview, observation and documentation
	Chain of evidence	Constant supervision and advisory from supervisors regarding argument and logic development
	Have key informants review draft case study report	Draft research report been sent to several industrial experts for advises.
Internal Validity	Pattern matching	The matching of patterns from cross case analysis
	Explanation building	
	Address the rival explanations	
	Use logic models	

External Validity	Theoretical Saturation	Theoretical Saturation
Reliability	Use case study protocol; Generation of data base	The development research protocol before data collection

In this research, internal validity is addressed through pattern matching tactics, as will be explicated in Chapter 5 and 6. Furthermore, theoretical saturation, a tactic suggested by Yin (2014), is adopted in this research to ensure the external validity of this research, as will be demonstrated in Chapter 5. Moreover, the construct validity and reliability issues are addressed during data collection process in this research, as demonstrated in the following sections.

4.4.3 Data Collection

4.4.3.1 Industrial Background

The target industry in this research is Heavy Equipment Manufacturing (HEM) industry in China. As revealed in previous research, hem is one of the key industries that significantly contributed to the economic development in China for last two decade (Xu and Xie, 2008). Historically, given its strategic value, this industry used to be monopolised by state-owned enterprises (SOEs). The main products provided by this industry cover the following categories: crane, bulldozer, earth-digger, horizontal and vertical drillers, tunnel boring machine, shield tunnelling machines, etc. In addition to these products, on-site services, distanced maintenance services and pre-and- after sales services are also provided by these manufactures in this industry. The strategic value of this industry can also be demonstrated

through its contribution to the development of many other industries (i.e., construction and mining industries).

Given this industry was used to be monopolised by SOEs, the significance of innovation has long been overlooked senior managers in this industry. However, ever since China adapted into market economy, the competitive landscape in this industry has changed significantly. As revealed by Men et al., (2013), innovation is now considered as the key determinants of the core competence for firms operating in this industry. Subsequently, the last two decades has witnessed a remarkably increase in R&D expenditures in this industry, as shown in the following **Figure 4-2**.

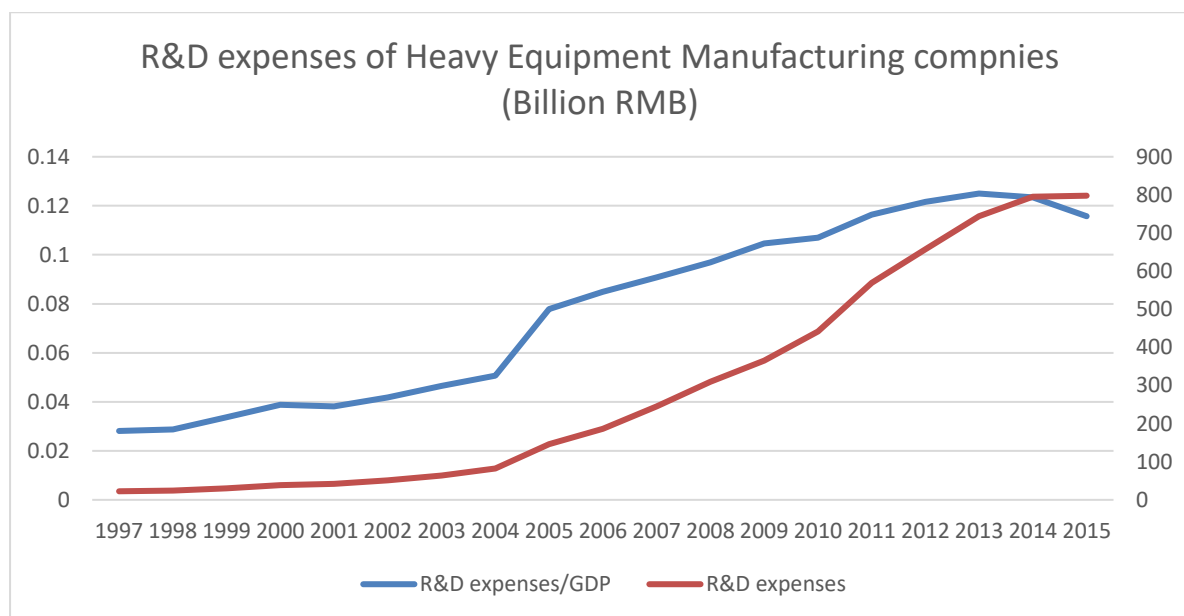


Figure 4- 2 Research and Development Expenditure in HEM Industry

Source: China National Bureau of Statics

4.4.3.2 Identifying Representative Cases

Prior to the field work started, two brief interviews, with industrial experts, are conducted. Certain value insights, such as specific ways that the targeted industry accomplish its innovation activities are gained. Additionally, the two experts also offered some valuable advice in the design of general research questions, such as remove question that would be considered as too sensitive in the targeted research context. Moreover, they also helped in rephrasing ambiguous research questions into plain terms, so as the unnecessary confusion can be avoided once managers from these targeted firms are interviewed. Furthermore, as both industrial experts have more than twenty years' experience in heavy equipment manufacturing industry, it is with their help that the researcher successfully identified firms that satisfied the sampling criteria of innovativeness and ambidextrous leadership (as mentioned in 4.4.1).

Overall, it took the research five month, from Oct 2014 to Feb 2015, to finish the field work for this research. Due to unexpected reason, the temporary closure of heavy pollution firms in pan-capital areas in China during 2014 APEC, the access to the first company was only granted one month after field work started. From a retrospective point of view, the field work in Company Alpha is extremely valuable for this research, for, mainly but not only, the following three reasons: firstly, through the interview of senior managers in this firm, the research achieved a comprehensive understanding of key features of innovations developed in the targeted industry; secondly, the valuable industrial insights, especially those pertain to the bona fide innovativeness of firms operating in this industry, are offered by senior managers in this firm; and thirdly, initial access to some previously inaccessible firms are established with the help offered by senior managers in this firm.

It is with the help offered by senior managers from Company Alpha and the advices provided by the two industrial experts, that the list of firms suitable for this research is finalised. And

eventually, by following the *literal replication* case selection principle suggested by Eisenhardt (1989) and Yin (2014, p.57) (see detailed discussion provided in section 4.4.1), three leading innovative companies in the targeted industry are selected in this research.

4.4.3.3 Data Collection

In this study, data are collected from the following channels, interviews with managers, observation and company documents. Each of these methods will be elaborated in the following subsequent sections. In the end of this section, a short summary will be provided pointing out that the adoption of multiple methods in data collection process not only served the purpose for improving the quality of data collected through *triangulation*, but also significantly contribute to the construct validity of this research, a point that discussed in preceding section (4.4.2).

- Interview

Interview is one of the most prominently adopted data collection method in the field of social science studies (Creswell, 2007; Bryman, 2012; Yin, 2014). According to Bryman (2012), interviews, can be organised in the following three shapes: structured, semi-structured and in-depth. The key difference between structured and the rest two types of interviews is that the former requires researchers to follow interview questions, that been designed prior to the interview, stringently during interview; and any kind of improvisations such as asking extra questions and changing the sequence of interview questions executed by interviewer will be considered as unnecessary and undesirable (Bryman, 2012). In contrast to the structured interview method, researchers who adopt semi-structured or in-depth interview method are privileged with freedom, though the level varies accordingly to each of these two specific methods, to improvise by asking follow-up questions once some new and valuable insights,

that not been included in the pre-designed question guide (Saunders et al., 2009). In other words, semi-structured and in-depth interview method are more suitable for researches that aim to reveal the underlying correlation between social phenomena whilst structured-interview offers better opportunities for causal-effects between social realities to be established, as suggested by Creswell (2007) and Vaus (2001).

In contrast to the distinctions that can be utilised to distinguish between structured-interview and the rest two proposed interview methods, as discussed in preceding paragraph, the difference between semi-structured and in-depth interview is quite subtle, as they both allows certain level of freedom for researcher to pursue topics that are not covered in prior to the interview. As suggested by Saunders et al., (2009, p.246), in semi-structured interview, research questions are guided by a list (*interview guide*) of general themes and topics that the researcher wants to explore during the research, whilst in in-depth interview, there is no such a list of themes or topics that can be used as the general guide for researcher to develop their specific questions, and consequently, the interview can deviate from its originally directions to anywhere.

Therefore, in this study, semi-structured interview is adopted. And the rationale for adopting this specific interview method are three folds. Firstly, its less structured nature enables this study to adapt firm-specific questions, so that data gathered from interviewees can be firm specific. Secondly, it allows the researcher to respond to some newly emerged themes during interviews promptly and consequently enable this research to achieve more comprehensive understanding of the social phenomena under investigation. Thirdly, by following the interview guide, which is drafted prior to the field work, this study can focus on the pursuit of the novel themes to those relevant to the research topic only and significantly reduce the risk of getting digressed.

In this research, by following suggestions from Yin (2009) and Eisenhardt (1989), an interview guide (as listed in **Table 4-13**) is developed prior to the start of work. This interview guide is used as an essential source to guarantee that key themes and questions in this research can be covered in every interview. The theoretical framework (section 3.6.3) is used as the primary guide for the development of the interview questions. Subsequently, questions proposed in the interview guide are tailored accordingly, so as to reveal the correlations between these key constructs derived from literature. Additionally, this research also adopted the open-ended question design in interview questions, so that the interviewees' personal experience and feeling regarding the correlation between their firm's senior level managerial activities and firm's innovation performance could be fully comprehended during interviews. During the field work, the researcher always seeks the opportunity to establish initial contact with each firm through their General Manager (GM), as the key informant. And these GMs are always the first that to be interviewed during the field work in each firm. Information provided by them are particular useful for this study to tailor firm specific interview questions for the follow up interviews with the rest of members of the senior management team in each firm. Moreover, these GMs also helped the researcher to identify the key personal for follow up interviews along with granting the access to these key personals, so that the follow-up interviews can be conducted smoothly. However, in this study, the action of taking firms' GM as a primary source of firm specific information should not be over interpreted as 'key informant' bias, a term proposed by Kumar et al., (1993, p.1635-1637)²². As in this research, multiple respondents, both inside and outside these targeted firms, are consulted to verify the credibility of the overall data gather from each firm.

²² Key informant bias is bias that quite often occur during the data collection process of qualitative studies, as a result of over reliance on data and information provided by certain key individuals (Kumar, 1993).

The total number of interviews conducted during the field work is 37. And interviews in each firm continued until the theoretical saturation point (which represents a point that no new information can be obtained from conducting extra interviews), as suggested by Sandelowski (1995, p.181), is reached. Interviewees that approached in this study are senior managers in these three companies, covering General Manager, deputy General Manager, process research directors, R&D directors, human resources managers, and in some cases new product development managers. These senior managers are included in this research because, as observed by Hambrick (1989, p.5), “*ultimately, they [senior managers] account for what happens to the organization*” (for detailed discussion see Chapter 3).

The details of these interviewees’ personal profiles will be presented in the following **Table 4- 11**.

Table 4- 11 Background Information of Interviewees

Case Company	Interviewee	Managerial Post	No. of years in the company	No. of interviews taken
A	GM1	General Manager	31	2
A	DGM 1	Deputy General Manager, Head of the Research Institution	26	1
A	E1D1	Head of Material Processing research institute	20	1
A	E1D2	Deputy Manager of Material Processing research institute	22	1
A	F1	Head of Assembly Department	25	1
A	G1	New product development Manager	20	1

A	DG1	Deputy New product development manager	30	1
A	H1	Head of IT Department	30	1
A	J1	Head of the Department of Product Development	27	1
A	DJ1	Deputy of the Department of Product Development		1
A	K1	Head of the Department of Technology Management	15	1
A	L1	Project Manager	17	1
A	M1	MIT on site Manager	N/A	1
A	N1	Head of the Department of Technical Support	33	1
B	GM2	General Manager	33	2
B	DGM2	Deputy General manager	30	2
B	HR2	Head of Human Resource Management Department	32	1
B	E2D1	Head of Material Processing research institute	25	1
B	PJ2	Head of the Department of Product development	24	1
B	DPJ2	Deputy of the Department of Product development	22	1
B	FD2	Head of Assembly Department	22	1
B	DFD2	Deputy of Assembly Department	28	1
B	G2	Head of Marketing and after sales department	18	1

C	GM3	General Manager	10	2
C	DGM3	Deputy general manager	10	1
C	PGM3	Project Manager	8	2
C	DPGM3	Deputy Project manager	9	1
C	PGM4	Project Manager	6	1
C	PGM5	Project Manager	7	1
C	E3D1	Manager of processing department	10	1
C	FD3	Manager of Assembly department	7	1
C	CMD3	Manager of components manufacturing department	10	1

During the field work, the lengths of each interviews varied from forty-five minutes to three hours, and, due to availability issue of several interviewees, some interviews have to be split into several different occasions before it can be finished. Additionally, a number of follow up telephone interviews have also been conducted by in this research to clarify some confusing or inconsistent information provided by some interviewees initially during the field work.

The majority of interviews are recorded by using digital recording device. The use of digital recording device can help this research to guarantee the integrity of original data, and minimise the possibility regarding the occurrence of researcher's selection bias during data collection, as suggested by King et al., (1994). But this tactic is not flawless, as pointed out by Chenail (2011, p.255). As suggested by the author, the use of digital recording device may potentially inhabit researchers from listening to their interviewees, as the former is convinced that all conversations are recorded, and they can always listen these recordings when they feel necessary. According to Chenail (2011) this is quite detrimental as it will forgo the opportunities for researcher to identify novel phenomena that emerges during the interview

along with chances to achieve in-depth understanding of these phenomena by asking to follow up questions during interviews. Therefore, during the field work, this research also used interview notes to summarise and highlight interesting points that emerged during each interview. And this also helped the researcher to firstly identify new points and then explore them comprehensively during interviews.

There are occasions in which interviewees refuse to be recorded by the researcher, due to some political and personal reasons. In these cases, conversations are written down word by word by the researcher during the interview firstly, and typed copies of these interview are then sent to these interviewees for corrections. And it is only after the confirmation, regarding the content of the conversations, been received from interviewees that these files are then be documented as interview records.

These interview recordings are transcribed into word documents after the field work in this research is finished. The total number of interview transcriptions is around seven hundred pages. After that, these transcriptions are then translated into English. During the process of translating these interview transcripts, constant help and supervision are provided by two Chinese management PhD students, so to maintain the quality and accuracy of data after the translation process.

Following the procedure recommended by the Ethics community of University of Birmingham, during the process of translation, information, that could be used by third parties to locate the identification of firms and individuals that participated in this research are replaced with codes.

- Observation

In addition to the use of recording device, the second data collection method adopted by in this research during the field work is Observation. Observation, as suggested by Marshall and Rossman (1989, p.79), is the “*systematic description of events, behaviour and artefacts in the social setting chosen for study*”. As revealed in previous researches, observation enables researcher to investigate social phenomena within its nature environmental setting, and can significantly contribute to the comprehensiveness of researchers’ understanding regarding the correlations between social realities that been investigated (Stake, 1995).

In a general sense observation can be categorised into the following two categories: participative and non-participative (Bryman, 2012). A participative observation requires researchers to engage into activities of people or organisations he/she is observing, whilst in non-participative observation thus engagements are considered as unnecessary by research methodologists (Saunders et al., 2009; Creswell, 2007). In other words, in participative observations, researchers will inevitably engage into the process of social construction of reality, and such active engagement may potentially compromise the reliability and validity of data collected (Saunders et al., 2009; Bryman 20112). But in non-participative observation, thus concern is quite ignorable, as researchers are excluded from the process of the generation of social phenomena (Mason, 2002).

In this research, the non-participative observation method is adopted, and field-note is the primary method applied in recording these observations.

During the field work, observations are carried out in various occasions and channels, and the most frequent one is companies’ meetings, such as pre-shift meetings and coordination meetings. And it is in these meetings that companies’ innovation projects or process related issues, such as cross-functional coordination, resource allocation and the feasibility and potential of alternative innovation options, are been addressed and debated by senior managers

of each firm. It is through the observation of these meetings that enabled this research to achieve in-depth understanding regarding the research context and the way these senior managers interacts with each other's formally in each firm. Moreover, interviews that took place in these managers' offices offered the second venue for observations to be carried out in this research. The observation of interactions between these senior managers and their subordinates offered a unique angle for this research to understand how information and knowledge are transferred and assimilated both within and cross departments during the process of innovations.

In addition to the aforementioned two formal channels, observations have also been conducted in some informal ways, such as company Chi. The researcher observed the informal interactions in various levels, i.e., interactions between managers themselves and interactions between managers and their subordinates. And the observations of these informal interactions are then used as a reference to for reliability check for data collected from other channels.

- Company Documents

Company documents offers the third channel for data to be collected in this research. A method quite often used jointly with observation and interview in social research (Vaus, 2001; Saunders et al., 2009; Bryman, 2012). As suggested by Yin (2009), the use of company documents offers opportunities for researchers to collect information not publicly accessible. And the public domain along with companies' internal data archive are considered as the best channels for researchers to collect thus documents, such as internal administrative reports and annual reports, officially produced by firms (Bryman, 2012, p.550).

However due to the data security concern, as expressed by some General Managers from case firms, this research is only being granted quite limited access to companies' internal

documents during the field work. Therefore, in order to mediate these managers' concern, the researcher only consulted some administrative and coordination meeting reports that these case companies willing to provide.

In addition, none of the case companies participated in this research are public listed firms (they are either subsidiaries of Chinese heavy equipment manufacturing conglomerates or private firms), therefore, these firms are not obliged by law to publish their own independent annual report to the public. And this further limited the possibility for the researcher to measure each of these case firm's innovation performances through the use of numerical data. Therefore, in order to establish a solid base line for the measurement of firms' innovativeness, this research consulted industrial annual books as the reference. As in these annual books, the overall performances of these case firms are reported for statistical purposes by industrial associations²³.

Despite the aforementioned constraints, by the end of the field work, about two hundred pages case companies' internal documents are collected in this research. And it was through the exploration of these internal documents that the researcher enhanced his understanding regarding the differences in managerial and innovation activities exhibited amongst case firms (see detailed elaboration Chapter 5).

4.4.4 Case Study Protocol

As suggested by Yin (2014, p.84-85), Eisenhardt (1989) and Bryman (2012), despite that fact that the adoption of interview as the primary method for data collection in case study research

²³ In fact, the researcher has been reminded that, statistics (such as sales, new products sales, R&D expenditures etc. al.,) reported in industrial annual books could only be used as a source of reference rather than direct evidence of firms' innovation performances, a point repeatedly emphasised by senior industrial practitioners during the field work.

can significantly enhance researcher's understanding of the relationships between social phenomena under investigation, the adoption of this method is not without drawbacks. The challenges associated with the interview method reveals themselves under different forms to researchers across sequential stages from prior interview preparation to the actual conduction of interview in real life settings. In a fairly brief term, by referring to previous discussions, the first two challenges posed to this research. The first one is the persuasion of potential candidates to participate in interview. The second one is to stay focused in the pre-established line of inquiry rather than get digressed by topics that are irrelevant to the research but particularly interested to the interviewer. And the last by the most prominent challenges associated with this specific method is, it need to cater into interviewees schedule and availability, of which this research has no control with. This is particular relevant point in this research, as the research design involves the use of multiple cases rather single case.

Therefore, in order to mediate these challenges associated with this specific data collection method, in this research a case study protocol has been developed prior to the field work. A suggested by distinguished case study methodologist such as Yin (2014, p.88) and Eisenhardt (1989), if executed stringently, a properly designed case study protocol can enhance the quality and efficiency of data collected by researcher(s) during interviews. In addition to that, the proper development of such protocol along with its stringent execution performed by researchers can significantly enhance the reliability of case study research (Yin, 2009).

In the following part of this sub section, the illustration of the case study protocol developed in this research will be provided with reference to the protocol model provided by Yin (2014, p.84-85) (as shown in **Table 4-12**) firstly. Then the elaboration of details regarding the execution of this protocol in the field work will be presented.

As demonstrated by Yin (2014, p.84-85), a case study protocol generally comprised by the following sections: overview of the research project, data collection procedures, data collection questions, and guide for the case study report; as shown in **Table 4- 12**.

Table 4- 12 Summary of components in Case Study protocol

Section A: Overview of the research project
Section B: Data Collection Procedures
Section C : Data Collection questions

Source: adopted from Yin (2014, p.85)

As suggested by Yin (2014), the first part of the protocol serves the purpose of explanation of the aim and the potential value of research project, along with the provision of some essential information regarding the researcher(s). In this study, research background information is concisely summarised into single paragraph description and provided to all interviewees during the early stage of the field work.

The overall case study protocol developed is presented in the following **Table 4-13**.

Table 4- 13 Case Study Protocol

Case Study Protocol	
Background	
Constructs	Elements
Ambidextrous Leadership	• <i>Opening</i> leader Behaviours • Closing Leader Behaviour • Temporal Switch
Absorptive Capacity	• Exploratory Learning Process • Transformative Learning Process • Exploitative Learning Process
Innovation Adoption	• Initiation • Adoption Decision • Implementation
Case Study Questions Question 1: <i>How does the Absorptive Capacity learning process facilitate the Innovation Adoption Process ?</i> Question 2: <i>How does Senior Managers' Ambidextrous Leadership facilitate the Absorptive Capacity Learning process ?</i> Data Collection Procedure	

Method	Procedure and Questions
Semi-Structured Interview	• How are innovations developed in this firm? • Can you specific the differences in these innovations with regard to its processes. • Where did you get these knowledge for firm's innovations? • Why you chose this knowledge but not the alternative? • Who can decide which knowledge to adopt? • How does you guide the process of knowledge adoption? • Tell me how you use these knowledge for organisational innovation • Is there anything else you want to tell me?
Non-participating Observation	• Visit the factory • Visit managers' office • Observes the interactions between managers and employees in work launch
Company Document	• Boucher • Product category • Seasonal progress report

It is worth noting, these preliminary questions (as shown in **Table 4-13**) are proposed with reference to the theoretical model. However, this does not mean these questions are the only

interview questions asked during the data collection process. In fact, the questions listed in **Table 4-13** are used as a guide for researcher to ensure that the interviews are conducted to focus on addressing the research questions.

In this research, gaining accesses to key personals from case firms are achieved through a two stages process, rather than in two different approaches as may be confused in the previous table. The first stage is to establish initial contact with General Manager through the help provided by several industrial experts. The second step is the persuasion of General Manager from each case firms to grant the access to key individuals in that firm. One advantage for adopting this strategy in this research is, gaining accesses to these key individuals through these General Managers' permission can significant smooth out the formers concern regarding possible repercussions for participating in this study.

Moreover, as data are collected from real life setting in this research, the possibility for unexpected events to occur is unignorably. Therefore, an action plan is developed by the researcher prior to the field work. In the action plan, details are specified regarding the identifications of possible alternative sources of data from each case firms. Additionally, prior to the field work, several experienced researchers from the Uni are consulted for their advices regarding contingencies that may occur during the field work. And a contingency plan is developed consequently, summarising actions should be taken during the field work to minimise risks such as data loss.

The third section (data collection questions), concerns with issues of associated with the development of research questions across different stages in the research. As suggested by Yin (2014), research questions developed by the researcher prior to the field work only reflects the general orientation of inquiry. However, in real life scenarios, firms are all operating in their own unique contextual, organisational and managerial settings. Therefore, during the

field work, researchers are recommended to tailor their research questions, such as by asking follow-up question, so as these unique features of each case can be reflected during the data collection processes (Eisenhardt 1989). Moreover, as specified by Yin (2014, p.90), the variances between these general orientation questions developed prior to the field work and cases' specific questions been asked during interviews reflects different level of inquiry (Yin, 2014, p.90), as summarised in **Table 4-14**.

Table 4- 14 Research questions and Corresponding level of Inquiry

The orientation of questions	
Level 1	Questions asked of specific interviewees;
Level 2	Questions asked of the individual case
Level 3	Questions asked of the pattern of findings across multiple cases
Level 4	Question asked about the entire study

Source: summarised from Yin (2014, p.90-91)

In the case study protocol developed in this research, the primary focus was given to Level 4 questions, following the suggestion offered by Yin (2014). However, due to reasons explained in previous sections, it is quite likely for researcher(s), especially less experienced ones, to get digressed into interesting but irrelevant topics coined by interviewees during the field work. Therefore, some self-guiding questions have also been developed prior to the data collection, as a reminder of the desired orientation of inquiry for this research, as presented in the following **Table 4-15**.

Table 4- 15 Research Questions Guide

Orientation of Inquiry	General Question Guide
Innovation adopting activities	How does firm's innovations been conducted?
Absorptive Capacity	How does the value of external knowledge been identified and screened? How does valuable external knowledge been acquired initially? How does these knowledge been dissimilated and implemented in firms' innovations?
Managerial Activities	How does firm's AC and consequently its innovativeness been affected by the senior managers ambidextrous leadership?

It is through the use of question list in **Table 4-15** as the reminder, that this research further tailored interview questions for each case firms and certain key individuals during the interviews in the field work.

By referring to **Table 4-12**, the last section of the case study protocol developed in this research reflects considerations, such as formats regarding how the case study can be best reported, during the preparatory stage of the project. As suggested by Yin (2014), issues such as theoretical orientations and methodological considerations that pertaining to the composition of the final research report should also be addressed, though not necessary to a great extent, in this section.

As elaborated by Yin (2014, p.183-187), formats that can be adopted by researcher(s) in reporting case study research(s) fall into four categories²⁴. In this research, the reporting format adopted is the *multiple-case study* one. The rationale for adopting this reporting format in this research will be presented in the following section, with reference to the discussion presented in preceding sections. More specifically, through specifying limited applicability of the rest three format with respect to this study.

The first type represents the classic *single-case study*. And the narrative in this format is orchestrated to achieve the comprehensiveness of the description of a single case. The second type follows the same root of formatting as the previous one. The difference between this type and the classic single-case study is, the former adopts multiple narratives, rather than the single narrative as in the latter, to achieve the multifaceted interpretations of social phenomenon been studied (Yin, 2014). As revealed by Yin (2014), the third format can be adopted for both single-and-multiple case studies, as long as questions asked during the study can be standardised.

In this research, following suggestions offered by Yin (2014), Eisenhardt (1989), and Saunders et al (2009), to name but a few, both within-and-cross case analysis will be presented, in separate chapters, so as the distinction between differences and similarities amongst findings from each case can be clearly demonstrated.

4.4.5 Ethics in Research

Generally, types of ethical concerns that needed to be addressed by researchers various accordingly amongst different disciplines (Bryman, 2012).

²⁴ According to Yin (2014:183-187), the four categories are: single-case study, multiple-case study, option for either single-or-multiple-case study and option for multiple-case study only.

In this research, the Code of Ethics provided by the University Ethical review committee is followed by the researcher faithfully. Research ethical issues applicable to this specific research, such as the protection of a) confidentiality regarding both information provided by and the identities of research participants and b) the participants rights to either participate or withdraw from interviews are all addressed in the Ethical Review form submitted to the University ethical committee prior to the commencement of the field work. And the approval is granted by the Ethical Review committee prior to the field work.

Moreover, certain procedures recommended by Saunders et al., (2009), Bryman (2012) and Voss (2002) are employed in this research, throughout the data collection and analysis processes of the research, to ensure the integrity of research ethic in this project, as will be illustrated in the following section.

Firstly, prior to the commence of interview, a consent form (Appendix A) is provided to every interviewee, explaining: 1) the purpose of this research, 2) the potential benefits that can be generated from participating in this research and 3) their rights to withdraw data provided by them prior to the submission of this research report.

Furthermore, in order to ensure the protection of confidentiality regarding the information provided by and the identifies of interviewees and case firms, all information that could be utilised by third parties to locate these individuals and firms participated in this research are replaced with alphabets during the interview data translation process. And all original data collected during the field work are stored in encrypted USB devices so as to minimise the risk of the leak of this information.

Additionally, in occasions when interviewees are not comfortable with the way the interview been recorded, the researcher is always willing to cater into interviewees preferences, so that these interviewees are not feeling been offended. And this manner is applied by the researcher

to every individual participated in this research, including these interviewees that are nominated by their superiorities.

Finally, interviewees are invited by the researcher to check the reliability of their own interview transcripts. These transcripts were only documented as data collected during the field work after the consent are gained from respective interviewees regarding the content of these interviews.

4.5 Data Analysis and Coding Methods

Qualitative data analysis is a process in which raw data are organised and interpreted in meaningful ways (Myers, 2009). A well organised and executed data analysis can significantly enhance the internal validity, and subsequently, the overall quality of a case study research (Strauss and Corbin, 1990). However, as revealed from previous studies, a universally agreed method in analysing the qualitative data is yet to be achieved amongst case study methodologists (Miles and Huberman, 1994; Voss et al., 2002; Yin, 2014). Therefore, in order to identify the most appropriate data analysis method for this research, an extensive review regarding case study analytical techniques is conducted. It is revealed that the insights provided by Eisenhardt (1989) regarding theory building through case study research, is particularly relevant to this study. Subsequently, following the method posited by Eisenhardt (1989) (as demonstrated in **Table 4-7**), in this research, the overall data analysis approach adopted incorporates both within case analysis (chapter 5) and cross case analysis (chapter 6). Additionally, during the within case analysis process, this research also managed to get some interviewees to check the case findings regarding their own firms. The feedback from these respondents indicated high level of accuracy regarding findings generated from the within

case analysis. Subsequently, these within case findings are compared and contrasted in the cross case finding chapter (Chapter 6), so as the overall pattern regarding the correlations amongst the three key constructs investigated can be revealed.

In the study, the analysis regarding qualitative data collected followed the code to theory process (demonstrated in the following **Figure 4-3**) as recommended by Saldaña (2013).

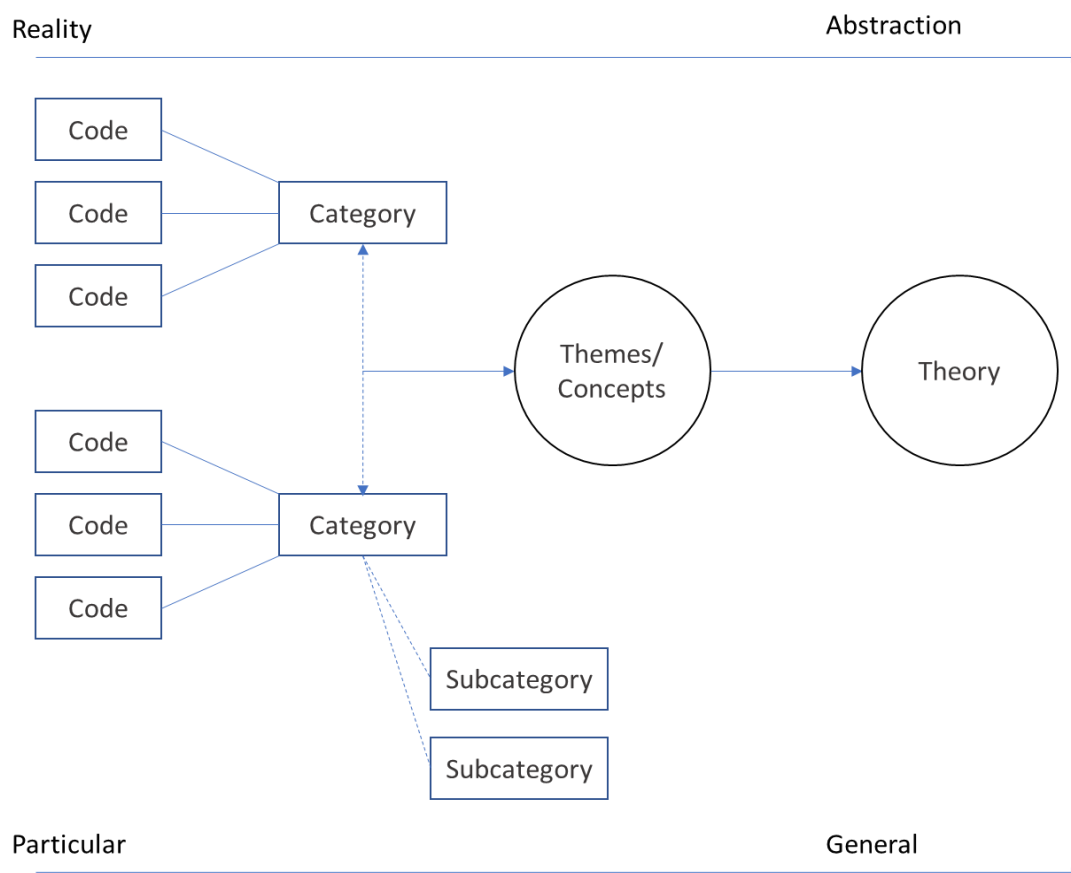


Figure 4- 3 Code to Theory Process

Sauce: adopted from Saldaña (2013, p.13)

According to Saldaña (2013, p.59), the code to theory process covers two analytical cycles, the first one refers to the development of code²⁵ from raw data, whilst the second covers the grouping and integrating codes to categories and themes for the purpose of theory building.

4.5.1 Coding From Raw Data

Prior to the coding process started, I spent 1 month to read all the interview transcripts, filed notes, and company documents, to get myself familiar with key words, phrases and jargons that are used by my interviewees.

Then, through consulting previous studies, a starting coding list regarding the key constructs incorporated in the theoretical model is developed, as demonstrated in the following **Table 4-16**. The operational definitions are also assigned to these codes to make sure data (words, phrases, sentences etc.) can be coded into the corresponding codes properly. Subsequently, I read through each transcripts to identify data related Ambidextrous Leadership behaviours, AC learning process, and Innovation Adoption process. It is revealed after I coded several interview transcripts manually (as a trial) that there are some mismatches between codes incorporated in the initial coding list and the actual data collected. Therefore, in order to address this problem, some sub-codes are revised or removed from the coding list subsequently. Additionally, some new sub-codes are developed through using key words, phrases, or short sentences derived from data²⁶. This is so as both the reality regarding how

²⁵ According to Saldaña (2013, p.3) code is “a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data.”

²⁶ As revealed in previous researches, there are two distinguished approaches that can be adopted in data coding, namely, top-down and bottom-up (Saldaña, 2013). In the former approach, codes are derived from previous literature, whilst in the later approach, codes are extracted from the raw data (Auerbach and Silverstein, 2003; Saldaña, 2013). As pointed out by Saldaña (2013), the excessive reliance on top-down coding approach can be quite detrimental in qualitative researches, as it inhibits the identification of new and valuable themes from data. Therefore, in this research, both coding approaches are employed. The adoption of this specific coding strategy allowed several factors along with its impacts to the learning processes associated with firms’ innovations to be revealed eventually.

these key constructs reveal themselves in case firms, and new factors that emerged from data can be addressed properly in the coding process (the final coding booking developed in this research is presented in **Appendix III**).

During this stage, each transcript was re-read and re-coded every time I modified my codes and sub-codes. Given the workload associated with this process, N'vivo 11, a qualitative data analysis tool, is used in this research to code these key constructs and emerging factors from raw data. Use of this software significantly eased the work required to record, search and retrieve, coded excerpts from the original data files.

Table 4- 16 Illustrative coding of Absorptive Capacity and Ambidextrous Leadership

Construct	Code	Sub-Codes
<i>Absorptive Capacity</i>	Exploratory Learning Process	1. Clearly defined strategic focus (Lane et al., 2006; Zahra and George, 2002; Jansen et al., 2005, Sun and Anderson, 2010) 2. The existence of relevant prior knowledge (Cohen and Levinthal, 1990; Crossan et al., 1999; Zahra and George, 2002; Lane et al., 2006; Sun and Anderson, 2010) 3. Openness towards external Knowledge sources (Kotler and Armstrong, 1991; Lichtenthaler, 2009; Gebauer et al., 2012) 4. Identification of knowledge in various external sources, through both formal and informal means (Tushman & Nadler, 1978; Auster & Choo, 1993; Flatten et al., 2011) 5. Engaging into knowledge/information searching activities (Minbaeva et al., 2003; Gebauer et al., 2012) 6. Motivation to use external knowledge sources (Minbaeva et al., 2003; Gebauer et al., 2012)

		7. Monitoring the business environment for valuable new knowledge/information/opportunities (Gebauer et al., 2012) 8. Acquisition of knowledge from various sources (Kohli et al., 1993; Gebauer et al., 2012)
	Transformative Learning Process (Codes: 3, 9, 10, 11, 12, 13, 14, 15, 16)	9. Communication of knowledge/information acquired, both within and across departments (Weick and Robert, 1993; Nonaka, 1994; Nonaka and Takeuchi, 1995; Crossan, Lane and White, 1999; Lane, Koka, and Pathak, 2006; Sun and Anderson, 2010) 10. The cross functional coordination (Van Den Bosch et al., 1999) 11. Development of formal channels and platforms for knowledge/information to be disseminated throughout the organisations (Argyris and Schön, 1978; Gebauer et al., 2012) 12. Generation of insights from various sources (DiBella & Nevis, 1998; Flatten et al., 2011) 13. Maintaining and reactivating knowledge (Lichtenthaler, 2009; Gebauer et al., 2012)

		14. Creation of new knowledge based on knowledge/information new acquired by the firm (Grant, 1996; Flatten et al., 2011) The development of prototypes (Sun and Anderson, 2011) 15. Introduce new products to the market (Nonaka and Takeuchi, 1995; Flatten et al., 2011; Gebauer et al., 2012)
	Exploitative Learning Process	16. Accomplishing innovation quota 17. Standardise the new procedure/process for manufacturing (Sun and Anderson, 2010; Gebauer et al., 2012) 18. Application of knowledge to commercial purposes (Cohen and Levinthal, 1990; Lane et al., 2006; Lichtenthaler, 2009)
Ambidextrous Leadership	Opening leader Behaviours	1. Allowing different ways of accomplishing a task 2. Encouraging experimentation with different ideas 3. Motivating to take risks 4. Giving possibilities for independent thinking and acting

		5. Give room for new ideas 6. Allowing errors 7. Encouraging error learning
	<i>Closing</i> leader Behaviours	8. Monitoring and controlling goal attainment 9. Establishing routines 10. Taking corrective action 11. Controlling adherence to rules 12. Paying attention to uniform task accomplishment 13. Sanctioning errors 14. Sticking to plans

4.5.2 Identifying Categories and Themes

In this research, the data analysis process in each respective case firm follows the same procedure, as summarised in the following table (**Table 4-17**).

Table 4- 17 Overview of Data Analysis Process for case firms

Steps in Data analysis process	Descriptions
1. Company background	
2. Identify the correlation between AC and IAP	Firstly, categorise innovation related activities into its corresponding stages in the IAP (with reference categories provided in section 3.5)
	Secondly, identify learning activities that facilitate these innovation activities
	Then, categorise these learning activities into corresponding sub learning processes in the AC (with reference to Table 3-2 in section 3.4 and Table 4-16 in section 4.5.1)
	Finally, provide a brief summary highlighting the correlation between AC and IAP as identified in the case firm.
3. Identify the correlation between SMAL and AC	Firstly, identify senior manager's leadership behaviours that facilitates each sub learning processes in the AC.
	Then, categorise these leadership behaviours into corresponding sub sets of SMAL (with reference to Table 2-2, section 2.4.1).
	Finally, provide a brief summary explaining the relationship between SMAL and AC as identified in the case firm.
4. Case summary	Summarising the details regarding the relationships between SMAL, AC IAP identified from the case.

Moreover, the identification of categories (the relationship between codes) is achieved through the following process (taking the identification regarding the correlation between Exploratory Learning process in AC and Opening Leader behaviours in SMAL as an example):

Firstly, I located sentences and paragraphs that related to the Exploratory Learning process (as a code by itself) of AC through searching corresponding sub-codes. As demonstrated in **Appendix III**, the code Exploratory Learning process (ACE1) comprises three sub-codes:

1. Identification and acquisition of knowledge from external sources- ACE1-1
2. Knowledge and information sharing between colleagues – ACE1-2
3. monitor business environment for valuable knowledge and information – ACE1-3

I looked into these sentences and paragraphs, which contain these sub-codes, to identify how they are correlated with the sub-codes of Senior Managers' Ambidextrous Leadership behaviours. Subsequently, evidences that indicate *opening* leader behaviours facilitate either ACE1-1, ACE1-2 or ACE1-3 are then grouped in to the category of Opening Leader behaviours facilitate Exploratory Learning process (detailed examples are provided in **Appendix V, VII and IX**).

This process is replicated in the analysis of all interview transcripts along with other documents collected in the field work. Through replicating this analytical logic, data collected are then condensed²⁷ into the following categories:

- 1) Exploratory learning process related to Initiation
- 2) Exploratory Learning process related to Adoption Decision
- 3) Transformative Learning process related to Implementation
- 4) Exploitative Learning process related to Implementation

²⁷ In this process, three analytical templates (as listed in **Appendix XI**) are created to help summarising and documenting information derived from interview transcripts.

- 5) Opening leader behaviours facilitate Exploratory Learning process
- 6) Closing Leader behaviours facilitate Exploratory Learning process
- 7) Opening Leader behaviours facilitate Transformative Learning process
- 8) Closing Leader behaviours facilitate Transformative Learning process
- 9) Closing leader behaviours facilitate Exploitative Learning process
- 10) General Manager's Vision facilitates Exploratory Learning process
- 11) Department Managers' Trust facilitate Exploratory Learning process
- 12) Department Managers' Trust facilitate Transformative Learning process

Subsequently, by referring to constructs each of the listed codes belong to, the following three major themes are then revealed:

1. The relationship between AC learning process and Innovation Adoption process, which comprises category 1, 2, 3, 4 and 5 (detailed examples are provided in **Appendix IV, VI and VIII**);
2. The relationship between Senior Managers' ambidextrous leadership and AC learning process, which incorporates category 6, 7, 8 and 9; and
3. The relationship between Emerging managerial factors and AC learning process, which covers category 10, 11 and 12 (detailed examples are provided in **Appendix X**).

Taken together, these categories identified from the data reflects the patterns regarding the correlations between SMAL, AC and IAP in each case firms. The detailed discussion regarding the correlations between these constructs in each case firm will firstly be provided in Chapter 5, and further compared and contrasted in Chapter 6. This is so as the theoretical saturation can be achieved through using the pattern matching technique as recommended by Eisenhardt (1989). Moreover, the internal validity in this research is also enhanced through the adoption of this technique, a point that been discussed previously in section 4.4.2.

4.6 Conclusion

In this chapter, methodological considerations in this research are discussed. As demonstrated in section 4.2, the ontological and epistemological stands adopted in this study are *Constructionism* and *Interpretivism*, respectively. Additionally, this research follows the Inductive theory building approach, and embraces the case study research method. Moreover, following the recommendation provided by Eisenhardt (1989) and Yin (2014), multiple case design is employed to enhance the validity regarding this research.

In this research, data are collected from three Heavy Equipment Manufacturing firms based in China. The overall data collection process is guided by the case study protocol developed prior to the field work. Industrial experts are consulted by the candidate with regard to certain practical issues at this stage, so as to guarantee the development the research protocol is carried out in a pragmatic manner. During the fieldwork, data are collected from the following three channels, namely, interview, non-participant observation and company document. This is so as the data triangulation, a technique recommended by Yin (2014) to enhance the quality of case study research, can be achieved in this study.

Ethical issues are also considered in this research. Interviewees are thoroughly informed regarding the nature and the purpose of this study prior to commencement of interviews. Moreover, information that can be used to locate either the firms or the individuals involved in this study are replaced with code names, so as to assure the confidentiality with regard to both firms and individuals participated in study.

Furthermore, following the analytical strategy recommended by Eisenhardt (1989), both within and cross case analyses are implemented in this research. The analysis of raw data followed the Code to Theory process as proposed by Saldaña (2013) (as demonstrated in **Figure 4-3**). The qualitative data analysis software N'vivo 11 is used to enhance both the efficiency and

accuracy with regard to the coding and subsequent identification of categories and themes from raw data. In the following chapter, within case analysis will be provided.

CHAPTER 5 WITHIN CASE DATA ANALYSIS

5.1 Introduction

This chapter is dedicated to the elaboration of the relationships between Senior Managers' Ambidextrous Leadership (SMAL), Absorptive Capacity (AC) and Innovation adoption process (IAP), that been demonstrated in each of the three case companies respectively. The structure of this chapter will be three sections of case based analysis followed by a chapter conclusion.

The data analysis process in each respective case follows the same procedure (as shown in **Table 4-17**, section 4.5.2), and uses the integrated conceptual model (see section 3.6.3) as the primary guide. An overview of the details of the analysis process, and how the conceptual model is used as a guide is provided as follows:

1. A brief company background will be given.
2. The relationship between the constructs of AC and IAP (see bottom two level of conceptual model in **Figure 3-6**, section 3.6.3) in the case firm will be explored (as in sections 5.2.2, 5.3.2 and 5.4.2). The analysis regarding the correlation between AC and IAP in the case firm follows a three-step process. It starts from the categorisation of innovation related activities identified from interviews into related stages in the IAP (as shown in the IAP section in **Appendix III**). It then moves to the identification of learning activities that enable them. Then, the learning activities identified will be categorised into related sub learning processes in the AC (as shown in the AC section in **Appendix III**). A brief summary will be given at this end of this stage to highlight details regarding the correlations between the each stages of the IAP and its corresponding sub learning processes in the AC. This

addresses the sub research question of: *How does the Absorptive Capacity learning process facilitate the Innovation Adoption Process?* (as posited in section 1.3).

3. The relationship between SMAL and AC (see top two levels of conceptual model in **Figure 3-6**, section 3.6.3) in the case firm will be revealed (as in sections 5.2.3, 5.3.3 and 5.4.3). In this process, senior managers' leadership behaviours that facilitate each sub learning processes of the AC will be identified firstly. Then, through using the leadership behaviours proposed by Rosing and her colleagues (2011) (see **Table 2-2**, section 2.4.1), these behaviours will be categorised into corresponding subsets of SMAL (as shown in the SMAL section as in **Appendix III**). Finally, a brief summary will be provided highlighting the correlation between SMAL and AC identified in the case firm. This addresses the sub research question of: *How does the Senior Managers' Ambidextrous Leadership facilitate the Absorptive Capacity Learning process?* (as posited in section 1.3).
4. A case summary will be provided, summarising the details regarding the relationships between SMAL, AC and IAP identified in the case firm. This addresses the overarching research question of: *How might organisational innovation be facilitated by senior managers' ambidextrous leadership?* (as posited in section 1.3).

5.2 The analysis of Case Company Alpha

5.2.1 Company Background

Company Alpha, a wholly owned subsidiary of a pioneering heavy equipment manufacturing conglomerate in China. As a State-Owned Enterprise (SOE), Company Alpha has established a strong reputation of been reliable and innovative in the way they serve the market. At the end of 2012, the overall assets in Company Alpha totalled at 5.7 billion RMB. It has 5400 production and laboratory equipment, 5000 employees, including 1,082 professional and technical personnel and 323 full-time research and development personnel. Amongst these R&D personnel, 5 of them have Doctor degrees and 96 with master degrees. Moreover, it has National Heavy Equipment R&D centre, and the R&D capacity of Company Alpha is in the leading position amongst other domestic heavy equipment manufacturers in China. It now has production capacity of 160,000 tons and 109 authorized patents registered, amongst which 9 are invention patents. Product X is the main and core product of Company Alpha, with a dominant domestic market share around 30 per cent (as shown in **Figure 5-1**). Some of its products are now exporting to more than 30 countries and regions including the United States, Russia, India and Australia. In 2015, Company Alpha was rated as one of the top 500 enterprises in China's Heavy Equipment Manufacturing Industry and one of the top 100 innovation companies in China (Company document and website).

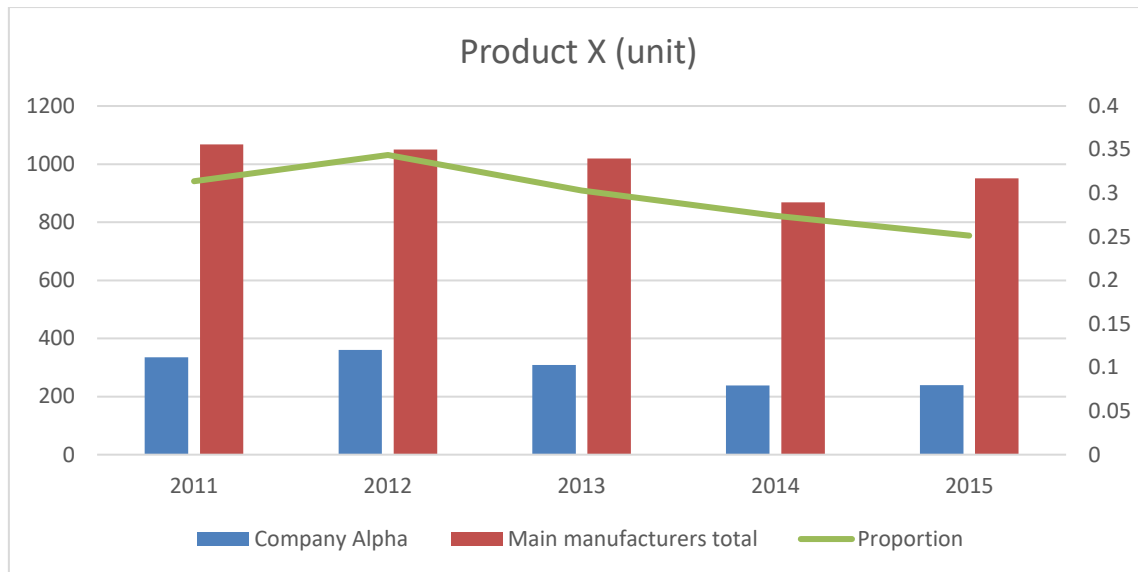


Figure 5- 1 Market share of Product X from Company Alpha

5.2.2 The Relationship between AC and IAP

5.2.2.1 The Relationship between Exploratory Learning Process and the initiation and adoption decision in IAP

In this section, the relationship between exploratory learning process and the initiation and adoption decisions of innovation adoption process in company Alpha will be explored, with reference to interview data collected during the field work.

This section is organised as follows. Firstly, the driven forces which underlies the initiation of innovations in this company will briefly described. Key internal players and consulted external knowledge sources will be identified. This is so a comprehensive understanding regarding activities taken by the firm to facilitate the initiation of innovation adoption process can be achieved.

The criteria adopted by the firm regarding its selective assimilation of external knowledge will be elaborated to emphasise the importance of the firm's prior knowledge to its innovation adoption decisions.

Finally, a short summary will be given indicating the activities performed by firm's managers and employees in the innovation initiation and adoption decisions stages in firm's innovations and how they significantly resemble the firm's exploratory learning process.

5.2.2.1.1 Motivations for Innovation

The driven forces that underlies company Alpha's continued pursuit of innovation adoptions is quite complicated and covers three categories:

- Market,
- Long term company development, and
- National Strategic planning for technological advancement

“Actually, it is fairly complicated to explain why we continuously pursue for innovations there are so many reasons. Generally, I think, for this firm, innovations are driven by the demands from the following three categories: market, the long-term development of the firm, and the national strategic planning for technological advancement in heavy equipment industry” (Respondent GM1).

Several initiatives have been undertaken by the firm to facilitate its pursuit of innovations to cover the three categories. These are also facilitated through consultation with various external knowledge sources at an organizational level.

5.2.2.1.2 Initiation of IAP and external knowledge sources consulted

- **Market oriented innovation**

Given the ongoing deteriorating environment of the market, maintaining and increasing market share have been envisaged, by managers, as the most appropriate strategy for the firm. According to these managers, the continuous enhancement of customer satisfaction level is considered as the most appropriate vehicle for such a business strategy to be successfully

delivered. Therefore, in order to achieve this strategy, the following initiatives have been assigned the highest priorities amongst senior managers in the firm:

- cost reduction,
- quality improvement
- customisation

Management is convinced that the proper execution of these initiatives lays out the foundation for the accomplishment of the firm's strategic objective in the long term.

Cost reduction and quality improvement

As a SOE, price competition has not been a strength for Company Alpha²⁸. Therefore, to cope with negative externalities stemmed from virulent price competition, the objectives of cost reduction and quality improvement have often been pursued simultaneously in certain firm level innovation projects. This is a common feature shared by heavy equipment manufacturing firms.

“As a manufacturing firm, cost reduction or the increase in efficiency are the same thing as they all lead to the final reduction of manufacturing cost. And, from the cost reduction perspective, the process of raw material processing merits attention. In fact the innovation or improvement in raw material processing method or technologies can serve the goals of cost reduction and quality improvement simultaneously” (Correspondent DGM1)

“From the perspective of process technology development, we do not use the word innovation what is innovation? In this department we do not have tangible products, does that mean there is no innovation? For me, our job to continuously search and develop new methods or processing techniques, of course with the assistance of up-stream and down-stream departments, that can be employed to reduce the cost and

²⁸ This can be explained from various perspectives, but the two most relevant reasons are: pension (result from the its employee base) and other social responsibilities assigned by various levels of government.

enhance the quality of our products this is a accumulative process, and this is what this department is for” (Correspondent E1D1).

And several quite distinguished knowledge/information sources have been consulted by the staff from material processing research institute, during their exploration of external knowledge.

“It is true that we do have accumulated a lot of experience and knowledge stock through the history, but there are always rooms for improvement, you know. Therefore, in order to keep up with the pace of advancement of process technologies in this industry, we borrow from various sources, such as from the leading global firms and firms with specialised in material process technologies, and universities, in certain occasions” (Correspondent E1D1).

Customisation

The market demand for customised equipment has escalated significantly in past decades, due to the intensification of competitive pressure triggered by both domestic and foreign competitors, as elaborated in the industrial background section. Since most of the customised equipment require tailored structure engineering designs, several external knowledge sources have been consulted to facilitate the exploration and adoption of novel and creative design methods, especially, in the Product Development department. As the latter bears the ultimately responsibility for the successful delivery of tailored structural engineering designs for this customised equipment.

“different sources, such as market information and feedbacks from customers provides the sources of the start point for the search for solutions that can be employed into the customisation of products.....and of course, experience matters as well, as sometime, customers are not experts, they only know the technical requirement or the function that the machinery have to be able to delivery, but they cannot provide specific parameters that can be consulted in the design and development of the equipment. In these cases,

we have to use our experiences and intuitions as the starting point for the search”
(Correspondent J1)

Long-term oriented innovation initiatives

In addition to these aforementioned innovation initiatives that focus on daily operations, company Alpha also developed its long-term innovation focus. As will be presented in the subsequent section.

For the clarity sake, the following terms, supply chain integration and diversification, will be employed to categories the distinction between these innovation activities. The rationale for the adoption of these terms is that they offered the opportunity for this study to demonstrate the essences of these innovations in a vivid way. However, no explicit linkage should be envisaged between the long-term and short-term innovation initiative initiatives themselves and the operational and business strategies they infer to, as this was never the intention of in this research.

- **Supply chain integration perspective**

Several innovation projects have been initiated by firm’s senior managers to facilitate the internalisation of the production of components that previously been supplied by foreign manufacturers.

“Overall, these are long term [innovation] projects. And we took these initiatives so as to kill two birds in one stone. Firstly, we can reduce the reliance of certain key components from foreign supplier, which will significantly reduce our manufacturing cost. And we can....be a supplier of such lucrative products in China in the future, you know, they are widely used in a large number of heavy equipment manufacturing firms. And of course, we did not just come up with this idea from nowhere, we cannot just say: that product is lucrative, let us go for it. It is impossible and impractical, we only do

what we can do [based on firm's R&D, processing and manufacturing capabilities]" (Correspondent GM1)

"We monitor these manufactures, we monitor the market as well, and we analyse these products in details, then we develop an department evaluation report, based on these analysis, to demonstrate the feasibility of such internalisation [innovation] projects to the board....and exploration and collection of information actually started before the initiation of these projects" (Correspondent G1)

External knowledge sources that been most frequently consulted in during the early stage of these innovation projects are Universities, research institutions, and firms that possess relevant specialised knowledge.

"Due the lack of certain knowledge, we had to firstly consult with universities and research institutions to verify [the feasibility for internalisation] during the preparation stage of such projects" (Correspondent G1)

- **Diversification perspective**

The previous section discussed innovation projects to support and enhance the firms core business. From a diversification perspective, this is less significant but collaboration with other organisations is often required to facilitate the development of such innovation projects

"Regarding this project, we collaborate with the US based research institution. As a matter of fact, we are learning from them [co-developers] during the process of co-innovation, and of course, we have included some other [domestic] firms into this project, and we learn from them as well. But in term of technology perspective, the key source [of knowledge] is that US based research institution. As previously, our access to knowledge and specialities required in this project is quite limited" (Correspondent L1)

- **National Scientific Key Projects**

These projects are innovations are not determined by narrow commercial interests. They are national scientific key projects, a political assignment from, and sponsored by, the central government on a regular basis. They are a form of social responsibility commonly shared by SOEs, especially the large ones.

In these innovation projects, the collaborations and synergies are quite often required and expected to be realised between SOEs and research institutions (universities mainly) involved. However, each company can pick up specific and relevant knowledge for their own benefit. There is also shared advancement of the technology level regarding machinery manufacturing industry.

“As a manufacturing organisation, it is our responsibility to provide the platform for the experimentation to be conducted, and collaborate with the other parties to achieve the project. And this does not mean we just follow orders blindly. We also do our part to provide some initial directions. But the priorities are different between us and the universities or research institutions [in these innovation projects]. We try to learn as much as possible from these universities and research institutions regarding the up-to-date development of processing technologies, novel techniques and that relevant to our firm, and to some extent we are less concerned with tangible results these project can bring to the firm” (Correspondent GM1)

“But this does not mean these national key projects are just white elephant projects. They have strategic values to the country, to the industry and to the firm as well.....in an explicit way, we take [the participation into] these projects as opportunities to enrich our knowledge repository. And simultaneously enhance our capabilities, along with the expansion of horizons for employees participated in these projects” (Correspondent GM1)

5.2.2.1.3 Adoption decisions in IAP

In this section, by referring to innovation project typologies developed in preceding discussion, different groups of key internal players involved in the initiation of these innovation projects will be identified. Then the rationale behind company's adoption of these innovation projects will be brief discussed, with reference to company's innovation decision making process. The focal point of discussion will be limited to ideas that been adopted by the firm to initiate its' short term and long-term innovation activities. Due to the fact that company Alpha does not have exclusive control over the decision-making process regarding the selection of national key innovation projects, the rationale regarding the adoption of this specific type of innovation projects will excluded in the following discussion.

In a general, innovation ideas adopted in this firm can be summarised as having been generated from the following two categories, namely, top-down and bottom-up. The former represents ideas or initiatives that been generated by senior managers, whilst the latter refers to ideas that proposed by employees of the firm. Additionally, the terms top down and bottom up used here refer to their literal meanings, so as a clear demonstration of the directions associated with the emanation of these ideas could be achieved, as shown in the following **Figure 5-2**.

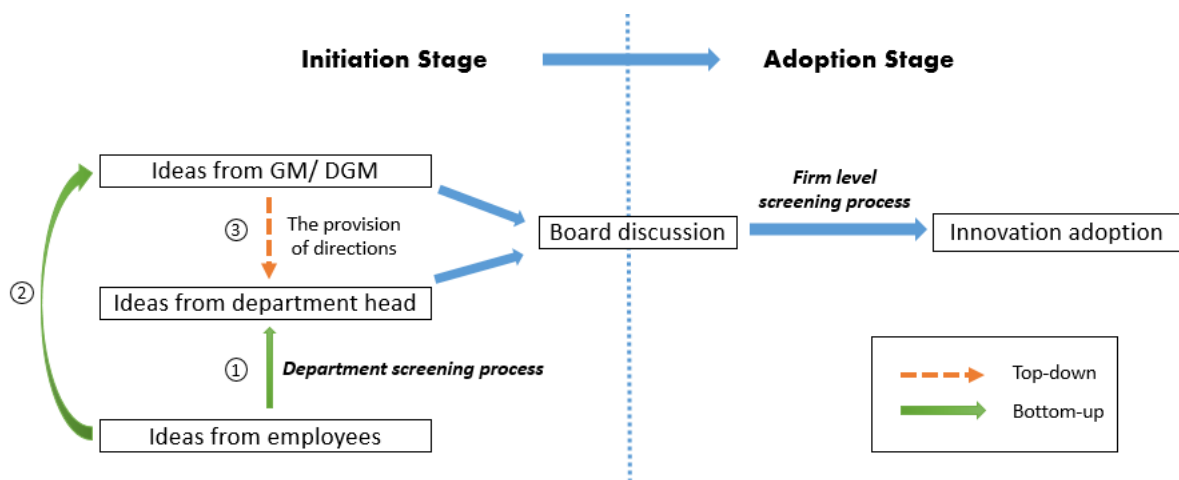


Figure 5- 2 Initiation and Adoption Decisions in the Innovation Adoption Process

In company Alpha, it is managers who are primarily responsible for envisaging innovation projects that are strategically important to the firm. Those of less strategic significance are delegated to the staff with their specialist knowledge in their respective departments

“We have different categories of innovation projects, you know. In terms of the long-term oriented innovation projects and projects that require the commitment of large amount of resources [from the firm], the majority of them are proposed by managers. Whilst most innovation proposals that generated from staffs are termed small modifications [which are incremental innovations], as they are closely related to daily operations and more knowledgeable regarding their own areas of specialities”
(Correspondent K1)

Additionally, it is worth noting that though the level of strategic significance may vary amongst these innovation ideas, due to the cognitive limitations of individuals involved in envisaging them, it does not mean innovation ideas proposed by low ranking employees only focus on daily operational issues. In fact, as shown in **Figure 5-2**, despite the fact that these long-term oriented innovation ideas are generally initiated by managers in a top-down fashion, they are not necessarily originated from them, in the firm. As indicated in Arrow 2 and 3 in **Figure 5-2**.

“We are all limited to what we have learned. That’s why as the general manager, sometimes I only provide suggestions regarding future directions of innovations, that I believe are relevant to the firm, to department managers, then they will do the search and report back to me. In addition to that, I asked IT department to create an internal e-mail, dedicated for the collection of creative ideas from various levels, especially the shop-floor one, of the firm. They [low ranking staff] can email me if they believe their suggestions are been undervalued...I tend to respond to these emails fairly quickly”
(Correspondent GM1)

“As the head of the department, it is my job to monitor the external [business and scientific] development. There are a lot of channels that be used for information/knowledge [that are relevant to the firm] to be collected, [such as] attending industrial conferences, meetings with [research faculties from] universities and sometimes browsing the internet. And we encourage our staff to do the same, of course they do not have so many chances to attend conferences or meeting with researchers, but they can still do it if they want. Sure there are occasions that we got suggestions [regarding potential innovation areas] from our superiorities, we will listen to it, and do the best as we can.” (Correspondent J1)

Board meetings are organised after the firm’s Technology Management Department finishes collecting these innovation suggestions proposed by managers. These strategically important innovation ideas proposed by managers have to be discussed, in the context of profitability, and evaluated before conclusions regarding either the adoption or the abandonment of these proposals can be reached. Additionally, despite the key role played by the General Manager (GM) in the initiation stage of IAP, the final decisions regarding innovation adoption have to be achieved on collective basis.

“In terms of these big and important innovation projects, we have to discuss them in board meetings. Suggestions and recommendations from different perspectives [departments] will be listened. For instance, finance, R&D, processing technology, product development departments and our factories will all be consulted. We have to take the reality into consideration, such as our budget, [human] resources and [technological and manufacturing] capabilities. Above all, profitability is a key criterion in the decision-making process.... Additionally, we are SOE, it is the collective responsibility for all senior managers rather than individual responsibility such as the GM” (Correspondent DGM1)

“There are occasions that the ideas we proposed to the board meetings got rejected. It is quite normal, we are inclined to evaluate these projects from department perspective, unconsciously, but our superiorities they are look at the bigger pictures” (Correspondent J1)

During these board meetings, the evaluation process, as shown in **Figure 5-3**, that been applied in the screening of innovation proposals is quite standard.

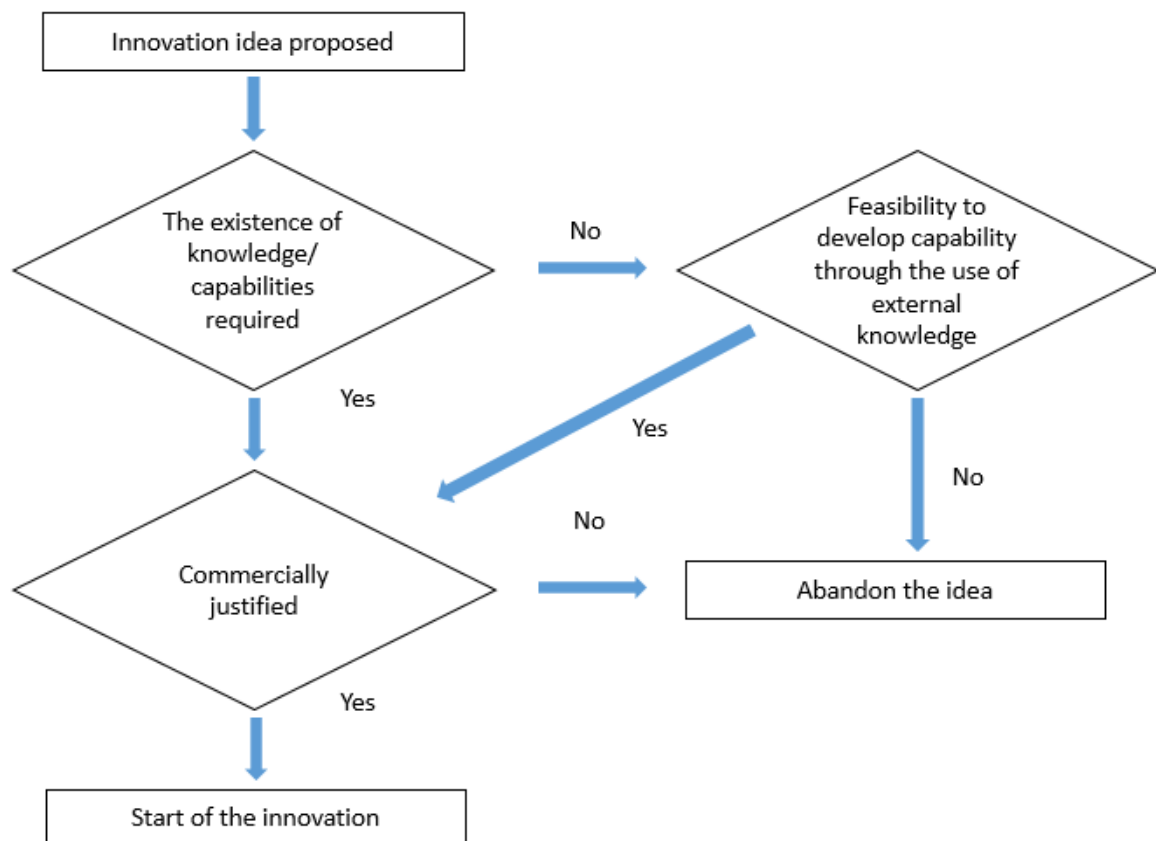


Figure 5- 3 Process of Adoption Decisions

As illustrated in **Figure 5-3**, firm’s existing knowledge and capabilities have been given appropriate weighting by members of the board during their innovation adoption decision making process.

“Take the hydraulic coupling device project for example, we did not just come to the idea of internalisation of this product from nowhere. First of all, due to the considerable costs that will be associated with its internalisation, we discussed value this project internally [within the department]. Then after the head of the department agreed with our idea, he then passed this initiative to senior managers. In the meantime, we have to prepare for the materials that can be used to justify of this proposal during the board meeting. Our justification is relatively straight forward, as senior managers are already aware of the potential benefit for internalising such product. And, after several years of using it, we [the department] have accumulated certain knowledge about this product, they [managers] knew it. Though not sufficient, but after consulting with several universities and research institutions, we were confident that they [knowledge and capabilities needed] can be acquired and internalised as we have [relevant] knowledge stock in this product. And we have people [from different departments] with different expertise in this project, assembled by the General Manager” (G1)

5.2.2.1.4 Summary

The preceding sections show for company Alpha that during the initiation and adoption decision stages of innovations various external knowledge sources have been consulted and assimilated by firm’s managers and employees. These combined activities performed by firm’s staff members significantly resemble the firm’s exploratory learning process.

Therefore, it is reasonable to argue that in company Alpha the exploratory learning process significantly correlates to the initiation and adoption decision stages of its’ innovation process. Furthermore, the existence of prior knowledge also demonstrated a significant role in the firm’s exploratory learning process and innovation initiation and adoption decisions.

5.2.2.2 The Relationship between Transformative and Exploitative Learning Processes and Implementation in IAP

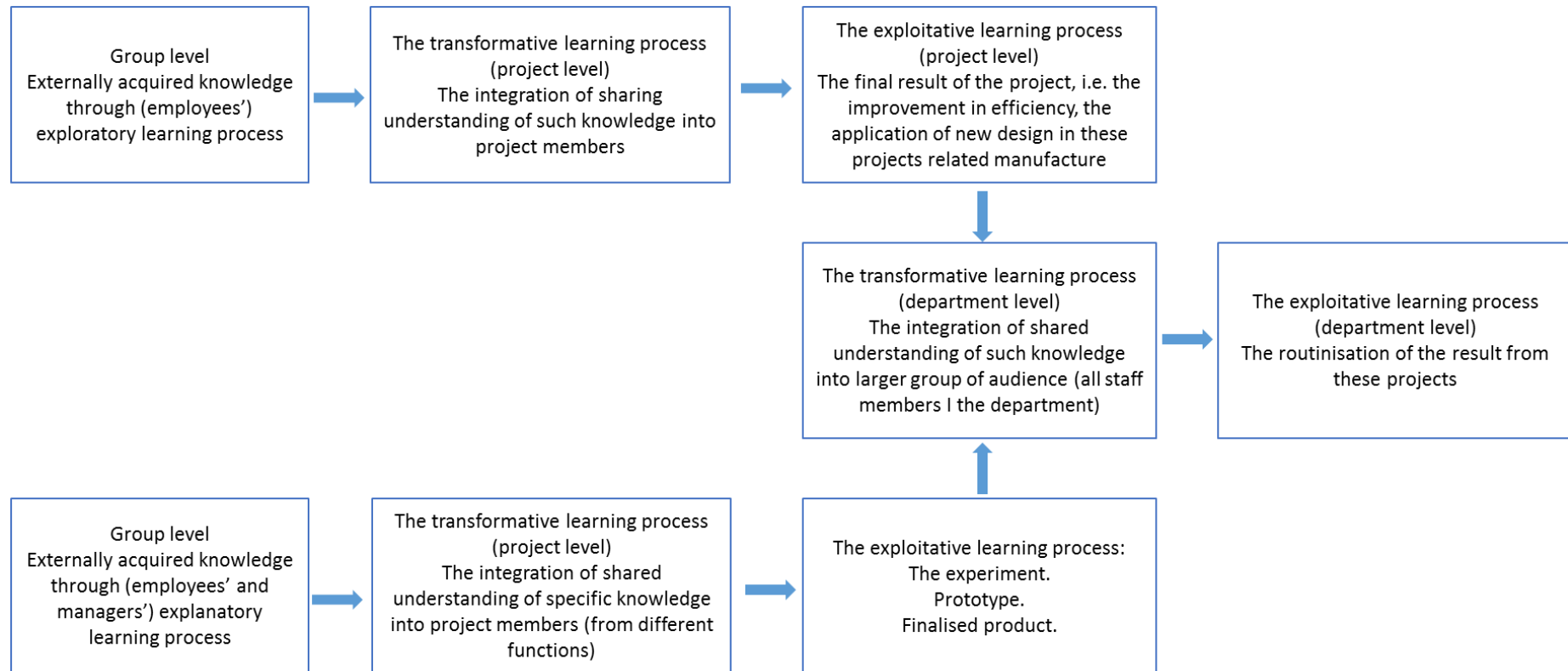
In this section, the correlation between company Alpha's transformative and exploitative learning process and its innovation implementation will be explored. As mentioned in previous section, innovation projects have been organised in either project groups (the most frequently adopted method in short-term oriented innovations) or project teams (the primary method for conducting long-term oriented innovations or national key scientific projects) during its implementations. The overall transformative and exploitative learning processes occurred in the implementation stage of IAP is shown in the following **Figure 5-4**.

As indicated in **Figure 5-4**, knowledge transformation is the development of new shared understanding regarding knowledge externally acquired and the subsequent integration by personnel within project groups and teams. As the development of shared understanding regarding these knowledge, which are been acquired to facilitate the implementation of firm's innovations, are predominant achieved by participants involved in these innovation projects. Whilst the transformative learning occurred on department level served the purpose for the retention, along with the subsequent dissemination of such knowledge within the organisation. The two levels of the transformative learning processes, jointly, served the purpose for new knowledge creation and retention. To avoid ambiguity, both levels will be addressed in the following sections.

Additionally, it is worth noting that in this firm, its operations are organised on functional basis. This means, although, innovations have been analysed as phenomena orchestrated on organisational level, it is firm's departments, either in an independent or joint manner that accomplished both the implementations of these innovations, along with is commercialisations. Therefore, in the following part of this section, the discussion regarding the correlation between firm's transformative and exploitative learning processes and its innovation implementations

will be addressed predominantly from department perspectives. This approach will be employed throughout this specific case analysis.

Short-term oriented innovations (mainly “small modifications”)



Long -term oriented innovations (i.e. product internalisation)

Figure 5- 4 Transformative and Exploitative learning processes in Implementation

The structure of this section is organised as follows: firstly, by referring to **Figure 5-4**, transformative learning activities performed by both individuals and groups in firm's innovations will be identified. Then channels and platforms that been developed in the firm to facilitate the retention and dissemination of knowledge, from the transformative learning process, at a department level will be presented. Further, routines and procedures deployed from department perspectives to facilitate the systematic exploitation of these knowledge will be discussed. Finally, a summary will be given, pointing out significant correlation between the firm's transformative and exploitative learning processes and its innovation implementations.

5.2.2.2.1 Individual and Group level knowledge transformation

Short Term Oriented Innovations

As elaborated in the preceding section, the majority of firm's short-term oriented innovation projects are initiated and implemented through activities performed within departments. The personnel involved in these projects are staff from each of the corresponding departments. As explained previously, knowledge acquired in these types of innovations are generally not too distant from individual employees existing knowledge base. Therefore, in most cases the transformation and integration of these externally acquired knowledge are achieved through work related discussions between these individuals that engaged in these innovations in firm Alpha.

“For these projects [that been accomplished by individual departments] we general have a project leader, who is responsible for the overall process of the project. They are supervisors or employees that have strong capabilities and more industrial experiences. These project leaders are responsible for the communication [of

knowledge/information acquired during the early stage of innovation and the expected result of these innovation projects] to their group members firstly. Then during the progress of the [execution of these] projects, the project leader will be monitoring the [overall project] progress, and coordinate the progress made by individuals, till the end of the project. This is the most frequently adopted method [in this firm] regarding this type of innovations. And, since most of these projects are closely related to their jobs, the communication [of information/knowledge] is not difficult. There are occasions that some newly recruited failed to catch the point [their project leader made] initially, they can still comprehend it through informal communication between them and their group members latter or if necessary with their project leader” (Correspondent J1)

Long term and National Key Innovation Projects:

The strategic significance demanded to facilitate the implementation of these innovations often requires a Project team to be assembled. This dedicated team has expertise from different departments allowing the cross-functional synergies required for the smooth implementation of such projects. Within this team decisions are made on a consensus level and cannot be made by a sole individual.

“Take the development of the prototype X [Internalisation Project] as an example, for this kind of project, we firstly need to establish a dedicated project team, which comprises specialists from respective departments. After the initial discussion, a project execution plan will be developed, clarifying who is responsible for what in this project....then through the cross functional coordination [amongst managers], the synergies can be achieved [to facilitate the development of the prototype]. Cross-functional communication is essential [in this kind of projects]. Project briefing and

coordination meetings had been organised on regular basis for these specialists and their managers [from respective departments] to discuss [project] related [technological and progress] issues [occurred during the process of the development of the prototype]. Sometimes special board meeting had to be arranged [to deal with certain issues]. The project [itself] represents a [innovation] process that comprises design, processing, manufacturing, R&D and other relevant departments [from the firm]. You [as specialist participated in the project] cannot say this is what I think the best way of doing it [from department perspective], it does not work that way. You have to communicate [with other team members regarding the feasibility of your ideas]. Consensus have to be reached, regarding [such as whether] the design, the method [proposed] fit in [current capabilities of related departments], and how we can use it properly. This is a process of constant coordination and communication [between personnel participated in the project]” (Correspondent J1)

5.2.2.2.2 Channels adopted to facilitate the dissemination of knowledge within departments:

As described previously, the creation of shared understanding and the subsequent integration regarding knowledge acquired from external resources is firstly achieved between individuals of whom participated in these innovation projects implemented in the firm. Consequently, the retention and dissemination of such knowledge is limited to a small group at this stage, due to limited opportunities available for employees to engage into these projects. This significantly limits the potential for the further exploitation of such knowledge to larger groups of employees within the organisation. Therefore, various activities have been organised, together, with a dissemination channel, in firm Alpha, to facilitate the

dissemination and retention of these knowledge on department level. These activities also laid down the foundation for the subsequent exploitation of these knowledge.

“We have considered about this [knowledge dissemination] problem. And that is why we organise internal introductory sessions [on regular basis] in the department. Every quarter, these supervisors or individuals [who have strong technical capacities] will be invited to give lectures regarding what they have learnt from projects they participated in or problems they solved during their work to the others [staff in the department] Further, we also have seminars, which allows managers share what they have learnt from external sources to their employees, and discussions are always welcomed during these occasions” (Correspondent J1)

“In addition to these introductory sessions and seminars, and we have developed an internal platform for knowledge/information sharing....employees [within the department] can upload information [regarding what they learnt from or what they think is new and relevant to their jobs] to this platform, it is open to everyone, and you can learn from it, if you are interested....Of course they can access the information gathered and published by different departments, it is an internal network, just like browsing the website. But [in this industry] our job-related knowledge is quite specialised. To be honest, you cannot expect employees in the design department to have extensive knowledge regarding other departments... but after couple of years working in this firm, they [employees] all have established some common sense regarding the others [related departments], there is no way that we cannot understand at all. So, in that sense, internal network represents a channel for them to learn from other [departments]” (Correspondent J1)

“There is no reason [for individuals] to withhold [information/knowledge acquired from external resources], this is a SOE, innovation performances are evaluated on

group rather than individual basis, collaboration is emphasised but not competition. As you cannot define who contributed the most during for these innovation project, the originator? The co-worker? Or the department that provided resources [that been utilised to facilitate the implementation] for it” (Correspondent J1)

Additionally, despite developing systematic channels to facilitate the dissemination of knowledge, the integration of such knowledge within the firm has not always been straight forward. An example is where externally acquired knowledge was developed for a very specific industrial and contextual origin, which were not directly compatible. In these cases, modification knowledge would be required before it can be successfully integrated into the firm, as illustrated in following quote.

“It is not rare that we need to do some modifications [regarding knowledge acquired externally]. It is actually quite common in our [processing technology] department, for instance, there are some forging techniques which are really good, but we cannot use it directly, ...you have to be flexible here, you cannot just imitate what they did, we have to adjust accordingly [to accommodate our capabilities and needs], for instance, we modified [their processing formula] with some techniques to increase the stress range for yield, and reduce the harness, etc., to cope with the need for our products” (Correspondent DGM1)

5.2.2.2.3 Approaches adopted for further knowledge exploitation

In company Alpha, ways that externally acquired knowledge has been exploited for commercial purposes can be summarised into the two categories: application through daily operations (regarding short-term oriented innovations) and application through systematic design (regarding long term oriented innovations).

One approach is the application of these knowledge, which can easily be comprehended by its employees, directly, through daily operations.

“For these small modifications, it is relatively straightforward, there are closely related to daily routines, it is quite often communicated and shared between colleagues through their [job related] conversations and discussions.....Sure, if they are been repeated used [routinized] by employees into their practises, we will include them into our manual book [for operations], as this means its’ value have been confirmed by our staff” (Correspondent E1D1)

In contrast, the second approach represents a formal and systematic way for externally acquired knowledge to be utilised. Various standards and procedures should be developed to facilitate the exploitation of such knowledge. Take the batch production of products, that been internalised by the firm, as an example:

“In term of the batch production of these finalised products [prototype], as a manufacturing firm, a formal [overall] procedure have to be developed first, then each department will develop their own detailed manuals, such as standards, routines, and technical parameters etc., But this does not mean there will be no further modifications [regarding the process and standard that been developed to guide the manufacture of these products], the initial formalisation of the manufacturing process is a structural guide, and we will continue working on it to for further improvement” (Correspondent E1D2)

5.2.2.2.4 Summary

For Company Alpha, its implementation stage of innovations is comprised by three distinctive sequential processes. Firstly, externally acquired knowledge is integrated by the individuals and groups directly involved in these innovation projects. Then this integrated

knowledge is dissimilated and retained at department level through collective actions performed by staff members within firm's departments. Finally, knowledge is exploited by the firm through process and procedures such as batch production and standardisation.

Collectively, activities performed during the first two sequential process the integration, dissemination, and retention of externally acquired knowledge resemble the firm's transformative learning process. Whilst activities performed in the final stage of innovation implementation resemble the firm's exploitative learning process. Therefore, it is reasonable to argue that, in company Alpha, innovation implementation is facilitated by its transformative and exploitative learning processes.

5.2.3 The Relationship between SMAL and AC

This section discusses how senior managers ambidextrous leadership (SMAL) influences the learning process (AC) associated with IAP.

5.2.3.1 The relationship between SMAL and Exploratory Learning Process

This section details activities that have been performed by the senior managers to facilitate the exploratory learning process in firm's innovations.

The section will firstly provide a simplified relationship map (**Figure 5-5**) indicating:

1. the sequential co-construction process that been deployed by firm's senior managers to enhance its environment for innovation, and
2. the subsequent increase of employees' self-generated initiatives in engaging exploratory learning, stemmed from such environment.

Then, approaches employed by firm's senior managers in the co-construction the pro-innovation environment will be elaborated. Finally, a summary will be given, pointing out:

1. the importance of the ambidextrous leadership exhibited by firm's General Manager in the co-construction process of firm's pro-innovation environment, and
2. the significant positive correlation between the firm's senior managers' *opening* behaviours and exploratory learning process in firm's innovations.

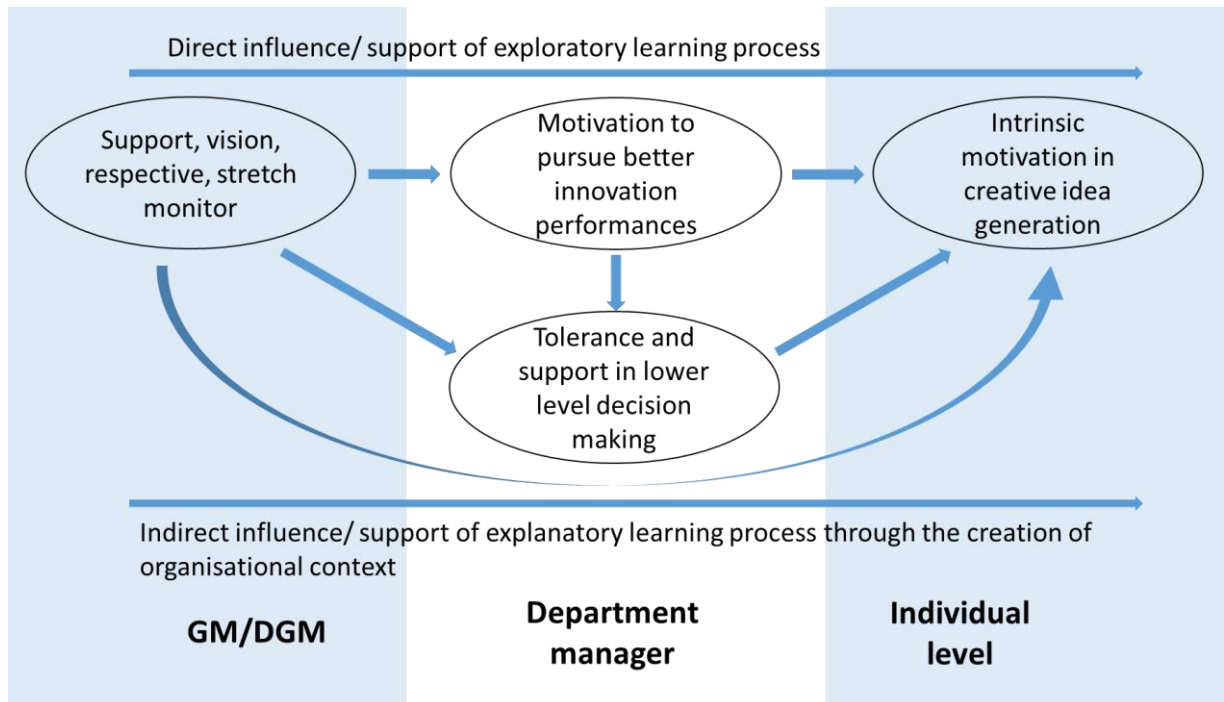


Figure 5- 5 Senior Managers influence on the Exploratory Learning process

The Senior Managers' *opening* leader behaviours that facilitate the co-creation of pro-innovation environments

Despite the guiding role that company Alpha's senior managers have demonstrated during the initiation stage of innovations, as elaborated in preceding sections, the significant role performed by their employees cannot be overlooked. They participate in both the initiation (as the originator of some creative ideas), and the implementation (as the executor) stages of these short-term oriented innovation projects. However, the participation level varies reflecting the differences of R&D capabilities possessed by respective individuals.

Additionally, it is rarely the case that senior managers have superior knowledge or information available regarding all aspects of an innovation than their followers. Therefore, the increase of employees self-generated initiatives in engaging proactive knowledge exploration, especially during the initiation stage of innovations, matters significantly. In company Alpha, various approaches have been adopted by its senior managers to facilitate the increase of such initiatives within its employees.

A strategic vision has been developed by the firm's General Manager and communicated to employees and department managers across all levels of the firm. Aiming to achieve the following goals:

1. to understand the importance of innovation to the firms' future,
2. the creation of an innovation friendly environment, and
3. the subsequent increase of self-generated initiative amongst staff members in engaging exploratory learning.

"You have to let them know [the importance of innovation], I've emphasised this several times during the [staff] meetings, innovation is the only way for us to survive [both for now and in the long run], especially under current circumstances [which was an economic downtown]. I think now they fully understand it, and it is a consensus [for everyone in the firm] now [regarding the importance of innovation for the firm]. As this [vision] been embraced by more and more employees, I can feel the overall [innovation] environment is getting better" (Correspondent GM1)

In addition, department managers, as the conduit between upper and lower level of the organisation, also played a significant role in the co-creation of the innovation friendly environment within the firm. Nevertheless, in contrast to the General Manager's broad focus, regarding innovation environment creation, approaches adopted by department managers to

facilitate the development of the desired environment is relatively narrow (departmental) focused.

“Our primary concern is the execution of the ideas [regarding how to facilitate innovations in the firm] proposed by our superiors. From our [department] perspective, this [exploratory learning] is encouraged from the following perspectives. Firstly, we encourage employees to [engage] self-learning during their spare time. Secondly, we have set up allowances for people to put their new ideas into practices, not a lot of money, but it really inspired their morale. The third one is group discussion, which we organise every month, during such discussion people can express their ideas [regarding these job-related innovations], and we encourage critical discussion during these meetings.....it is through this way [that] we simultaneous increased employees self-generated initiatives [in exploratory learning in innovations] and created the innovation friendly environment [in the department]”
(Correspondent F1)

General Manager’s *closing* leader behaviour that facilitate the co-creation of pro-innovation environment

The shared understanding regarding the importance of innovation to the firm does not necessarily lead to the subsequent unanimous embracement of it by every individual in the organisation. As putting them in practice requires individuals to take initiatives to challenge their status quo and stretch their capabilities.

Therefore, the General Manager understands that key are managers who must have the innovation mind set, to think ‘outside the box’ and create the environment and motivation for their subordinates to innovate.

To enforce this a technology committee has been organised where the General Manager and Department Managers meet. In this forum, the General Manager:

- checks that Department managers are stimulating innovation in their departments
- gives direction for new innovation projects
- passes on ideas on how to motivate employees

“I think it is just an excuse for saying [as the manager] it is impossible [to achieve certain innovations]. For example, there are a lot of things that Jack Welch does not know [in details], but he knows how to [lead a firm to] become the top of the industry [it operates in]. In fact, [manager’s] capabilities are determined by [their] mind-set, experience and knowledge. If you do not understand it [for now], you can understand it fairly quickly [if you want], if you do not understand the details you can still understand the principles. I always wanted to find someone who is not from the design department to manage this department, sure he is not familiar with these details [regarding how to run the department], but this is his strength. He can think out of the box” (Correspondent GM1)

“You [as the manager] have to have the innovative mind-set, to think out of the box.... there is no such a thing that is impossible, you mind-set determines you attitude, you effort in searching for new and creative ideas [that can be potentially adopted for innovations]” (Correspondent GM1)

“It’s like running a country, [most] presidents of US are graduates from Law schools, but that country is the best in [terms of] technological innovation. Why? Because they created the environment for innovation. In a firm, its’ technology level should be equivalent to its [the level of] expertise’s, but not its managers’. They should be assigned with different priorities. Managers are the bellwether, their job is to create a platform [for innovation] for their subordinates, and stimulate the intrinsic

motivation from employees. Their mind-set matters significantly [regarding the creation of pro-innovation environment]” (Correspondent GM1)

“This is why now I have organised a technology committee, and I’m the chair of this committee. I organise meetings every month, ask them [department managers] to write work log for me on regular basis. [It is] through this way that I pass my ideas [regarding how employee’s motivation can be increased, along with suggestions regarding the selection of direction for innovation projects] to them” (Correspondent GM1)

In addition to the technology committee, direct communications with low level employees also provided a channel for the General Manager to check, and correct if necessary, the level of compliance of his department managers regarding their attitudes toward innovation. Though such communication channel was originally designed to inspire employees’ motivations in engaging innovation related activities.

“As a matter of fact, through [the content in] these emails [that been sent] from employees [regarding creative ideas they proposed], you can tell what their managers are doing. The first superior that these employees should have approached [regarding the creative ideas they come up with] is their managers. A conscientious manager within a good [in terms of innovation friendly] environment would have picked up these ideas if they are valuable. But it is a progress [for people to fully embrace the innovation-oriented mind-set], so I can understand [some managers been relatively slow in making such progress], and I will tell them if they fail [to do so] continuously” (Correspondent GM1)

It is through the synergies provided by the senior managers, that the shared understanding regarding the importance of innovation to the firm could be achieved by their employees. Along with the subsequent enhancement of firm’s innovation friendly environment.

Collectively, these activities contributed to the increase of employee generated initiatives in the participating in exploratory learning (the generation of creative ideas) to the firm's innovations.

“Overall, the environment for innovation is good. We have already got several really good innovation suggestions proposed by different apartments this year. And employees are willing to engage into it [the generation of creative ideas]. Sure the General Manager has to be accredited for it, as his attitude towards innovation has played a decisive role [regarding employees' motivation in engaging into innovation related activities]. This is a SOE, leaders' decision matters significantly”
(Correspondent K1)

Summary

As demonstrated previously, in company Alpha, senior managers' *opening* behaviour is the key facilitator of firm's exploratory learning process in its innovations. But it is also worth noting, the General Manager's closing behaviour towards his department managers also contributed to enhancement of this specific learning process, though in an indirect way.

5.2.3.2 The relationship between SMAL and Transformative Learning Process

In this section, details regarding behaviours been performed by firm's senior managers, along with the impacts that these behaviours projected on firm's transformative learning process that occurred during the implementation stage of innovation adoptions, will be elaborated.

The discussion of the firm's transformative learning process will be depicted by the analysis of the transformative learning processes occurring (in project group level) within respective types of innovations in this firm, for rationale provided in section 5.2.2.

This section elaborates on the different roles performed by firm's General Manager and Department Managers during the transformative learning process of its short-term oriented innovations. It also covers the important roles performed by senior managers in the firm's long term-oriented innovations.

Short-term oriented innovations

Regarding the implementation of firm's short term-oriented innovations, the integration and retention of externally acquired knowledge, by employees through the transformative learning process, is straightforward. As most knowledge acquired to facilitate these innovations through firm's exploratory learning processes are not too distanced from employees' existing understanding. Integration of this knowledge has been achieved, primarily, through collegial job-related discussions between employees during the implementation of these innovation projects.

“Discussions [regarding innovation related issues] general happens during [the implementation of these projects], most of them are quite straightforward, as I said, most of them are all job related specific knowledge, and a common understanding [regarding such knowledge/information] is not difficult to be achieved amongst employees in [project] groups. If it is really necessary, we have our supervisors and expertise [available] to help them, but it is not quite often for them seek the help [from their supervisors]. I think the communication between them [employees] is sufficient for them [to sort issues occurred during the transformative learning process]. As they all have at least one year on-job intern experience before they started their job, and we have a fairly comprehensive processing technique manual [summarise job related knowledge accumulated from past] to guide their work. I think it is not a problem for them [to establish sharing understanding regarding these

externally acquired knowledge through the transformative learning process]”
(Correspondent E1D2)

Department managers are both the facilitator and supervisor regarding the transformative learning process that been performed during these short-term oriented innovations. They also must balance innovation projects with the expected work output from the department.

“During this [the implementation of these short-term oriented innovations] process, there are two things [that are] merit attention from us [as department managers]. The first thing is to consider individuals capabilities before we assign them to these projects. The capabilities possessed by each individual are different, some are better in certain perspectives, whilst some are better in others. We [as department managers] have to be aware of it. The second thing is to monitor the progress. In these [short-term oriented innovation] projects, we [as department managers] will have a time table for them, with deadlines specified. We are a manufacturing firms, not a research institution. What the General Manager emphasised during the [staff and board] meetings [regarding the importance and necessity for all staff members in this firm to embrace the innovation mind-set] is good, I totally agree. Without a doubt it [the embracement of such mind-set by all staff members] is necessary for the long-term development for the firm. But we [as department managers] have to balance [the resource allocated in these innovation department projects and manufacturing assignments]. We [as department managers] have to have a clear mind of this priority issue” (Correspondent J1)

“For these small modifications, it is relatively straightforward, there are closely related to daily operations, therefore, what they [as department managers] have to do is to support [their employees through the creation of an innovation friendly environment] rather than direct intervene. Of course, if these [projects progress] falls

behind its original schedules, they [as department managers] will [intervene]. Take the design department as an example, they [as managers] cannot get involved into every [innovation] projects, it is impossible and unpractical to do so. But what they can do is to provide support for the implementation of these [innovation] projects, and coordinate resources [especially human resources within the department] to help them [employees] to implement such [innovation] projects. In addition to that, they [as department managers] have to monitor the [overall] progress [of these innovation projects]. This is also a criterion that we use [as superiority] to evaluate their [department managers] performances” (Interviewee DGM 1)

In contrast to the operational oriented behaviour demonstrated by these department managers during transformative learning process, leader behaviour performed by General Manager is broader focused. It is through the provision of a pro-innovation environment in the firm rather than the direct intervention that the General Manager influenced the transformative learning process in firm’s short-term oriented innovations.

“As the leader of the firm, you simply do not have time and energy to get into these details [regarding these short-term oriented innovations], you will lost focus if you do so. We [as the leader], need to look at the big pictures but not the details. These [details] are the department managers’ job and their responsibility. What I have to do is to create an environment [in this organisation], and stimulate the self-generated initiatives for our employees, so as they can be [more] proactive and self-motivated to participated into innovations, along with the learning from each other” (Interviewee GM1)

“[literally] the only thing we have to tell the General Manager [regarding these short-term oriented innovations] is the overall [department innovation rather than individual innovations’] progress, like how many projects have been done this year,

and what [economic] benefits have been achieved from these innovations. You are not supposed to bother him with miscellaneous issues, and if you do that means you did not do your job well” (Interviewee K1)

Long term-oriented Innovations

As discussed previously, due to reasons explained in section 5.3.2, cross-functional collaborations are often required to facilitate, the progression of long-term oriented innovations, along with the associated transformative learning processes. Further, as experimentations and the developments of prototypes are often required to guarantee the successful implementation of these projects. The coordination issues, regarding resources, both human and financial, become prominent in these innovations. Therefore, in contrast to the low-level engagement demonstrated by firm’s senior in its short-term oriented innovations, firm’s senior managers, especially its General Manager, have often been directly involved in the long term innovation implementations. In certain occasions the General Manager is the only one that has the authority to ensure cooperation across departments so that innovations proceed smoothly.

“[coordination related] Decisions made by him [the General Manager] matters significantly [regarding the success of these long-term oriented innovations], as [human, financial along with other] resources required for the implementation of thus projects belongs to different departments, it is fairly difficult for us [as the department managers] to coordinate and mobile these resources sometimes. He [as the General Manager] is the only one [that have the authority] that can do so [in situations when admiration orders from higher level authority have to be issued to achieve certain necessary cross-functional coordination in the organisation]. Additionally, as these expertise [assembled for long-term oriented innovations] are

from different departments, sometimes it is not easy [for them] to achieve the consensus [regarding the decision of adoption of specific approaches or methods to deal with problem occurred during implementation stage of these innovations] [through transformative learning process]. Of course, we as [department] managers will provide suggestions in these situations, but not everyone [department managers] are reasonable enough, some of us are quite protective [in terms of backing up expertise from their own department unconditionally]. It's quite normal. In situations like this, decisions will have to be made by the GM, so as these [long-term oriented innovation] projects can be pursued smoothly" (Correspondent N1)

Despite the long-term oriented nature for these innovations projects, the importance regarding their time to market must also been addressed by firm's senior managers. Therefore, firm's senior managers often involved in the supervision of the development of these projects along with the transformative learning process associated within such development. Though the level of engagement in supervision varies amongst these managers, reflecting their differences in strategic focuses.

"Generally, it is individual department managers' that take [the primary] responsibilities for overseeing these [long-term oriented innovation] projects. And they report directly to our General Manager. The General Manager will check the progress [that been made regarding these projects] with them regularly. We are a manufacturing firm, time [that been consumed during the development of these innovations] matters. Put it another way, the faster the better. As in the end [firm's] resources are limited, they [these expertise] also have their own job to do [in their own departments]" (Correspondent K1)

"During this [development] process [of these long term oriented projects], execution is what matters after all....no one will challenge the feasibility or value of these

projects [especially after they been decided by the management board during board meetings]. What we [as department managers] cares is about the progress, [in terms of] technological issues we have our expertise [that been assigned to these project teams], our job is provide support for them [if necessary] rather than monitor every step they take” (Correspondent L1)

Summary

In this section, company Alpha’s senior managers leader behaviours along with the impact that these behaviours to the firm’s transformative learning process have been analysed. Transformative learnings that occur during firm’s innovation projects have been adopted as the epitome for firm’s transformative learning process. On occasion the GM adopts closing behaviour (i.e. paying attention to task accomplishments and taking corrective actions) for long term innovation projects, whilst most of the time the GM is not directly involved in these projects.

In contrast to the *closing* behaviour that performed by General Manager occasionally, activities performed by firm’s department managers are a predominantly *opening*, in firm’s transformative learning processes. The difference of behaviour exhibited between the GM and his department managers reflects their distinctive managerial focuses. For the GM it is strategic, but the department managers are more operational oriented, and this is highlighted by their role as both the facilitator and supervisor of these innovation projects and their need to balance innovation with work output.

5.2.3.3 The relationship between SMAL and Exploitative Learning Process

This section describes the SMAL and its impact on its exploitation learning process. The exploitative learning process will be depicted by activities performed to achieve the

exploitation of the commercial values of these externally acquired knowledge. As explained in previous section, the exploitation of knowledge has primarily been achieved through the following ways:

- exploitation through daily operations (regarding short-term oriented innovations), and
- systematic designs (regarding long-term oriented innovations).

Exploitation through daily operations

A body of knowledge already exists to facilitate short term innovation projects. These manuals have been created from accumulated past experiences and if something useful comes from a short-term innovation these are expanded to exploit (the exploitative learning process) gained knowledge

“Every employee [in the department] have a design manual, summarising [job] related fundamentals, techniques and some useful tips in it. These [fundamentals, techniques and tips] are what we have accumulated from past experiences. And if we found something valuable [from these short term oriented innovations], we [as department managers] standardise it and put it into the manual as well. So everyone in this department can use it” (Interviewee J1)

Consistency is the key word that has often been emphasised when such knowledge exploitation activities have been addressed by firm’s department managers. This indicates the department managers’ predisposition towards closing behaviour in the exploitative learning process.

“The purpose regarding the routinisation and formalisation [of these knowledge] is to guarantee the consistency [regarding the reuse of these knowledge by employees]. Take the design work as analogy, you cannot just say I put the engine in the lower

deck [of the system] whilst you put it on another place for the next time. You cannot do that. For each series of system, there will be specific standards. Without consistency, there is no way for calling that as application [of knowledge], that is improvise, we do not accept that, and our customers will not accept it neither” (Interviewee E1D1)

Exploitation through systematic design

This type of knowledge exploitation (through exploitative learning process) often occurs during the early stages of batch production of newly development products. Managerial attentions are given to the following issues:

- standardisation of manufacturing related technical parameters and procedures,
- quality concerns, and
- meeting the schedule.

These all reflect closing leader behaviour. An example is the batch production of the internalised products X:

“[in terms of the] The production of this product, first of all you will have to standardised manufacturing procedure, pin down details, such as what [process] starts firsts, for how long, which [department] follows which [department], and the quality standard etc., Then each department can develop their own detailed manufacturing process, schedules, and manuals, disentangle this job into [departmental] details” (Correspondent E1D2)

“During the manufacturing, stick to the schedules is extremely important, as you can see [from the manufacturing process flow chart], if you cannot meet your schedule, which means the others [departments manufacturing plan] will be interrupted, and the consequence is severe” (Interviewee GM1)

“Quality matters, that’s why we have a TQM [total quality management] system in the firm, and we have our supervisor on the front lines [of manufacturing departments] to monitor the quality. And they [the subordinate factory] have their own quality management staff as well. It is multilevel process to make sure our product meet the quality standard” (Interviewee J1)

Summary

As described the firm’s senior managers moved unanimously to *closing* leader behaviours during the exploitative learning process. Also, knowledge exploitation has been effectively supported by manager’s adoption of techniques such as standardisation, routinisation along with the imposition of quality control. This indicates goal oriented managerial activities (*closing* leader behaviours) which represents good fit in exploitative learning process.

5.2.4 Case Summary

In company Alpha the correlation between its AC learning process and the innovation adoption is significant (details in **Appendix IV**). Activities performed by firm’s employees and managers in different sub-sets of its AC learning process facilitate the completion of objectives in different stages of innovation adoption process, as shown in **Figure 5-6** and **Figure 5-7**, respectively.

In the initiation and adoption decision stages of innovations, issues such as the generation of creative ideas and the subsequent selective adoption of these ideas based on the firm’s specific needs merits attention from firm’s senior managers. These two issues have been addressed by this firm through activities performed by its staff members in the firm’s exploratory learning process. Firstly, employees and managers guided by a clearly defined

and communicated strategic focus, engaged in self-motivated external knowledge searching. Then using existing prior knowledge as the starting point, various external knowledge sources were then explored for creative idea generation. Finally, creative ideas proposed by staff members were critically evaluated and selectively adopted by managers at the adoption decision making stage of innovations²⁹.

²⁹ As the simplified innovation adoption decision making process has already been provided in Figure 5-5 (section 5.2.2), the details of this process will not be repeated here.

Exploratory Learning Process

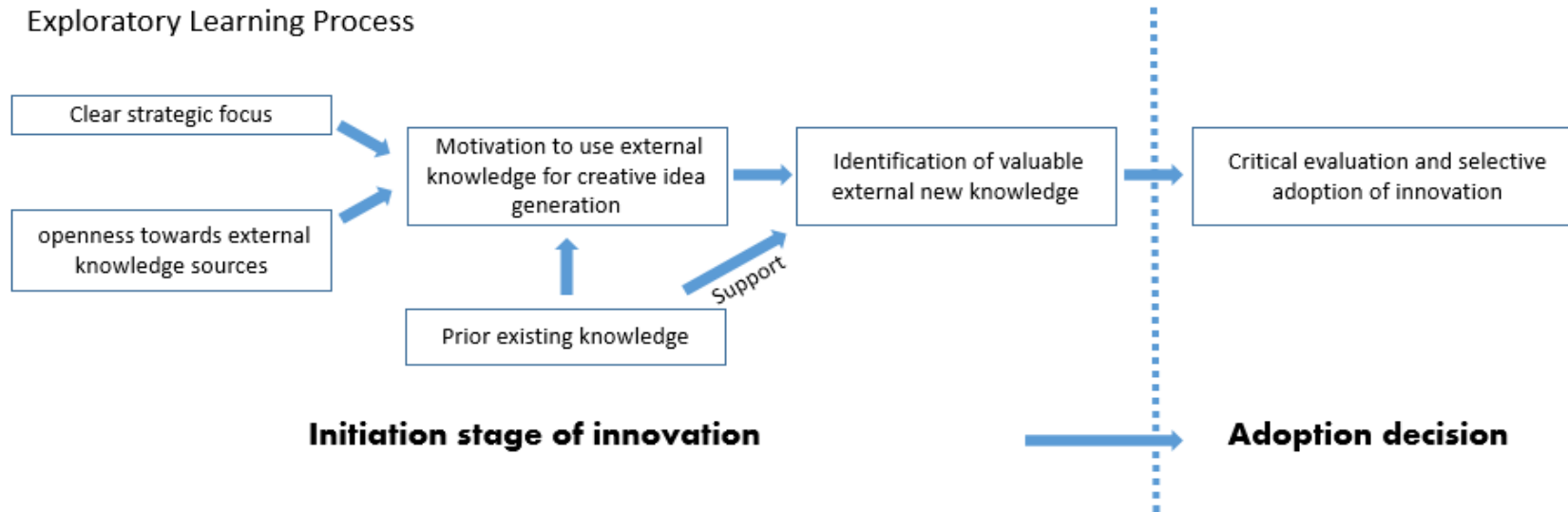


Figure 5- 6 Relationship between the Exploratory Learning Process and Initiation and Adoption Decisions in IAP

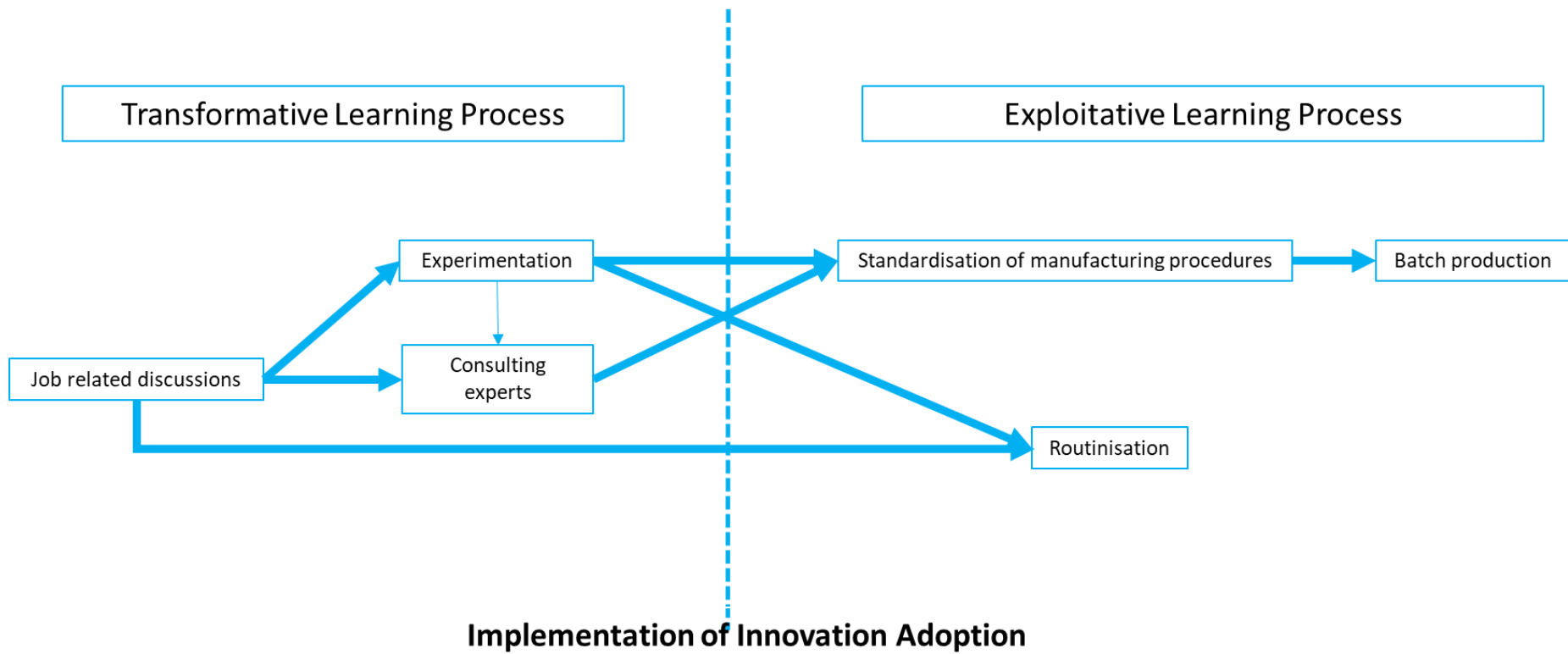


Figure 5- 7 Relationship between Transformative-Exploitative Learning processes and the Implementation in Innovation Adoption process

During the implementation stage, the primary concern of innovation adoption process moved from external knowledge exploration to the integration and the subsequent commercialisation of these knowledge that been identified by the staff members. As shown in **Figure 5-7**, the integration of such knowledge is achieved through activities performed in its transformative learning process, namely, collegial job-related discussion, experimentation, and the consultation of expertise. Commercialisation of this knowledge is facilitated by the firm's exploitative learning process which includes standardisation of the manufacturing procedure of innovations, along with the subsequent introduction of such products to the market.

In terms of the leader behaviour demonstrated by senior managers during its AC learning process, an overview is summarised in **Figure 5-8**³⁰.

³⁰It is worth noting that Figure 5-8, is a simplified summary regarding senior managers leader behaviours that been demonstrated in firm's AC learning process. Certain peculiarities such as the demonstration of closing behaviour by firm's General Manager in the exploratory learning process is not included. The detailed descriptions regarding the relationship between SMAL and AC as demonstrated in Company Alpha are provided in **Appendix V**.

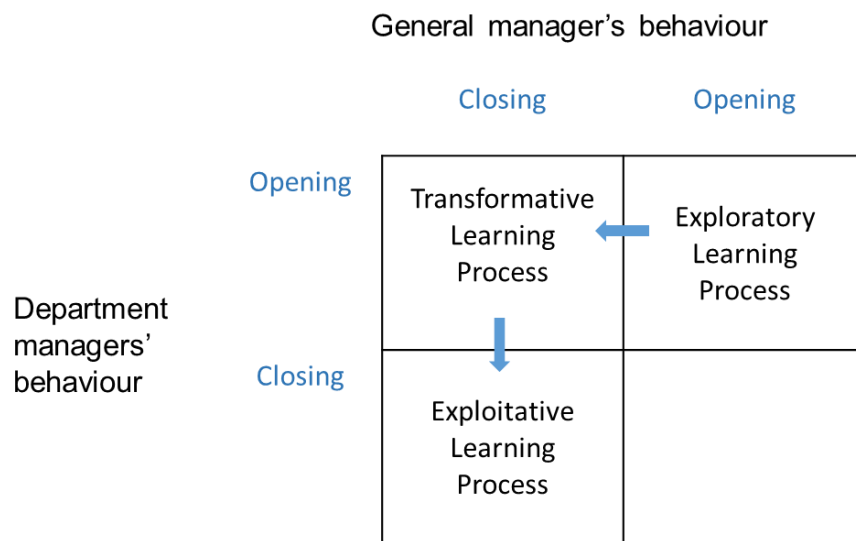


Figure 5- 8 Senior Managers Ambidextrous Leadership and the Absorptive Capability Learning Process

As elaborated in section 5.3.4, senior managers, and especially the GM, adopted *opening* leader behaviour (the top right corner in Figure 5-8) which contributed to the creation of an innovation friendly environment in the organisation. The existence of such an organisational environment significantly contributed to the motivation of employees in initiating exploratory learning.

However, the unanimous adoption of the same leader behaviour did not occur in firm's senior managers during its transformative learning process. In this process, General Manager moved from *opening* leader behaviour (emphasising delegation and error learning) to the occasional adoption of *closing* leader behaviours (the top right corner of **Figure 5-8**). In contrast, during this stage, Department Managers are both the facilitator and supervisor of knowledge integration in their own departments, and the leader behaviours adopted by them are predominantly *opening*. This shows that managerial focuses are different amongst these senior managers in the transformative learning process. General Manager has a strategic focus and adopts the *closing* leader behaviour, though just

occasionally, to oversee the progress. Whilst, department managers adopted opening behaviour so as to facilitate effective knowledge integration in this process. Furthermore, as shown in **Figure 5-8**, bottom left corner, the senior managers' leader behaviours moved to *closing* during the exploitative learning process in innovation adoption process. As revealed in the analysis, *closing* leader behaviours (i.e., monitor the progress, taking corrective actions (impose quality) and establishing routines and procedures) adopted by senior managers effectively supported the exploitative learning process in innovation adoptions.

5.3 The analysis of Case Company Beta

5.3.1 Company Background

Company Beta is an SOE, with 55 years of history and 3300 employees, targeting the high-end market, with strong brand reputation. At the end of 2012, the assets possessed by the company totalled at more than 3 billion RMB. This company has more than 400 professional and technical personnel, and 22 senior engineers and 89 engineers, and more than 3,000 sets of equipment. The annual output value in this company reached 2 billion RMB in 2015.

This company is one of the largest professional Product Y producer in China, with an average domestic market share around 28 per cent from 2011 to 2015 (as shown in **Figure 5-9**). It also exports its Product Y to the United States, Russia, Indonesia, India and other countries. This company has been rewarded provincial and ministerial-level science and technology progress special award several times during the last decade. Additionally, this company has been nominated as Key high-tech firm in National Torch Project for consecutive 15 years, from 2000 to 2015 (company website).

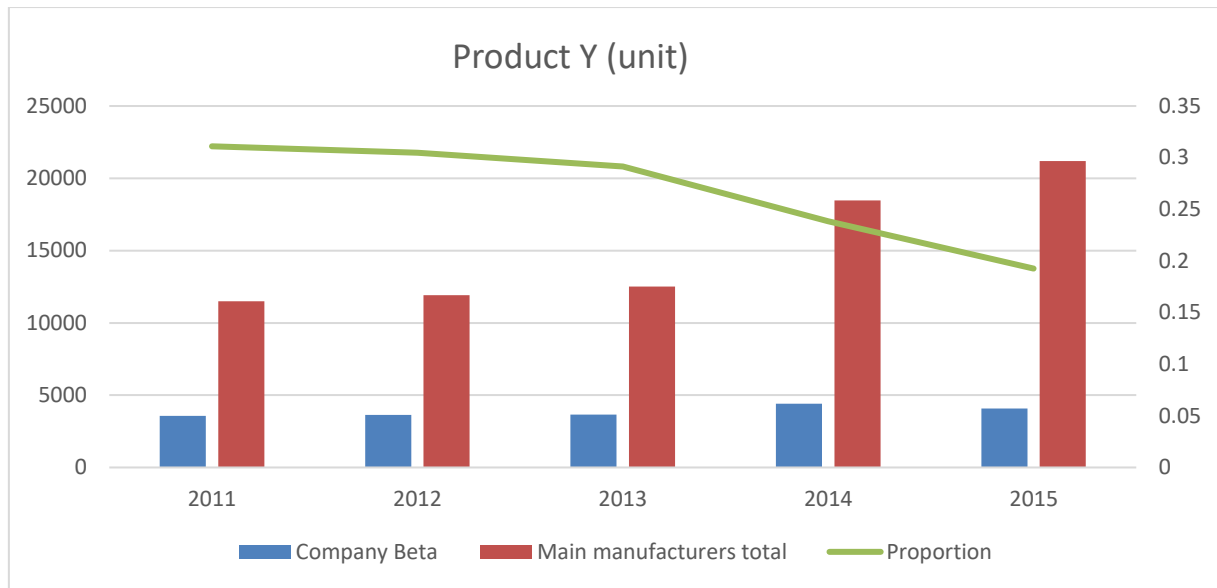


Figure 5- 9 Market share the Trend of Company Beta

5.3.2 The Relationship between AC and IAP

5.3.2.1 The Relationship between Exploratory Learning Process and the Initiation and Adoption Decisions in IAP

In this section, the relationship between exploratory learning process and the initiation and adoption decisions of innovation adoption process in company Beta will be explored, with reference to interview data collected during the field work.

This section is organised as follows. Firstly, the driven forces which underlies the initiation of innovations in this company will briefly described. Key internal players and consulted external knowledge sources will be identified. This is so a comprehensive understanding regarding activities taken by the firm to facilitate the initiation of innovation can be achieved.

The criteria adopted by the firm regarding its selective assimilation of external knowledge will be elaborated to emphasise the importance of the firm's prior knowledge to its innovation adoption decisions.

Finally, a short summary will be given indicating the activities performed by firm's managers and employees in the innovation initiation and adoption decisions stages in firm's innovations and how they significantly resemble the firm's exploratory learning process.

5.3.2.1.1 Motivations for Innovation

According to the firm's General Manager, the forces that underlies company Beta's pursuit of innovation adoptions can be summarised into the following three categories: social responsibility, market pressure and the increasing needs for customisation.

“Overall, [the motivations for firm to innovate] comes from the following [three] perspectives: the first one is the [organisation's] social responsibility. We are SOE, and National Team [a metaphor], we have to take the responsibility regarding the national level technology advancement in our [heavy equipment manufacturing] industry. And we feel proud of this. The second one is the competition and the deteriorating market environment, which made us have no choice [but to innovate]. The third one is ever increasing demand of customisation [of products], [which motivate] us have to innovate accordingly to satisfy our customers' [specific] needs. Of course, this is also reflected in our [organisational] culture as customer focused and continuous innovation” (Respondent GM2).

In company Beta, various initiatives have been taken by the firm to facilitate its innovations. Distinctive activities have been adopted by its staff members, along with the consultation of various external knowledge sources, to facilitate these initiatives. These are discussed in the following section.

5.3.2.1.2 Initiation of IAP and external knowledge sources consulted

In response to the deterioration of the market environment, maintaining market share and targeting high end industrial sector have been envisaged, by managers, as the most appropriate strategy for the firm. According to these managers, the continuous enhancement of customer satisfaction level is considered as the most appropriate channel that can be adopted to guarantee the successful delivery of such strategies. Various innovation activities have been organised to support the strategy. Two initiatives, namely, product differentiation and customisation, have been assigned the highest priorities firm's senior managers.

Initiative taken from firm's strategic perspectives:

Product Differentiation

There has been major capital invested into the heavy equipment manufacturing industry in the last decade. The result has been that a significant number of firms are now forced to engage in price competition with each other. However, Company Beta is a SOE, with social responsibility to its employees, and this significantly limits its ability to engage in this tactic unlike its competitor private firms.

“As SOE we cannot simply go to price war with these private firms. We do not have their advantages. And we have responsibility for our employees, you cannot dismiss them because they are getting old or less efficient as they used to be. They [private firms] can do it but we cannot. That is why we opted to [product] differentiation strategy, and target the high-end market” (Interviewee HR2)

In company Beta, product differentiation and quality improvement are often pursued simultaneously through the collaboration between different functions. For example, the product development department is primarily responsible for achieving product

differentiation by proposing creative ideas from design and function perspectives, whilst firm's processing technology research institution is more concerned with the development of material processing techniques that enable the realisation of such design and functions.

“Our industry is a relatively mature one, and [product] differentiation means these [related] innovations are more functional oriented. In a simple term, most firms [operate in the same industrial sector as company B] only have the capability to manufacture [supporting] systems that operate in normal geological conditions, but we [have the capabilities] to design and manufacture systems that operate in more complicated [geological] conditions” (Interviewee J2)

“In order to differentiate our product, sometimes, in addition to the innovation in design, we have to use some new [material] processing techniques to facilitate the realisation of such design or functions [that required for the development of differentiated products]. From [material] processing perspective, they [product differentiation and quality enhancement] correlate with each other. And the advancement [regarding material processing techniques] represents a process of knowledge accumulation. In other words, the techniques we developed for specific product [or project] can and have been often used in other products and occasions [such as quality enhancement]. It is quite difficult to define what is what [regarding the applications of processing techniques developed], a lot technique developed here have more than one applications” (Interviewee E2D1)

Despite an extensive knowledge repository, external knowledge/information sources are still appreciated and often consulted by staff members. This is true, especially, during initiation stage of their product-differentiation oriented innovations.

“We do have relatively extensive knowledge repositories, but it is in relative term. However, the market [environment] is changing, technology is progressing, and our

competitors are catching up. This means, in order to achieve these goals [such as product differentiation], we have to keep up with the pace [with the market, technology trend and competitors] as well. And how can we do that? We have to learn. [And we] Learn from multiple channels, such as from firms with relevant industries, upper stream firms who collaborate with us, and sometimes universities” (Interviewee F2).

Initiative taken from firm’s operational perspective:

Customisation

Low level of standardisation has always been a feature of the industrial sector that company Beta operates in. Further, due the differences regarding the geological conditions that their customers operate in there are various specific needs. Therefore, tailored engineering and structural design are often required to facilitate the development of these customised products. Many external knowledge sources have been frequently consulted by different departments, to facilitate the generation of creative ideas. These can then be adopted to realise the customisations.

“To satisfy our customers’ [specific] needs is both the motivation and the start point regarding the search for innovative methods or techniques that can be further employed into the customisation of products. We do have a lot of experiences, but as time moves by, there are a lot issues [previously less addressed by customers] that now need to be addressed. Therefore, we have to innovate, from [mainly] the following perspectives, design, structural [engineering] and material [processing techniques]. And in order to facilitate these [customisation oriented] innovations, we have to consulted relevant specialised firms [to achieve the acquisition of desired knowledge from external sources] in several occasions” (Correspondent J1)

Initiatives taken from social responsibility perspective:

National Scientific Key Projects

Commercial interest is not the sole motivation for company Beta to engage in national scientific key projects. Central Government orchestrates these innovation projects to be implemented by selected SOEs and research institutions. The objective is to enhance the level of technology advancement of targeted industries through synergies generated from the collaboration between firms' and universities during these innovation projects. Although improved innovation capability of the technical staff is expected, participation also raises the capabilities of the senior managers. The resultant innovations are, according to firm's General Manager, considered a social responsibility that firm Beta willingly undertakes.

“Regarding [these national scientific key] projects, we do not have authority to make [the final] decision [regarding the selection of innovation projects], but we welcome them. This is not political propaganda. Because by participating in such projects, the overall capabilities of our [managerial] team got improved, along with the improvement of innovation capabilities of our technical staff. And, it offered chances for us to get the access to the cutting-edge technological development of industrial specific. It can lift firm's overall capabilities to a higher level. These are really valuable to our firm. It is through participation into these projects, that we and universities jointly developed a product Y last year. It filled the [product] gap both domestically and internationally. And we applied several patented technologies through it” (Interviewee GM2)

5.3.2.1.3 Adoption Decisions in IAP

By reference to the firm's innovation project typologies identified in preceding discussion, key internal players involved in the innovation adoption decision performed in each innovation category will be elaborated. Also discussed will be the external knowledge sources that been consulted by these internal players during the adoption decision making stage

Following the same rationale as company Alpha, national key scientific innovation project will be excluded from the following discussion of firm Beta, as firm's senior managers does not have exclusive control in innovation adoption decision making in these innovation projects.

As demonstrated in the preceding section, firm's initiation of product differentiation oriented and customisation-oriented innovations are driven by different perspectives. Production differentiation have a strategic focus, while innovation to facilitate customisation are more operational focused. With this operational focus, it is more straightforward with less senior managers intervention in the adoption decision process and the subsequent assimilation of external knowledge for customisation-oriented innovations

“[the adoption decision making regarding] customisation [oriented] innovations are relatively simple. We take orders and specifications [regarding expected functions, geological conditions etc.], provided by our customers, as the start point. We [as department managers] then delegate these [department specific sub-innovation] jobs to different teams. Our employees are experienced, they know where to look for [regarding sources of external knowledge], and we will advise these newly recruited [employees]” (Interviewee PJ2)

“There will be limitations [regarding firm's R&D capabilities], and we will consider it in these customisation [innovations]. But, overall, most of them are

achievable, as knowledge that required to facilitate these [innovations] are job related, and there are constantly learning it [from various channels] as they work.

So, it is not too difficult for our employees to assimilate them” (Interviewee E2D1).

Although customisation can originate from a customer pull in the firm’s initiation and adoption decision stages, company Beta also actively engages in proactive knowledge search activities to uncover additional customisation innovations.

“Customisation cannot be simple interpreted as an [passive] reaction. We are actually quite proactive in this perspective [regarding enhancing customer satisfaction level through the provision of customised products]. For instance, let’s say we identified [through external knowledge searching] that there is a technology that can be applied [by our firm] to reduce wear and tear of our machinery, but our customers are not aware of it. In that case, we will introduce it to our client. Of course, we cannot dictate whether our customers chose it or not in the end, but still it represents a channel [for the firm] to simultaneously achieve both customisations and development in innovation capabilities” (Interviewee E2D1)

Contrasting with the low-level engagement demonstrated by firm’s senior managers in these customisation-oriented innovations, judgement calls made by them are often required during the adoption decision stage of product-differentiation oriented innovations. Information from various channels are consulted and evaluated by the firm’s senior managers before the final consensus can be reached.

“Product differentiation is a general term. The key is how to achieve it. We have to make these decisions based on both market information [gathered by the firm] and our own capabilities. Though most people [senior managers] were agreed with the proposal [regarding the adoption of differentiation strategy], opinions [expressed by managers regarding specific ways that should adopted to achieve the

differentiation strategy] were quite diverse. As people tend to look at this [differentiation] issue from their own [department] perspectives. We had hold several board meetings to discuss details [regarding the final innovation adoption decision]” (Interviewee GM2)

“we [as firm’s senior managers] did not rush into it [production differentiation strategy], it is thoughtful decision and we have considered a lot of factors, such as our own R&D and manufacturing capabilities, the market trend, along with information we gathered from industrial expo and research institutions. And we have dedicated R&D teams [with expertise from different departments working together] for these [product-differentiation oriented innovations]” (Interviewee J1)

5.3.2.1.4 Summary

In company Beta, during the initiation and adoption decision stages of innovations, various external knowledge sources are consulted, by managers and employees. Relevant knowledge is subsequently assimilated.

Collectively, these activities performed by firm’s staff member significantly resemble the firm’s exploratory learning process. Therefore, it is reasonable to argue that for company Beta, the firm’s exploratory learning process significant correlates to the initiation and adoption decision stages of its IAP.

Furthermore, the existence of firm’s prior knowledge also demonstrated a significant role in facilitating the exploratory learning process in the initiation and adoption decisions stages of firm’s innovations.

5.3.2.2 The Relationship between Transformative and Exploitative Learning Processes and the Implementation in IAP

This section will explore the correlation between firm's transformative and exploitative learning processes and the implementation of its innovations. As discussed previously, in company Beta, customisation-oriented innovation projects are implemented on a department basis. Staff members from each department are responsible for dealing with their own department specific techniques issues that occurred in these innovations. Therefore, activities performed to facilitate the integration of desired external knowledge during the implementation stage of innovations are predominantly individual and group based, as shown in **Figure 5-10**.

However, this does not mean the transformative learning, regarding external knowledge acquired for these innovations, only happens on individual level or group level. As shown in **Figure 5-10**, the transformative learning process also happens at department level. The same phenomenon has also been identified in firm's product-differentiation oriented innovations as well, though the job breakdown process is slightly altered, as shown in **Figure 5-11**.

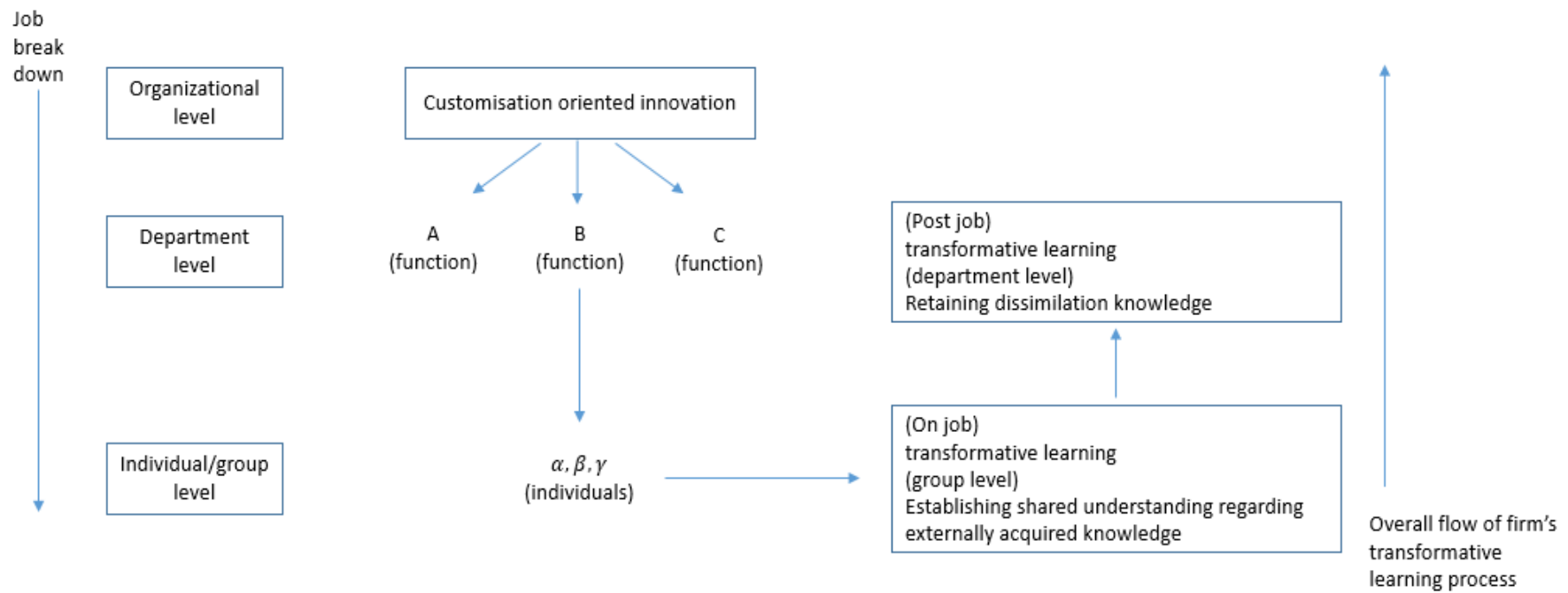


Figure 5- 10 Transformative Learning Process in Customisation Oriented Innovations

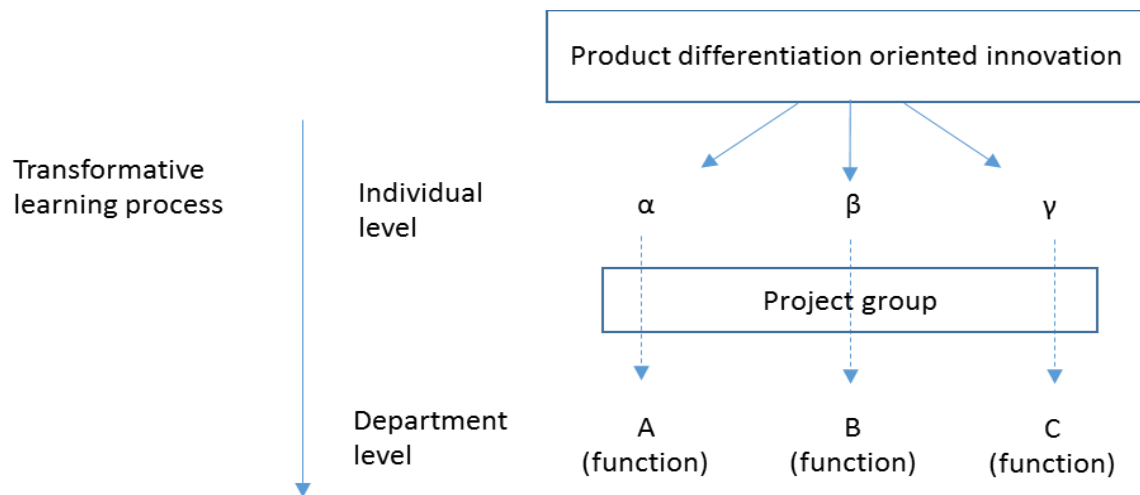


Figure 5- 11 Transformative Learning Process in Differentiation Oriented Innovations

As indicated in both **Figure 5-10** and **Figure 5-11**, knowledge transformation (described as the development of new shared understanding regarding knowledge externally acquired, along with the subsequent integration of such knowledge by staff members involved in these innovations) occurred, mainly, within project groups and teams. The project participants disseminate the retained knowledge through a department level transformative learning process to non-participants. Jointly, these two levels of transformative learning processes constitute the overall transformative learning process in firm's innovations.

To avoid unnecessary ambiguity, both levels of transformative learning processes (as shown in **Figure 5-10** and **Figure 5-11**) identified for these innovations will be addressed. Additionally, it is worth noting that in this firm, its operations are organised on a functional basis. This means innovations are analysed at an organisational level, but it is firm's departments, either in an independent or joint manner, that accomplish the implementations of these innovations and the commercialisations.

Therefore, in the following sections, the discussion regarding the correlation between firm's transformative and exploitative learning processes and its innovation

implementations will be addressed predominantly from department perspectives. This approach will be employed throughout this specific case analysis.

By referring to previous Figures, firm's transformative learning process that occurred on individual and group levels will be identified. Then channels and platforms that been developed within the firm to facilitate retention and dissemination of knowledge from the previously discussed transformative learning process at a department level will be presented.

Routines and procedures that have been deployed from department perspectives to facilitate the systematic exploitation of these knowledge will be discussed.

Finally, a summary will point out the significant correlation between the firm's transformative and exploitative learning processes and its innovation implementations.

5.3.2.2.1 Individual and Group level knowledge transformation and integration

- **Customisation oriented Innovations**

As stated, the majority of the firm's customisation-oriented innovation projects have been initiated and implemented through activities performed within departments. Also, the personnel involved in these projects are staff from each corresponding department.

The knowledge acquired in these type of innovations is generally not too distant from individual employees existing knowledge base. Therefore, in most cases the transformation and integration of externally acquired knowledge is achieved through work related discussions between these individuals who are engaged in these innovations in firm Beta.

“From the [department of] product development perspective, most of these [customisation oriented] innovations are implemented in small groups, around 5-6 people. And it is these employees, and sometimes supervisors [within these groups] who are responsible for the integration of desired knowledge. As I said earlier, the

feature in these [customisation oriented] innovations is the application of new technologies and [manufacturing] methods [by the firm]. It does not need a lot of R&D. Our employees are capable for doing these. And if they do have some problems [regarding achieving the shared understanding of certain knowledge] in these innovations, we will have our supervisors and expertise to support them. But in most situations, they won't have such problems. I'm confident they have the capabilities to solve these [issues] between themselves" (Interviewee J2)

On occasions when knowledge acquired has been developed from relatively distant industries, external expertise will be used to facilitate employees' transformation and integration of this knowledge into innovation projects.

"Take the Z technology for example, it is originally developed for military purposes, but we realised it has commercial value, so we decided to transplant that technology into our firm. In order to facilitate the [smooth] transplant, we have to invite these expertise from the research institution [within which this technology was originally developed], and we had organised relevant personnel to learn from them [to achieve the comprehension of such technology]" (Interviewee E2D1)

- **Product-differentiation oriented and National Key Innovations:**

In firm Beta, these innovations are implemented through designated project teams, comprising of expertise from different departments. Therefore, generating cross functional synergies within the team is important especially during the implementation stage. Where knowledge does not exist to solve issues, external sources are used and the acquired knowledge shared amongst project team members and integrated into the innovation.

"As I said our [product] differentiation [innovations] are functional [differentiation] oriented. In order to achieve such goals, collaboration between [expertise from]

different departments are required. As the differentiation in one perspective [of their product] needs the support from several different departments. And this [feature exhibited in product-differentiation oriented innovations] complicated the problems [associated with the development of such innovations], as we have to address coordination and technique issues simultaneously. This does not mean we don't have coordination issues in other [innovation] projects, but it is more significant in these [type of] innovations. And sometimes our General Managers have to get involved to settle certain issues [occurred in these innovations] From technique perspective [per se], it is not unmanageable. As we [as managers] would not have started these [innovations] if we are not confident in achieving these innovations. In occasions that we encountered [technical] issues that we cannot solve, we just went to universities or research institutions for solutions. But in most situations, we can solve these issues by ourselves, through industrial trials and experimentations. And we [as managers] were involved in the process [of solving these technique related issues], as we are more experienced" (Interviewee PJ1)

5.3.2.2.2 Channels adopted to facilitate the retention and dissemination of knowledge within departments

Figures 5-10 and 5-11 show that the creation of shared understanding and the subsequent integration of acquired knowledge from external resources is firstly achieved amongst individuals who participated in these innovation projects. Consequently, due to the limited opportunities available for employees to engage into these projects, the retention and dissemination of such knowledge is limited to a small group at this stage.

This significantly limits the potential for further exploitation of such knowledge by larger groups of employees within the organisation. Therefore, various activities utilising

different dissemination channels have been established in firm Beta at the departmental level. These dissemination and retention activities laid the foundation for the subsequent exploitation of knowledge

“In terms of [dissemination and retention regarding knowledge created through] customisation [oriented innovations], we organise [innovation] project report meetings quarterly [on department basis]. In these meetings these employees are encouraged to share what they have learnt from these [innovation] projects they participated. In addition to that, we have a department tutor system. These more experienced employees [as teacher] will teach, help, and facilitate their student. It is a tradition in this firm” (Interviewee HR2)

Knowledge dissemination differs between customisation-oriented innovations and product-differentiation and national key scientific innovations. Where customisation innovations use internal employees and channels, for product differentiation it is more complicated as external tutors are required to present on specific knowledge areas.

“In terms of [the dissemination and retention of knowledge created through] these [product differentiation oriented] innovations, we tend to organise [department] project report after the [completions of the] prototypes. And we would invite these external expertise [whom been consulted during these innovations] to give tutorial for our employees regarding the specific techniques that been deployed in these innovations” (Interviewee E2D1)

As well as recognised channels, there is also an informal way knowledge is disseminated and retained using company Beta’s internal network as a platform. Here knowledge is stored in a less refined way.

“As a matter of fact, most of these [knowledge that generated from these aforementioned innovations] are available on our inter network. This is also a way

for documenting our [innovation] files. All our employees [from relevant departments] have access to this information. Though it is not explicit, as they are all presented [in the format] as final results [of innovations], but [our] employees can still learn it if they want” (Interviewee GM2)

5.3.2.2.3 Approaches adopted for further knowledge exploitation

In company Beta, standardisation and routinisation are the most frequently adopted ways for the firm to exploit knowledge that been dissimilated and retained in the organisation through its transformative learning processes.

Routinisation is often applied to the exploitation of knowledge generated from customisation-oriented innovations. However, in areas where customisation is very high, routinisation has to be raised to the level of design principles.

“In our [product development] department, routinisation is referred to [the routinisation of] certain [design] principles [that generated from innovations]. As the customisation level is fairly high in our products, we cannot routinize everything [we have learnt] from these innovations into daily operations. But we can summarise these valuable ideas, for instance, we realised that certain structural [engineering] designs developed in these [innovation] projects may offers good fit for certain [geographic] locations, as these places tend to have similar geological conditions, etc., in these cases, we will extract the [design] principles from them, and code them into our [R&D] manuals, so our employees can use it to increase their efficiency and productivity in their jobs” (Interviewee DGM2)

A formal and systematic exploitation of knowledge generated from production differentiation-oriented innovations are often facilitated through the process of

standardisation. Various standards and procedures must be developed to facilitate the exploitation of such knowledge. For example, take the batch production of products Y:

“Our product is like a train, comprised by several sections. And standardisation here means we use standardised [manufacturing] procedure, processing techniques and design in each section. We finalised these [technique] parameters from the industrial trails as I’ve mentioned. It is until we have standardised these [parameters, procedures, and processing techniques] that the batch production of this product can be started [along with the distribution of specific jobs into different departments]. Without these standards, you cannot guarantee the quality of the [the differentiated] product you produced, so it [standardisation] is the necessary prerequisite to achieve the marketization of such product” (Correspondent DFD2)

5.3.2.2.4 Summary

As demonstrated previously, for company Beta, the implementation stage of innovations is comprised by the following three sequential processes.

- Externally acquired knowledge integrated by individuals and groups directly involved in these innovation projects.
- Dissemination and retention of knowledge at department level through collective actions performed by staff members within firm’s departments.
- Exploitation (implementation) of knowledge through routinisation and standardisation activities.

Collectively, activities performed during the first two processes, the integration, dissemination and retention of externally acquired knowledge, resembles firm’s transformative learning process.

The final stage of innovation implementation resembles firm's exploitative learning process. Therefore, it is reasonable to reason that in firm Beta its innovation implementation is facilitated by its transformative and exploitative learning processes.

5.3.3 The Relationship between SMAL and AC

This section will elaborate upon the relationship between firm's senior manager's ambidextrous leadership (SMAL) and its impact on AC during firm's innovation adoption process.

5.3.3.1 The relationship between SMAL and Exploratory Learning Process

In this section, the relation between SMAL and exploratory learning process in firm's innovations will be discussed. Firstly, behaviour and attitude demonstrated by firm's General Manager to facilitate the exploratory learning process in firm's innovations will be demonstrated. Then, leader behaviours adopted by department managers in promoting this learning process will be revealed. Finally, a summary will be given, indicating how SMAL facilitates the firm's exploratory learning process in innovation adoption process.

General Manager's *opening* leader behaviours that facilitate the exploratory learning process

Although innovation decisions are predominantly determined by either customer feedback or senior managers, it is its employees, either individually or in groups that carry out innovation projects. Therefore, increasing employees' self-generated initiatives and engaging in innovations matters significantly regarding firm's overall innovation performance. This issue has been addressed by firm's General Manager in the following ways:

- Emphasis an innovation culture
- Genuine openness by senior managers toward creative ideas from employees
- Create a sense of ownership and proactivity by employees in innovations

“From my [as the General Manager] perspective, our employees’ self-generated initiatives in learning and innovation had been enhanced from the [following] three perspectives: the first one is the [firm’s senior managers] emphasis regarding the importance of the innovative culture [in the organisation]. As a matter of fact, we have always had it, but it had been overlooked during the golden age [of the heavy equipment manufacturing industry, from 2002-2012]. We reemphasised this in recent years, and I think the employees’ self-generated initiatives [in engaging learning and innovations] have improved quite remarkably” (Interviewee GM2)

“The second one is the openness [attitude demonstrated by firm’s senior managers] regarding creative ideas and methods that proposed by employees. This has to be more than empty talks. It matters significantly regarding the increase of employees’ self-generated initiatives in learning and innovations... As we all have served the firm for quite a long time, it is quite easy for us [as senior managers] to fall into certain stereo types, so we have reminded ourselves to keep an open mind regarding creatives ideas proposed by our employees” (Interviewee GM2)

“The last one is to develop the sense of ownership [in employees]. We have to increase their willingness to take initiatives to engage in innovations. It is only through these ways that our employees will be engaging into learning and innovations more proactively.” (Interviewee GM2)

Additionally, firm’s exploratory learning process has also been supported by the *closing* behaviour demonstrated by its General Manager, though is an indirect way.

General Manager's *closing* behaviour that facilitates the exploratory learning process

“We as managers are required to rotate in between different departments in every 5 years. It's a routine. And it is requested by our General Manager. From my perspective, I think it is really useful. As we now have the capabilities to look at the big picture. And this enabled us to guide our employees better in innovations”
(Interviewee E2D1)

In contrast to the macro-level oriented approaches adopted by firm's General Managers, activities adopted by firm's department managers to facilitate firm's exploratory learning process are micro level oriented. Both *opening* and *closing* leader behaviours can be identified in their activities.

Department Manager's *opening* leader behaviours that facilitate the exploratory learning process

At departmental level managers promote *opening* behaviour through delegation of innovation activities to employees together with trust and freedom that they will overcome challenges. Also, reward plays its part. Performance in innovation idea generation will be rewarded. This may not be financial but in recognition.

“From my perspective [as the department manager], I encourage employees to use their self-generated initiative to engage [exploratory] learning by delegating them with [innovation] jobs. You have to trust them and give them freedom and opportunities to work out problems they encountered [in these innovations]. This [delegation] is more than just a way to manage the department, but also it increases our employees' self-generated initiatives to engage learning” (Interviewee PJ2)

“And we reward [exploratory] learning in our department, from the following two perspectives: the first one is innovation related. For those individuals who have

strong innovation capabilities, we will reward them. And the second one is linked to employees' performance in creative idea generation in innovations. Which means, if some employees envisaged some good ideas and been adopted in innovations, we will reward them. Though these rewards maybe not be significant in financial term, but it is an honour to them" (Interviewee PJ2)

In addition to the *opening* behaviour, *closing* behaviour (such as establishing routines) demonstrated by department managers facilitated the firm's exploratory learning process in its innovations.

Department Manager's *closing* leader behaviours that facilitate the exploratory learning process

Routine as a facilitator also covers having regular talks and lectures from external knowledge sources to employees. This could then be captured and repeatedly used in new innovations. A standard rotation process where an employee gathers experience in several departments before being assigned to a single department gives essential knowledge of the firms' overall capability. This can be used to target learning.

"As they do not have too much opportunities to take systematic part-time learning, in our department, I [as the department manager] invite expertise from related industries and lectures from universities to give [our] employees lectures on regular basis. And this significant enhanced their knowledge reserve, capabilities in self-motivated [exploratory] learning and the generation of new ideas" (Interviewee E2D1)

"Our employees [in the product development department] have to do one-year intern before they been assigned to our department. In this one-year intern, they will be rotated between different departments, such as manufacturing, processing

and assembly. The purpose for doing that is to let them accumulate some first-hand experiences and establish some intuitive understandings regarding how jobs are been done there. These experiences are fairly helpful in the [product development] jobs they engaged later, as they would have some basic ideas of firm's overall capabilities in their mind when carrying out these jobs. And this also made them more target oriented in their learning" (Interviewee PJ2)

Summary

Overall, in company Beta, its exploratory learning process has predominantly been facilitated by *opening* leader behaviours demonstrated by firm's senior managers. However, certain *closing* leader behaviour, i.e., the routinisation of job related learning for employees, performed by firm's department manager also enhanced firm's exploratory learning process in innovation adoption.

5.3.3.2 The relationship between SMAL and Transformative Learning Process

Behaviours that been performed by the firm's senior managers, along with the impacts that these behaviours had on its transformative learning process towards innovation adoptions, will be elaborated. The discussion of firm's transformative learning process will be depicted by the analysis of the transformative learning processes that occurred (at project group level) within respective types of innovations in this firm for rationale provided in section 5.4.2.2.

The structure of this section is to begin with discussing the different roles performed by firm's senior managers' during the transformative learning process of customisation-oriented innovations. Then demonstrate the different roles performed by firm's senior managers' during the transformative learning process of its differentiation-oriented

innovations. The summary will indicate firm's transformative learning processes have been supported by the both *opening* and *closing* leader behaviours demonstrated in firm's senior managers.

Customisation-oriented innovations

Regarding firm's customisation-oriented innovations, the integration and retention of the externally acquired knowledge by employees through the transformative learning process is, mostly, straightforward. This is because most of the knowledge acquired, through firm's exploratory learning processes, to facilitate these innovations are from resources close to the employees' existing knowledge. Also, integration of this knowledge has been achieved through collegial job-related discussions amongst employees during the implementations of innovation projects. Both facilitating and supervising roles have demonstrated by the firm's department managers in this specific learning process.

- *Opening* leader behaviour demonstrated by firm's department managers:
“Yes, I think it is necessary for us [as department managers] to provide certain support and room to promote our employees' self-generated initiatives in engaging into [innovation] project related discussion. This is why we [as department managers] emphasised the importance of delegation. And I think this is the way for us to rejuvenate the innovative culture, which have been emphasised by our General Manager, in the firm” (Interviewee J2)

However, the support and freedom provided to employees by department managers' in delegation towards these innovations is not without constraints. The importance to achieve on time delivery of products to customers has always been addressed by firm's managers in its innovations.

- *Closing* leader behaviour demonstrated by firm's department managers:

“As a manufacturing firm, our highest priority is to achieve on time delivery of [these customised] products to our customers. And we have to meet the deadlines.

In other word, we innovate to support the production, not other way around. We need to be clear regarding the priorities here. In practice, it is a balance that we need to achieve, but overall, I think we are doing well.” (Correspondent J1)

In contrast to the department focused behaviour demonstrated by these department managers during transformative learning process, the leader behaviour performed by General Manager is broader focused. It is through the emphasis of the rejuvenation of innovative culture in the firm rather than direct interventions that the General Manager influenced the transformative learning process in the firm’s customisation-oriented innovations, though in a fairly indirect way.

- *Closing* leader behaviour demonstrated by firm’s General Manager:

“From my perspective [as the General Manager], organisational cultures matter significantly to the success of a firm. Why Google [the firm] is so innovative? Because it has an organisational culture which emphasises innovation. It is the same for us, though we are a manufacturing firm, but innovation is the general trend. Therefore, I think it is necessary for us [as managers] to borrow certain mind-sets from these [innovative] firms. And this is the only way for us to inspire our employees’ self-generated initiatives in work and innovations. This is also the responsibility we should accept as leaders of the firm. And this is why I would only intervene as it is absolutely necessary.....most of the time, I just watch them from a distance, monitor the overall progress, I think that is enough” (Interviewee GM2)

Product-differentiation and National key scientific Innovations

In firm Beta, cross-functional collaborations are often required to facilitate the progression of these innovations, along with the transformative learning processes associated them. Further, as experimentations and the developments of prototypes are often required to guarantee the successful implementation of these projects, the coordination issues, regarding resources, both human and financial, become prominent in these innovations. Therefore, in contrast to the low level of engagement and overall *opening* leader behaviours demonstrated by firm's senior managers in its customisation-oriented innovations, they often been directly involved in product differentiation and National key scientific innovations. The leader behaviours demonstrated by them are both *opening*, as the facilitator, and *closing*, as the supervisor.

- *Opening* leader behaviour demonstrated by department managers:

“General, it is the product development department who takes the overall responsibility in coordinating these [innovation] projects. And we assist them. As [department] manager, my job is to coordinate with project manager, mobilise resources to facilitate their experimentation, and if there are issues that cannot be solved by our employees [who engaged in these projects], I will help them. The implementation of experimentations themselves are repetitive processes, nobody can guarantee its completion in one go. And sometimes there were setbacks, its normal, it's a learning process. We would not blame our employees on this basis, as long as they can make progresses as pre-planned, it will be fine” (Interviewee E2D1)

- *Opening* leader behaviour demonstrated by General Manager

“There will problems in [these] innovations, it is inevitable. The key points here are, it has to be manageable and it is worth it. Take 863 innovation project we accomplished last year as an example, no one has produced that kind of product

before, but it has strategic value for the industry. So we did it. And we collaborated with several key universities to reduce the risks in innovation” (Interviewee GM2)

However, to support the firm’s product differentiation strategy, speed to the market of the firm’s differentiated products is essential. This has been revealed by the closing behaviour i.e. supervisory role, performed by managers in firm’s transformative learning process.

- *Closing* leader behaviour demonstrated by department managers:

“It is true that generally it is the product development manager’s responsibility to oversee these [innovations], but it does not mean we can take the free ride. We [as department managers] have our own responsibilities in supervising the progress made in our department. It is rarely the case that we only have one or maybe two employees involved in these projects. It is not enough in most projects, so that is why we [as department managers] have to assist the project leader to facilitate and supervise the progress [in these innovations]” (Interviewee DPJ2)

- *Closing* leader behaviour demonstrated by General Manager:

“Under current market circumstances, time to market [regarding these differentiation innovations] matters. As we are not the only one who have the capabilities to do these. So we [as managers] do emphasise the importance of meeting the schedules in these related projects” (Interviewee GM2)

Summary

In this section, company Beta’s senior manager’ behaviours along with the impact that these behaviours projected in firm’s transformative learning process have been analysed. Individual and group level transformative learnings during the implementation stages of firm’s innovations have been adopted as the epitome of firm’s transformative learning process. By referring to previous elaboration, the leader behaviours demonstrated by firm’s

General Manager moved from predominantly *opening* (as in the exploratory learning process) to a combination of both *opening* and *closing* in this stage. In contrast, the department managers' behaviour maintained an overall *opening* style, in the transformative learning process. However, *closing* leader behaviours have also been adopted by department managers, albeit in less extent to the adoption of *opening* leader behaviours. Moreover, it is also revealed from the data, due to the two roles department managers play in the learning process, that of the facilitator and the supervisor, they are more engaged than their General Manager in this specific learning process during firm's innovations.

5.3.3.3 The relationship between SMAL and Exploitative Learning Process

The SMAL and their impact on exploitation learning process will be covered in this section. The firm's exploitative learning process will be depicted by activities performed to achieve the exploitation of the commercial values from externally acquired knowledge in the firm's innovations. As previously explained the primary approaches are:

- routinisation (regarding customisation-oriented innovations), and
- standardisation (regarding product differentiated oriented innovations).

This section is organised to cover activities adopted by firm's management during the two respective knowledge exploitation approaches. Then a summary will point out the unanimous adoption of *closing* leader behaviours by firm's senior managers. This reflects their managerial imperatives is goal achieving in the exploitative learning process regarding its innovations.

Knowledge exploitation through routinisation

Customisation oriented innovations extend existing knowledge and the development of department routines and operations standards are the most frequently adopted channel for department managers to facilitate the exploitation of this knowledge

- *Closing* leader behaviour demonstrated by department managers:

“In our [product development] department, routinisation is referred to [the routinisation of] certain [design] principles [that generated from innovations]. As the customisation level is fairly high in our products, we cannot routinize everything [we have learnt] from these innovations into daily operations. But we can summarise these valuable ideas, for instance, we realised that certain structural [engineering] designs developed in these [innovation] projects may offer good fit for certain [geographic] locations, as these places tend to have similar geological conditions, etc., in these cases, we will extract the [design] principles from them, and code them into our [R&D] manuals, so our employees can use them to enhance their efficiency and productivity in their jobs” (Interviewee DGM2)

“Customisation does not mean we do not have operations standards in the production of these [customised] products. We have set up fair stringent standards in the final manufacturing processes, good [product] quality is the prerequisite for us to achieve our customisation-oriented innovations, you have to have it” (Interviewee PG2)

Knowledge exploitation through standardisation

For new innovations, creation off standards (of procedures, processing techniques) and quality checking to those standards across departments is essential. This exploitation of innovation through standards and quality are required to maintain reputation and credibility.

This reflects *closing* leader behaviour. Take batch production of the differentiated products Y as an example:

- *Closing* leader behaviour demonstrated by department managers:

“Our product is like a train, comprised by several sections. And standardisation here means we use standardised [manufacturing] procedure, processing techniques and design in each section. We finalised these [technique] parameters from the industrial trails as I’ve mentioned. It is until we have standardised these [parameters, procedures, and processing techniques] that the batch production of this product can be started [along with the distribution of specific jobs into different departments]. Without these standards, you cannot guarantee the quality of the [the differentiated] product you produced, so it [standardisation] is the necessary prerequisite to achieve the marketization of such product” (Correspondent E1D2))

- *Closing* leader behaviour demonstrated by General Manager:

“Since it is new product, we have to develop a new quality and processing standard in our material processing, manufacturing and assembly departments. And we have our employees on the factory floor of both manufacturing and assembly departments to monitor the quality. We have to be stick here. And if our employees find any significant [quality] deviations on the components been products they will send it back. For this firm, innovation and quality are equally important regarding their significance to our reputation and credibility” (Interviewee GM2)

Summary

In the exploitative learning process for firm’s innovations, senior managers unanimously opted for *closing* leader behaviours. As at this stage, on time delivery of these innovation products to their customers becomes the imperative for firm’s managers.

Routinisation and standardisations of the manufacturing process regarding these innovations are the most frequently adopted approaches to achieve such goals. Their managerial focus moved from encouraging error learning, as exhibited in both exploratory and transformative learning process, to monitoring goal attainment.

5.3.4 Case Summary

The high level of customisation required to its products requires that the majority of innovations adopted in firm Beta are customisation oriented. Customer specific demands are taken by employees in the firm as the start points to initiate their exploratory learnings for innovations. During the initiation innovation stage, various external knowledge sources, such as other companies operating in related industries, research institutions and universities, are consulted.

The low level of engagement demonstrated by senior managers' in the early stages of these customisation-oriented innovations means that employee self-generated initiatives become a key determinant in the efficiency and effectiveness of knowledge exploration and acquisition. Therefore, to proactively increase employee self-generated initiatives, the General Manager emphasised the rejuvenation of innovative culture in the firm. This encourages employees to be more motivated to engage in job related exploratory learnings to facilitate innovation initiation and adoption decisions.

It is during the implementation stage of innovations, the primary concern of innovation adoption process moved from external knowledge exploration to the integration and the subsequent commercialisation of knowledge identified by employees of the firm. Integration of knowledge is achieved through activities performed in its transformative learning process, namely, collegial job-related discussion, experimentation, and

consultation with expertise. The commercialisation is facilitated in the exploitative learning process by actions such as, standardisation of manufacturing procedure for innovation and introduction of these products to the market. Detailed examples regarding the correlation between AC and IAP are provided in **Appendix VI**.

As elaborated in section 5.4.3.1, *opening* leader behaviours demonstrated by firm's senior managers significantly contributed to the promotion of firm's employees' self-generated motivation in initiating exploratory learning. Nevertheless, it is worth noting that despite the firm's exploratory learning process is predominantly supported by the *opening* leader behaviours demonstrated by its senior managers. The use of *closing* leader behaviours by its managers also enhanced the supportive organisational context regarding innovations, albeit in an indirect way.

In contrast to the relatively *opening* leader behaviours demonstrated by firm's senior managers in the exploratory learning processes in firm's innovations, behaviours demonstrated by General Managers in the transformative learning process is relatively *closing*. Moreover, at this stage, department managers are both the facilitator and supervisor regarding knowledge integration in their own departments, but the behaviours demonstrated by them are still predominantly *opening*. This shows the difference between a strategic focussed General Manager and operational focus for department managers.

Moreover, senior managers moved to *closing* behaviours solely during firm's exploitative learning process, so as to effectively facilitate knowledge exploitation in organisations.

The overall leader behaviours demonstrated in the AC learning process of innovation adoptions in firm Beta are summarised in the following **Table 5-1** (detailed examples are provided in **Appendix VII**).

Table 5- 1 Leader behaviours demonstrated by senior managers in facilitating firm's AC learning process-Beta

Theme	Codes	Exploratory Learning Process	Transformative Learning Process	Exploitive Learning Process
Opening Leader behaviours	Give room for new ideas	Encourage communications between colleagues	Encourage communications between colleagues	
		Openness towards new ideas		
		Encourage Creative thinking		
		Promote innovation friendly culture		
	Encourage error learning	Emphasise the importance to learn from mistakes	Emphasise the importance of learning from mistakes	
			Support trails and experimentations	
	Give possibility for independent thinking	Encourage independent thinking	Provide support for innovation	
		Delegation	Delegation	

<i>Closing Leader behaviours</i>	Establish routines	Routinise the provision of opportunities to learn from external experts	Routinise the provision of opportunities to learn from internal experts	
		Routinise job rotation		
				Develop operational routines
	Monitor and control goal attainment			Impose quality control and monitor deviations
				Specify processing procedures
	Monitor progress in tasks		Emphasise the importance regarding speed in innovation development	
			Supervise the progress made in innovation	

5.4 The analysis for Case Company Chi

5.4.1 Company Background

Company Chi is a private firm, with relatively short history. Established by 2007, this company initially entered this industry as a supplier for a key heavy equipment manufacturing firm in China, but then integrated downstream and become an equipment manufacturer. The overall market share for its key product Z is around 6 per cent, a relatively impressive performance given most of its competitors are at least 5 to 6 time the size of the firm, as shown in **Figure 5-12**.

This firm now has 300 employees work in six departments. Three of these departments are specialised in new product development, led by 6 professors from a top engineering and technology university in China. The final production of these products developed in these three departments are delivered through the collaboration between its material processing and production departments.

In these product development departments, R&D are predominantly implemented by these professor and their students' in the form of University research projects. Another quite interesting feature in this firm is, the General Manager in this firm is also the supervisor of these Professors in the University they current employed by.

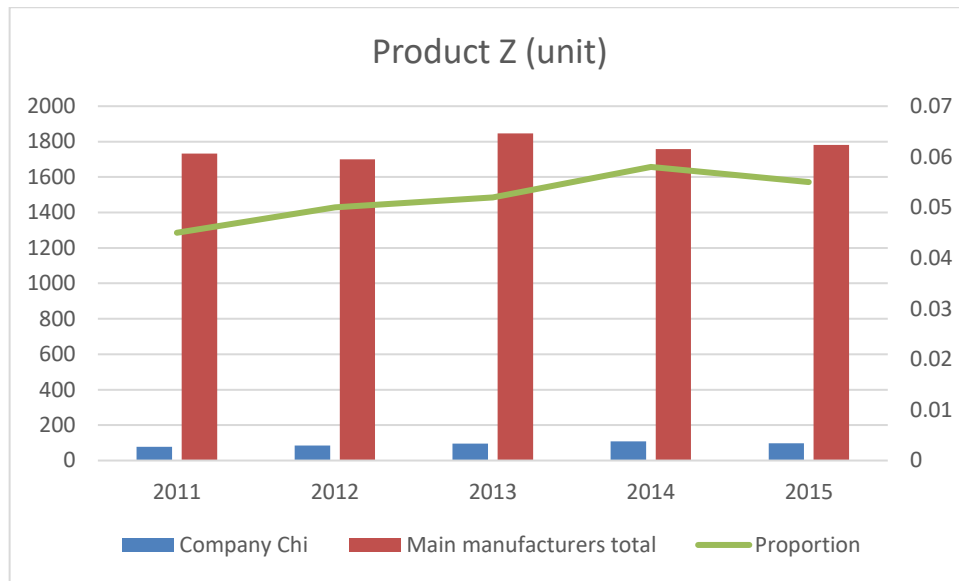


Figure 5- 12 5-years market share trend of Product Z

5.4.2 The Relationship between AC and IAP

5.4.2.1 The Relationship between Exploratory Learning Process and initiation and adoption decisions in IAP

In this section, the relationship between exploratory learning process and the initiation and adoption decisions stages of innovation adoption process in company Chi will be explored.

The structure of this section is organised as follows: firstly, the driven forces underlies the initiation of innovations in this company will be elaborated briefly. Then key internal players involved, along with these external knowledge sources that been consulted by them, in the initiation stage of firm's innovations will be identified. This is so a comprehensive understanding regarding activities taken by the firm to facilitate the initiation of innovation can be achieved. Furthermore, criteria that adopted by the firm regarding its selective assimilation of external knowledge, will be elaborated. It will be revealed that firm's prior knowledge

influences the adoption decisions in its innovations. Finally, a short summary will be given, pointing out in company Chi, activities performed by firm's managers and employees in the innovation initiation and adoption decisions stages in firm's innovations significantly resemble the exploratory learning process.

5.4.2.1.1 Motivations for Innovation

In company Chi, it is General Manager's vision that drives the firm to pursue its product differentiation related innovations.

“Products we used to produce are quite profitable, but these are not tech-intensive products. Sure, we can make profit out of them, but they are vulnerable to imitations. Moreover, the most important thing is I think we should do something valuable and meaningful regarding the future development of the industry. I've spent my whole life doing research in this field, I want to contribute something to the industry, it is not about money, it is about responsibility of being a scholar in this field” (Interviewee GM3)

5.4.2.1.2 Initiation of IAP and external knowledge sources consulted

In firm Chi, product-differentiation oriented innovations are organised on products basis. In each product, there will be one or two professors, who work as product manager, to organise these innovations. And these innovations are predominantly implemented through systematic designed research projects especially during the process of prototypes development. Nevertheless, despite the majority of innovations developed in this firm are product-differentiated oriented, quality-enhancement oriented innovations are also implemented in the firm.

Initiatives taken from firm's strategic perspective

In practices, product-differentiation is considered as firm's competitive strategy by firm's senior managers. And this specific strategy also reflects firm's core competence as R&D.

“We are professors. Our strong suit is in research. We do not have competitive advantage against these established firms regarding manufacturing capabilities, but we can provide the market with more innovative and differentiated products. And we have the R&D capabilities to do so” (Interviewee PGM3)

However, despite these senior managers in the firm are the experts in this industry, external knowledge is still valued by them for their own innovations.

“Yes, we are experts, but we cannot be jack-of-all-trades. We are just experts in certain areas after all. And as we focused on differentiation strategy, we have to watch closely to the market. Otherwise we might just miss the opportunity to be the first one” (Interviewee PGM3)

“Additionally, the industrial sector we operate in is a technology application oriented one, which means we have to absorb knowledge or technologies developed by others to facilitate the completion of our innovations. And innovation here does not equal to creation” (Interviewee DPGM3)

Initiative taken from firm's operational perspective

In addition to the emphasis of innovativeness and differentiation feature in their products, quality issues have also been addressed by firm's senior managers. However, since firm's core competence is its R&D rather than manufacturing capabilities, firm's General and product development managers tend to delegate these quality enhancement related innovations to their manufacturing and processing department managers. Therefore, the latter are primarily

responsible for these innovations. And, in the initiation stage of these innovations, the primary sources of firm's knowledge exploration are either established firms in related industries, or experts from universities.

“This industry itself is a mature one. What we are doing is fulfil the needs from specific targeted [market] niches, such as in the thin coal seam. Most heavy equipment manufacturers simply don't have products that can work in this condition. This is what we called differentiation. But it is not a ground-breaking innovation. And we have to continuously innovate to enhance the quality and functionality regarding [our] machinery, as they are relatively new and not as good as these existing products [in terms of quality]. So, we have to work on it, to improve it” (Interviewee CDM3)

5.4.2.1.3 Adoption Decisions in IAP

In this section, by referring to firm's innovation project typologies identified in preceding discussion, key internal players that involved in adoption decisions performed in each innovation categories will be elaborated respectively.

As explained in the previous section, the initiation of product-differentiation and quality-enhancement oriented innovations are driven by motivations derived from distinguished perspectives. As innovations initiated to facilitate production differentiation are more strategic focused, whilst innovation initiated to facilitate quality enhancement are more operational focused. Therefore, in firm Chi, the adoption decision process and the subsequent assimilation of external knowledge regarding its quality-enhancement oriented innovations are relatively straightforward. Moreover, it is also revealed from the data, firm's senior managers are not directly involved regarding the knowledge exploration in these innovations.

“Quality enhancement [oriented] innovations are predominantly implemented in the following sequences: firstly, we get feedbacks from our product managers, or sometimes the General Manager [regarding issues been identified either through the industrial trial of our prototypes or by our customers], then we will search for solutions. And such search will be fairly focused, as the directions [regarding these research] are provided by our managers. Most of these jobs are been taken by master students who are doing their interns here. They are quite capable [in searching for such solutions from external sources], it is information age, you know. These young people are really good” (Interviewee CMD3)

Nevertheless, despite the majority of firm’s quality-enhancement oriented innovations are triggered by feedbacks provided from its product development managers, there are occasions that their master students proactively engaged into knowledge exploration and contributed to the adoption decisions.

“If our master students find out something that are valuable and can possibly contribute to the quality enhancement in the future, they will pass it to us as well” (Interviewee E2D1)

In contrast to their low-level engagements in its quality-enhancement oriented innovations, firm’s senior managers played a decisive role in the adoption decision stage of its product-differentiation oriented innovations. And information from various channels had been consulted and evaluated by firm’s senior managers before the final decisions can be made.

“Product differentiation is the general direction that we follow. But in terms of the finalisation of the innovation decisions, we [as senior managers] actually have consulted several information channels, such as industrial practitioners, market information and

sometimes even our colleagues, before such decisions can be reached. And, of course we have to be realistic as well” (Interviewee GM3)

Furthermore, in addition to the commercial interests, their responsibilities as scholars have also been addressed by firm’s senior managers in their innovation decision making process.

“We are not only the managers [of the firm], we are also scholars. So, the significance regarding how these innovations can facilitate the advancement of this industry have also been considered by us in decision makings. I always try to keep a balance here” (Interviewee GM3)

5.4.2.1.4 Summary

In company Chi, during the initiation and adoption decision stages of innovation adoptions, various external knowledge sources have been consulted by firm’s senior managers and employees, so as to facilitate the subsequent assimilation of relevant knowledge. As revealed in preceding sections, activities performed by firm’s staff members significantly resemble the exploratory learning process of AC. Therefore, it is reasonable to argue that in company Chi, firm’s exploratory learning process significant correlates to the initiation and adoption decision stages of its innovations. Additionally, it is also revealed, firm Chi’s prior knowledge also influences the exploratory learning process associated with firm’s innovations.

5.4.2.2 The Relationship between Transformative and Exploitative Learning Processes and implementation in IAP

In this section, the correlation between firm’s transformative and exploitative learning processes and its innovation implementations will be explored. As demonstrated in previous section, in company Chi innovation projects are implemented on department basis. And staff

members from each department are responsible for their own department specific challenges that occurred in these innovations. Therefore, activities performed to facilitate the integration of external knowledge, during the implementation stage of innovations are predominantly individual and group based in this firm. However, this does not mean the knowledge transformation in these innovations only occur on individual level or group level. As revealed from the data, knowledge retention and reactivation in these innovations are actually achieved through the transformative learning process that occur at department level in the firm, as shown in **Figure 5-13** and **Figure 5-14**.

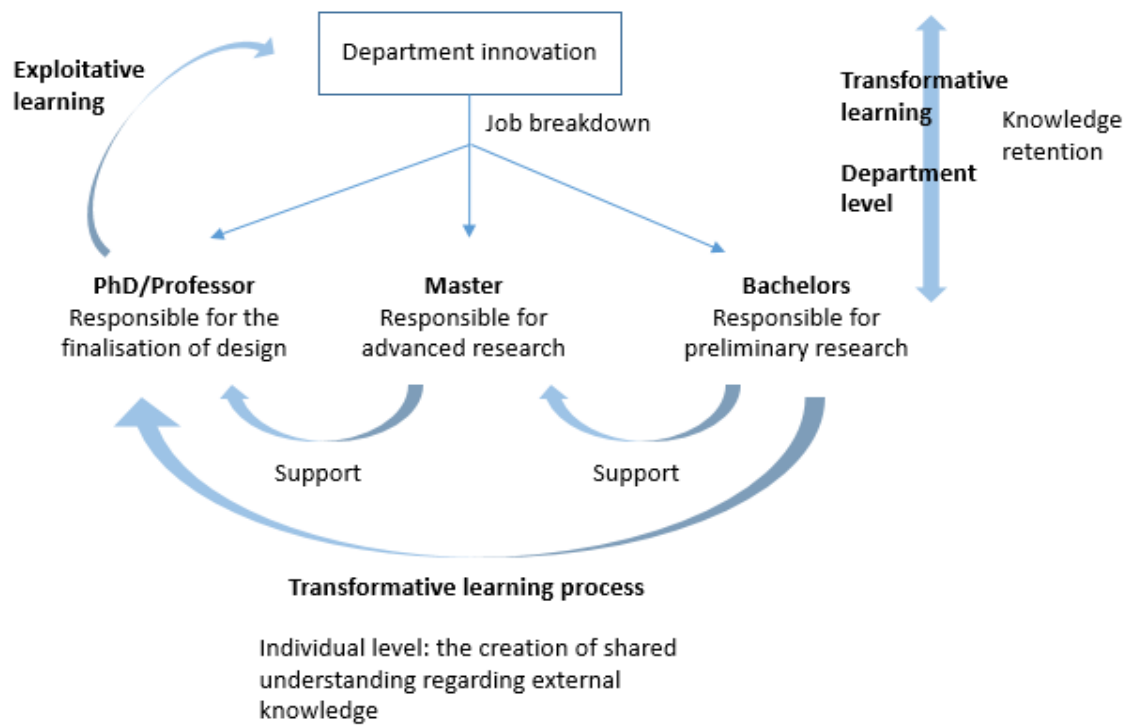


Figure 5- 13 Transformative Learning Process in Product-Differentiation Oriented Innovations

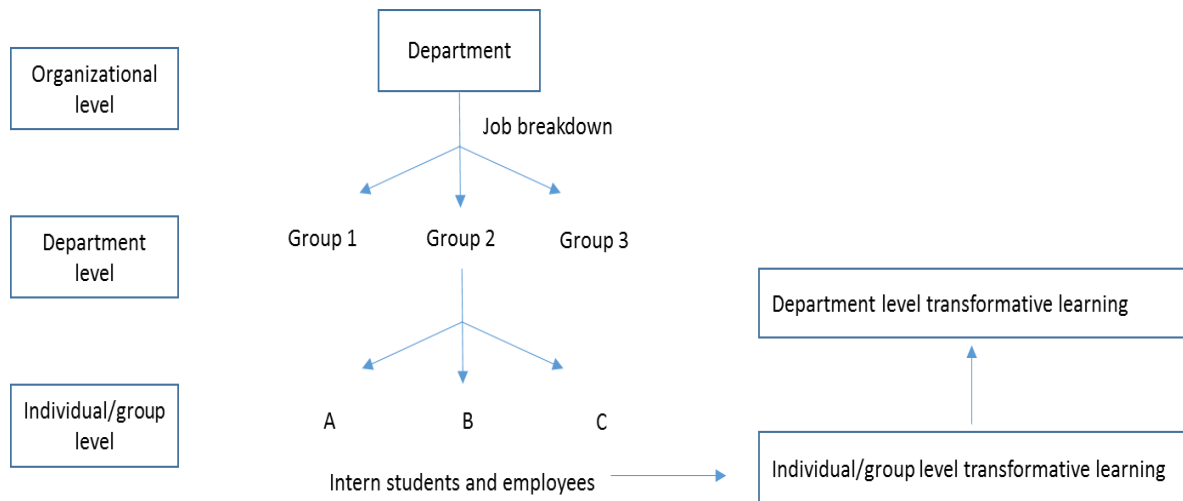


Figure 5- 14 Transformative Learning Process in Quality-Enhancement Oriented Innovations

As demonstrated in **Figure 5-13** and **Figure 5-14**, knowledge transformation (the development of new shared understanding regarding knowledge externally acquired, along with the subsequent integration of such knowledge by staff members involved in these innovations) occurred, mainly, within project groups and teams. As the development of shared understanding, regarding these knowledge that been acquired from external sources to facilitate the implementation of firm's innovations, are predominant achieved by participants involved in these innovation projects. Whilst, the retention and subsequent dissemination (from project team members to other employees from their respective departments) regarding these knowledges are achieved predominantly through department level transformative learning process. Collectively, these two levels of transformative learning process constitute the firm level transformative learning process in its innovations.

However, it is worth noting that in this firm, its operations are organised on functional basis. This means, despite the fact that innovations are been analysed as phenomena that been orchestrated on organisational level, it is firm's departments, either in an independent or joint manner, that accomplished the final implementations of these innovations.

Therefore, in the following part of this section, the discussion regarding the correlation between firm's transformative and exploitative learning processes and its innovation implementations will be addressed predominantly from department perspectives.

The structure of this section is organised as follows: firstly, details regarding firm's transformative learning processes that occurred on individual and group levels will be elaborated. Then channels and platforms that been developed in the firm to facilitate retention and dissemination of knowledge on department level will be presented. Further, approaches adopted by this firm to facilitate the knowledge exploitations in its innovations will be revealed. Finally, a summary will be given, pointing out the implementation stages of firm's innovations are facilitated by the transformative and exploitative learning processes of its AC.

5.4.2.2.1 Individual and Group level knowledge transformation and integration

Quality-enhancement-oriented Innovations

As elaborated in preceding sections, the majority of firm's quality-enhancement-oriented innovations are implemented by its manufacturing and processing departments. And personnel involved in thus projects are both university master students, who are doing their interns, and firm's formal employees in these departments.

As these intern master students are from heavy equipment manufacturing or material processing related disciplines, external knowledge acquired to facilitate these quality-enhancement oriented innovations are not too distanced from their existing knowledge base. Therefore, in most cases the transformation and integration of these externally acquired knowledge are achieved through job related discussions that between these individuals who participated in these innovations in the firm.

“These master students are extremely valuable in these innovations. Most of these jobs are done by them. Our [formal] employees can offer some suggestions in practice, but they are less capable in developing new practices through learning. Professional knowledge reserve is what they are short of” (Interviewee E3D1)

Whilst in occasions when knowledge acquired are developed from relatively distant industries, external expertise will be consulted to facilitate employees’ transformation and integration in these innovation projects.

“There are occasions that we got some problems that cannot be solved [by intern students and employees]. Not too much, but yes it happened before. In this kind of situation, we consult specialised firms and sometimes, teachers in related disciplines from the Uni. There will be certain level of miss match between theory and practice, especially when expertise consulted are from industries, but they [students] can learn really fast” (Interviewee FD3)

Product-differentiation-oriented Innovations

In firm C, these innovations are often implemented as research projects, which are organised on team basis. Moreover, the members in these teams are mainly students of these Professors from the Uni, whilst their Professors act as the leaders of these teams. In these teams, knowledge transformation and integration take place in a progressive manner amongst its members (as illustrated **Figure 5-13**).

“These products are innovated through the collaboration between us [as Professors] and our students. We [as Professors] organise these innovations in a progressive manner. In a relatively simple way, the overall innovation process is like this: firstly, we got a general direction for what we are going to do, then we break it down into subprojects. These preliminary research work will be assigned to our bachelor students in their

graduation designs. Then we use the data from these graduation designs to support our master students in their advanced research. And finally, it will be me and my PhD students to finalise the overall design of our new products” (Interviewee DPGM3)

5.4.2.2.2 Channels adopted to facilitate the retention and dissemination of knowledge within departments

As demonstrated in **Figure 5-13** and **Figure 5-14**, the development of shared understanding and the subsequent integration regarding knowledge acquired from external resources are firstly achieved between individuals through their participation in innovations implemented in the firm. Therefore, the retention and dissemination of such knowledge at this stage are only limited to a small group of audience in this firm.

However, due to the fact that product-differentiation oriented innovations are predominantly implemented by Professors and their students in the product development departments, the collaboration between the product development department and other functions is quite limited in these product-differentiation-oriented innovations. As the manufacturing and processing departments have been assigned predefined role as supporting the manufacture for innovation products rather than co-developing these products in the firm. Subsequently, the dissemination of knowledge generated from product-differentiation-oriented innovations in the firm is considered as both unnecessary and inappropriate by managers from its product development departments.

“these products are results of our research. We have IP right on it. You do not have to disseminate it in large scale, as 1) not everyone in the firm need to understand it to do their work, and 2) for those PhD students who are going to do R&D with us in the future, we have everything documented already, they can learn if they want, and we can teach

them if it is necessary. So, I do not think [the dissemination of these knowledge] it is necessary” (Interviewee PGM4)

In contrast, the promotion of the dissemination regarding knowledge generated from quality-enhancement-oriented innovations are encouraged by senior managers in firm Chi. As the dissemination and retention of such knowledge contribute to the development of firm’s relatively weak manufacturing and material processing capabilities. Therefore, various channel, both formal and informal, have been adopted by firm’s senior managers to facilitate the dissemination of such knowledge in corresponding departments.

“We encourage our employees can learn from these [master] students during the work. But most of them will leave after they graduate, that is why we also have created a database, documented everything in there. So, these knowledge [developed in innovations] can be stored and reused by our employees and new intern students even after these old [master] students left” (Interviewee E3D1)

5.4.2.2.3 Approaches adopted for further knowledge exploitation

In company Chi, standardisation and routinisation are the most frequently adopted ways to achieve knowledge exploitation in batch productions of their new products. And routinisation is often used in the exploitation of knowledge generated from quality-enhancement oriented innovations, whilst the systematic exploitation of knowledge generated from product-differentiation oriented innovations are often achieved through the process of standardisation.

Routinisation

“In our department, routinisation is referred to the routinisation of certain processing technique. For example, our product W and U are totally different products, but they all need certain level of harness in their drilling blade. This means processing techniques applied in manufacturing the drilling blades in these new products are similar. As we

only have limited products in the firm, routinisation of these techniques are possible. And it can significantly enhance the efficiency in the batch production of these new products” (Interviewee E3D1)

Standardisation

“I think standardisation of the production of these innovative products itself is the typical example regarding how knowledge been used here. We [as Professors] firstly finalise these [technique] parameters from the simulations and industrial trails, then we standardised these parameters and pass them to the manufacturing department. And they will develop their own department standardised procedures to facilitate the final production. I think this is the typical example regarding the application of knowledge generated from innovations” (Correspondent DPGM3)

5.4.2.2.4 Summary

As revealed from data, in company Chi, the implementations of its innovations can further be brake down into three sequential stages. In the first stage, external knowledge is integrated by key individuals involved in these innovation projects. In the stage follows, knowledge integrated are disseminated and retained at department level through interactions between employees. In the final stage of implementations, knowledge disseminated and retained in each department are then systematically exploited by its employees to in the production of innovations. Collectively, activities performed during the first two stages regarding the implementation of innovations resemble the transformative learning process in AC. Whilst activities performed in the final stage of innovation implementations resemble the exploitative learning process of AC. Therefore, it is reasonable to argue that in firm Chi, the implementation of its IAP is facilitated by the transformative and exploitative learning processes in its AC.

5.4.3 The Relationship between SMAL and AC

5.4.3.1 The relationship between SMAL and Exploratory Learning Process

In this section, the influence that firm's senior managers' ambidextrous leadership projected to the exploratory learning process in its innovation adoption process will be revealed. The structure of this section is organised as follows: firstly, behaviour and attitude demonstrated by firm's General Manager to facilitate the exploratory learning process in firm's innovations will be demonstrated. Then an account of behaviours demonstrated by department managers in facilitating the exploratory learning process will be provided. Finally, a summary will be given, indicating, the exploratory learning process in firm's innovations is predominantly facilitated by the *opening* leader behaviours demonstrated by its senior managers.

General Manager's *opening* leader behaviours that facilitate the exploratory learning process

As revealed in preceding sections, in firm Chi, the strong R&D capabilities possessed by its product development managers and their students significantly contributed to its innovation performances. However, despite these Professors have their own vested interests in the firm, the same cannot be said to their students. Subsequently, when been asked the question regarding how the firm can promote these students' willingness in taking initiatives to participate these innovations, the General Manager of this firm responded:

“I don't think our students self-generated initiative in engaging into these innovations is an issue. Especially for those master and PhD students in our product development department. I think they know how to do their researches” (Interviewee GM3)

“The only thing I think we [as both manager and Professors] have to careful about is we should never underestimate the creativity of our students. We need to encourage and

support them but not to force our ideas into them in innovations. We are managers, but above all, we are their teachers” (Interviewee GM3)

And similar answers have also been provided by firm’s departments’ managers during the interviews.

Department Manager’s *opening* leader behaviours that facilitate the exploratory learning process

“Our innovation projects are organised as research projects. These students are involved in our research projects because their research interests fit in the direction of our research. And what we do here is to specify their research topics based the needs of our own projects, so they can be more focused in their research and study. But we will not get too involved into details, they are mature students, they know what they are doing” (Interviewee PGM3)

“Regarding these intern students in our [processing] department, as I said, they have strong capabilities. And they are fairly creative. So I always encourage them to try their new ideas in the work if they want. I think that’s the best way for them to contribute our department” (Interviewee E3D1)

In addition to these *opening* leader behaviours, *closing* behaviours adopted by department managers also have also demonstrated its value in facilitating the exploratory learning process in firm’s innovations.

Department Manager’s *closing* leader behaviour that facilitate the exploratory learning process

“Compared with our intern students, our formal employees’ weakness is their knowledge reserve. So, in order to help the latter to improve their learning capabilities and professionalism, on job trainings have been organised in our department, twice a

year. In these trainings, our intern students are invited to give some lectures, regarding job related theoretical knowledge, to our employees” (Interviewee E3D1)

Summary

As revealed in this section, in company Chi, the exploratory learning process in its innovation is predominantly facilitated by the *opening* leader behaviours adopted by its senior managers. However, empirical evidences also suggested certain *closing* leader behaviour, i.e., the establishment routines regarding job related educations, performed by firm’s department managers also enhanced firm’s exploratory learning process.

5.4.3.2 The relationship between SMAL and Transformative Learning Process

In this section, details regarding behaviours been performed by firm’s senior managers in facilitating the transformative learning process in its innovations will be elaborated.

The structure of this section is organised as follows: Firstly, leader behaviours adopted by firm’s senior managers in facilitating the transformative learning processes regarding its quality-enhancement and product-differentiation oriented innovations will be revealed respectively. Then, a short summary will be provided, indicating the transformative learning process is facilitated by both *opening* and *closing* leader behaviours demonstrated its senior managers. However, it will also be revealed that leader behaviour demonstrated by the General Manager in this specific learning process is predominantly *opening*. Whilst, leader behaviours performed by firm’s department managers are both *opening* and *closing*.

Quality-Enhancement oriented innovations

As elaborated in preceding sections, the integration and retention of the externally acquired knowledge by employees through the transformative learning process is fairly straightforward

in quality-enhancement oriented innovations. As most knowledge acquired to facilitate these innovations are not too distanced from firm's existing knowledge base. Subsequently, the integrations of these knowledge are achieved, primarily, through collegial job related discussions during the implementation of these innovation projects. Both *opening* and *closing* leader behaviours have demonstrated by firm's department managers to facilitate this specific learning process in this type of innovations.

- *Opening* leader behaviour demonstrated by department managers:

“As I said our intern students and employees all have their own respective strengths. Interns are good in theory, whilst employees are good in practices. It is complementary to each other. So we encourage them to help and learn from each other in their jobs, and we [as managers] try not to force our ideas into them at this stage” (Interviewee CMD3)

Moreover, as these innovations are implemented predominantly to enhance the market performance of firm's new products, department managers have to make sure these innovations are completed before the deadlines. Therefore, *closing* leader behaviours are also adopted by firm's department managers to facilitate this learning process in firm's innovations.

- *Closing* leader behaviour demonstrated by department managers:

“we have to be careful with the deadlines set by our product development managers. In other words, though in most case, we don't get directly involved into these innovations conducted by our employees and intern students in the department, we still have to monitor the progresses of the innovations. And we will intervene if we believe the progress is significantly behind the schedule. It is our job. But this kind of situations rarely happens, I think people know their jobs, they know what need to be done” (Correspondent E3D1)

In contrast to the department focused behaviour demonstrated by these department managers, leader behaviour demonstrated by General Manager is more broadly focused in transformative learning process in this specific type of innovations. And the leader behaviour demonstrated by firm's General Manager to facilitate the transformative learning process in these innovations is *opening*.

- *Opening* behaviour demonstrated by General Manager

“I trust my managers in these innovations. They never failed me. And I tend to not get into details regarding how they get their jobs done, as I'm not an expert in manufacturing and material processing. I don't think it is necessary for me to intervene” (Interviewee GM3)

Product-differentiation oriented Innovations

In firm Chi, product-differentiation oriented innovations are predominantly conducted in product development departments. Given the significance regarding these innovations for the firm, its department managers are often more involved in the transformative learning process in this type of innovation than in the quality-enhancement oriented innovations. And the leader behaviours demonstrated by them are both *opening*, as the facilitator, and *closing*, as the supervisor, in this specific learning process.

- *Opening* leader behaviour demonstrated by department manager:

“As I said these innovation projects are research projects as well. So it is quite natural for us to run into problems. There will be problems even us [as Professors] cannot have foreseen in the beginning. So, it is ok for my students to make some mistakes during the process. And I think learning from mistakes is more effective than learning from successes” (Interviewee DPGM3)

- *Opening* behaviour demonstrated by General Manager

“Honestly, from my perspective innovation and risk goes hand in hand. You have to take risk if you want to innovate. The key point here is, in this firm, we only taking limited risk. Because we are using resources from the University, and this significantly reduced the risk and even the cost in our innovations” (Interviewee GM3)

However, despite product differentiation is the competitive strategy adopted by the firm, speed to the market, regarding firm’s differentiated products, matters. Therefore, senior managers’ *closing* leader behaviour have also been identified in its transformative learning process, indicating the supervisory role performed by managers in this process.

- *Closing* behaviour demonstrated by department managers:

“Of course, speed to the market matters, and I think it matters for every product. We always have plan in the beginning, it is compulsory, as these innovations are research projects as well. So we have to stick to the plan, since we need submit progress reports to the department in the University. And of course, the faster the better from the commercial perspective.” (Interviewee PGM4)

- *Closing* behaviour demonstrated by General Manager:

“I’ve to check the progress they made regularly, not because I don’t believe them.... I’m the head of the department in the University, it is my responsibility to check the progress they made in these research projects. And from personal perspective, I also care about the progress they have made in these innovations. It is not only about market or profit, it is about time. The sooner they can finish, the sooner we can move to the next project. I want to contribute to the development of the industry as much as I can, so we need to do these quickly” (Interviewee GM3)

Summary

In this section, leader behaviours adopted by company Chi's senior managers to facilitate the transformative learning process in its innovations are revealed. Empirical evidence suggested that firm's General Manager facilitated the transformative learning process through using, mainly, *opening* leader behaviours. Whilst its department managers adopted both *opening* and *closing* leader behaviours to facilitate this learning process, and this highlights the two roles they have to play in firm's innovations, the facilitator and the supervisor.

5.4.3.3 The relationship between SMAL and Exploitative Learning Process

In this section, firm's senior managers' ambidextrous leadership, and the impact it projected in the exploitation learning process, in firm's innovation adoptions will be elaborated. Firm's exploitative learning process will be depicted by activities performed to achieve the exploitation of the commercial values of these externally acquired knowledge in firm's innovations. And, as explained in previous section, in this firm, the exploitation of these knowledge are primarily been achieved through the following two approaches: routinisation (regarding quality enhancement oriented innovations), and standardisation (regarding product differentiated oriented innovations). The structure of this section is organised as following: firstly, activities adopted by firm's manager during the two respective knowledge exploitation approaches will be revealed. Then a summary will be provided, pointing out the unanimous adoption of *closing* leader behaviours by firm's senior managers reflects their managerial imperatives are goal achieving in the explorative learning process of its innovations.

Routinisation

Due to employee's familiarity with knowledge generated from the majority of quality-enhancement oriented innovations, as explained previously, the development of department routines and operations standards are the most frequently adopted channel for department

managers to facilitate the exploitation of these knowledge. And firm's department managers leader behaviours demonstrated in these processes are *closing*.

- *Closing* behaviour demonstrated by department managers:

“The purpose for us to develop these routines is to facilitate the effectiveness and efficiency in batch production. And it also allows us [as department manager] to monitor the manufacturing process, and reduce some human factor induced errors in it” (Interviewee FD3)

“It is the execution of the manufacturing plan rather than creativity that matters at this stage, as most thing have already been routinized or standardised at this stage, so we have to do is to monitor how these routines and standards been executed in our department” (Interviewee E3D1)

Standardisation

Due to the newness of knowledge generated from product-differentiation oriented innovations, standardisation of such knowledge in the final batch production is a typical way to achieve the consistency in the reuse of such knowledge in the firm. And, managers' attentions are been devoted to the following two issues: standardisation of manufacturing related technical parameters and procedures, quality concern in exploitative learning process of its product differentiation oriented innovations. And leader behaviour adopted by firm's senior managers is closing.

- *Closing* leader behaviours demonstrated by Department Managers:

“We are a small firm, and our products are new. So, we as the development department have to provide all the necessary blueprints and parameters to our manufacturing and processing departments. We need to develop the standard for them, so they can produce

the products as we requested. And we monitored the manufacturing process, case we have to make sure the components they produced meets our design standards” (Correspondent PGM3)

- *Closing* behaviour demonstrated by General Manager:

“My concern at this stage is quality. It is pointless to emphasis the creativity in our products if it is without good quality. Our products work underground in fairly extreme conditions, there will be certain problems in the use, but it cannot be major issues. So, I always tell my managers, they have to be prudent and specific in developing the quality standards in these new products. And it applies to every single component we produced in manufacturing our products” (Interviewee GM3)

Summary

As demonstrated previously, in the exploitative learning process of firm’s innovations, firm’s senior managers opted to *closing* leader behaviours unanimously. As at this stage, product quality and manufacturing efficiency becomes primary concern for firm’s senior managers. Therefore, routinisation and standardisations of the manufacturing process and quality and design standards regarding these innovations are the most frequently adopted approaches for firm’s managers to achieve such goals. And their managerial focus moved from encouraging error learning, as exhibited in both exploratory and transformative learning process, to monitoring goal attainment in the exploitative learning process.

5.4.4 Case summary

As revealed from the data, despite the strong R&D capabilities possessed by the firm, knowledge generated from external sources are still valued considerably by its management

team. And various external knowledge sources have been consulted to facilitate firm's innovations.

As demonstrated in preceding discussion, though not addressed explicitly by interviewees, the existence of an innovation friendly environment in the firm has significantly promoted employees' willingness to engage job related knowledge exploration. It is through such explorations that enabled the identification of external knowledge which are potentially valuable for firm's innovations. The integration of such knowledge is achieved through the following activities performed in its transformative learning process, namely, collegial job-related discussion, experimentation, and the consultation of expertise. The commercialisations of these knowledge are facilitated through activities performed in firm's exploitative learning process, such as, standardisation of manufacturing procedure of innovation, along with subsequent the introduction of such products to the market.³¹

As elaborated in section 5.4.3.1, in order to facilitate the exploratory learning in its innovations, the leader behaviours adopted by firm's senior managers are, predominantly, *opening*.

In contrast to the predominant adoption of *opening* leader behaviours demonstrated by firm's senior managers in the exploratory learning processes in its innovations, leader behaviours demonstrated by Department Managers in the transformative learning process comprises both *opening* and *closing* elements. As revealed through data, at this stage, department managers are both the facilitator and supervisor of knowledge integration in their own departments. However, it is revealed that the leader behaviour adopted by the General Manager at this stage is still *opening*. The difference exhibited between the General Manger and his department managers', regarding the leader behaviours adopted by them, during this learning process can be explained by the distinctive managerial focuses demonstrated by them.

³¹ Detailed evidence regarding the relationship identified between AC and IAP in this firm are provided in **Appendix VIII**

Furthermore, firm's senior managers unanimously opted to *closing* leader behaviours during the exploitative learning process in innovation adoptions. And firm's knowledge exploitation (i.e., commercialisation of innovations) has been effectively supported by senior managers' adoption such behaviours (i.e., monitor the progress, taking corrective actions and establishing routines and procedures). Details regarding leader behaviours adopted by firm's senior managers to facilitate the learning processes associated with its innovations are summarised in the following **Table 5-2**³².

³² Detailed evidence regarding the relationship identified between SMAL and AC in this firm are provided in **Appendix IX**

Table 5- 2 Leader behaviours demonstrated by senior managers in facilitating firm's AC learning process-Chi

	Code	Exploratory learning process	Transformative learning process	Exploitive learning process
Opening leader behaviours	Give room for new ideas	Encourage creative thinking		
		Encourage communications between colleagues	Encourage communication between colleagues	
		Openness towards new ideas		
		Promote innovation friendly environment		
	Encourage error learning	Emphasise the importance of learning from mistakes	Emphasise the importance of learning from mistakes	
			Support trials and experimentations	

	Give possibility for independent thinking	Delegation	Delegation	
		Encourage independent thinking	Provide support in the process of innovation	
<i>Closing</i> leader behaviours	Establish routines	Routinize the provision of opportunity to learn from internal experts	Routinize the provision of opportunity to learn from internal experts	
				Develop operational routines
	Monitor and control goal attainment			Specifying processing procedure in innovation
				Impose quality control and monitor deviations
	Monitor progress in tasks		Emphasise the importance regarding speed in innovation development	Monitor the progress in innovations

			Supervise progress made in innovation process	
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5.5 Conclusion

In this Chapter, details regarding how firms' senior managers' Ambidextrous Leadership influences its learning and innovation processes are explored. The data analysis is structured through the use of theoretical model developed in Chapter 3. As demonstrated in this chapter, the overall learning process (AC) associated with firms' innovations are indeed facilitated by senior managers' ambidextrous leadership. However, it is also revealed, details regarding leader behaviours adopted by senior managers in facilitating the learning process various amongst these case firms. Therefore, in the following Chapter, the findings from within case analysis (Chapter 5) will be compared and contrasted amongst case firms, so as the overarching pattern regarding relationships amongst senior managers' ambidextrous leadership, learning and innovation processes in all case firms can be identified.

CHAPTER 6 CROSS CASE ANALYSIS AND FINDINGS

6.1 Introduction

The aim of this chapter is to compare, and contrast findings generated from three case firms. This is so that the overall pattern regarding the correlations amongst Senior Managers' Ambidextrous Leadership (SMAL), Absorptive Capacity (AC) and Innovation Adoption Processes (IAP) in these case firms can be revealed.

The Chapter is organised as follows: firstly, findings regarding correlation between AC and IAP, in all case firms, will be compared. This is to identify the overall pattern regarding the correlation between AC and IAP (the bottom two levels of the conceptual model in **Figure 3-6**, section 3.6.3). Then, the correlations between SMAL and the AC as identified from case firms will be contrasted so as to unveil the overall pattern regarding the relationship between SMAL and AC (the top two levels of the conceptual model in Figure 3-6, section 3.6.3). Finally, a conclusion will be given, summarising the common features, regarding the correlations amongst the SMAL, AC and IAP, as revealed this study.

6.2 Comparison of the relationship between AC and IAP

6.2.1 The relationship between Exploratory Learning Process and the Initiation and Adoption Decision

As revealed in Chapter 5, the driving forces underlying its engagement in innovations, along with the types of innovations adopted in each case firm varies, as summarised in the following **Table 6-1**³³.

³³ Information listed in this table are summarised from data presented sections 5.2.2, 5.3.2 and 5.4.2.

Table 6-1 The Comparison of Key Features associated with Innovations Implemented in Case Firms

	Company Alpha	Company Beta	Company Chi
Elements enabled knowledge exploration	Existing accumulated knowledge	Existing accumulated knowledge	×
	×	×	Strong R&D capabilities
	Openness towards external knowledge	Openness towards external knowledge	Openness towards external knowledge
	Social network	Social network	Social network
	Innovation friendly environment	Innovative culture	Innovation friendly environment
	×	×	CEO background
	General Manager	×	×
	Department Manager	Department Manager	Department Manager

	Company Alpha	Company Beta	Company Chi
Key personnel involved in exploratory learning	Other Key individuals, i.e., employees	Other Key individuals, i.e., employees	Other Key individuals, i.e., employees and students
Driven force to initiate innovation	Commercial interests	Commercial interests	Commercial interests
	Firm's exciting capabilities	Firm's exciting capabilities	Firm's exciting capabilities
	Market competition	Market competition	×
	Political assignment	Political assignment	×
	×	×	Responsibility as scholars
Innovation types	National key scientific projects	National key scientific projects	×
	Customisation	Customisation	×
	Cost reduction	×	×
	Diversification	×	×
	Supply chain integration	×	×

	Company Alpha	Company Beta	Company Chi
	×	Differentiation	Differentiation
	Quality enhancement	Quality enhancement	Quality enhancement
Key external knowledge sources consulted	Specialised firms	Specialised firms	Specialised firms
	Industrial expertise	Industrial expertise	Industrial expertise
	Universities	Universities	Universities
	Research institutions	Research institutions	×
	Supplier	×	×

Notes: × = evidence not found

As demonstrated in chapter 5, most major innovations implemented in these firms are initially proposed by senior managers through monitoring the market and technology trends in the industry.

However, it is also revealed, in these firms, approaches adopted to facilitate the initiation of strategically less significant innovations differ from each other. For instance, in Company Alpha, internal channels have been developed to help employees to communicate their innovation suggestions to the General Manager (as demonstrated in **Figure 5-2** in section 5.2.2.1.3). In contrast, such mechanism has not been identified in the other two companies.

Moreover, despite external knowledge sources are valued considerably by all case firms regarding initiating their innovations, the significance regarding these external knowledge sources to firms' innovations varies. So are these firms' senior managers' preferences in consulting these sources. As revealed in interviews Companies Alpha and Beta tend to appreciate external knowledge developed in industries rather than from academic institutions, such as, universities. As according to interviewees from these two firms, learning and co-developing with universities were only conducted on quite limited scale and occasions. In contrast, senior managers in Firm Chi tend to hold different views. According to them, universities and industries are both considered valuable external knowledge sources to facilitate their innovations.

However, despite the peculiarities and differences identified in and amongst these firms in the initiation and adoption decision stages of their innovations, certain common features have also been identified.

The first one is the importance of market information to initiation of their innovations. In all three firms, market information, collected either through formal channels such as customer

feedback, or informal channels, such as firms' senior managers' social networks, and especially the personal connections of General Managers (GM) have all been considered.

Additionally, it is revealed in all case firms, the existence of prior knowledge, and the R&D capabilities significantly influence the direction regarding knowledge exploration in the initiation stage of innovation adoptions. The existence of this knowledge and capabilities have considerable impact regarding firms' recognition and evaluation of external knowledge through the exploratory learning process. This is exemplified as the adoption of differentiation-oriented innovations in Firms Beta and Chi, along with the adoption of diversification-oriented innovations in Firm Alpha, as elaborated in Chapter 5. However, it is worth noting that in both Firms Alpha and Beta, such knowledge and capabilities are accumulated through its key staff members' experience. In contrast, in Firm Chi, it predominantly stemmed from each firm's key individuals', such as these Professors' and their students' educational backgrounds. Therefore, it is reasonable to argue, in these case firms, that it is key individuals' knowledge and experiences that enabled the exploratory learning in their innovations.

The third factor is the overall openness towards external knowledge demonstrated in these Firms and its positive impact on firms' exploratory learning processes. However, the development of this attitude is facilitated by different factors in each case firms. For instance, in Firms Alpha and Beta, this attitude is facilitated through their organisations' contextual factors, such as innovation-friendly environment and innovative culture. In contrast, in Firm Chi, this is predominantly facilitated by senior managers' educational backgrounds, as most of them are Professors from university. It is spotted in interview, this attitude positively contributed to these firm's exploratory learning from external knowledge sources, though in different manners.

Lastly, the final innovation adoption decisions, regarding firms' strategically important innovations are made by its senior managers, based on their evaluation of the following factors: firm's existing capabilities, the value of external knowledge and the commercial interest that can be generated from using these knowledge. Even though the last factor was not addressed explicitly by its senior managers in Firm Chi during interviews, the nature of that firm as a profit-driven organisation still provides solid foundation for such a conclusion to be reached.

As revealed from previous discussions, cross case finding suggested in all three firms, the initiation and adoption decision stage in innovation adoption processes are facilitated by exploratory learning activities, such as the recognition, evaluation and assimilation of external knowledge executed by its employees. These findings corroborate with the correlation between the exploratory learning process in AC and the initiation and adoption decision in IAP as proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), and reproduced here with the affected areas highlighted in the following **Figure 6-1**.

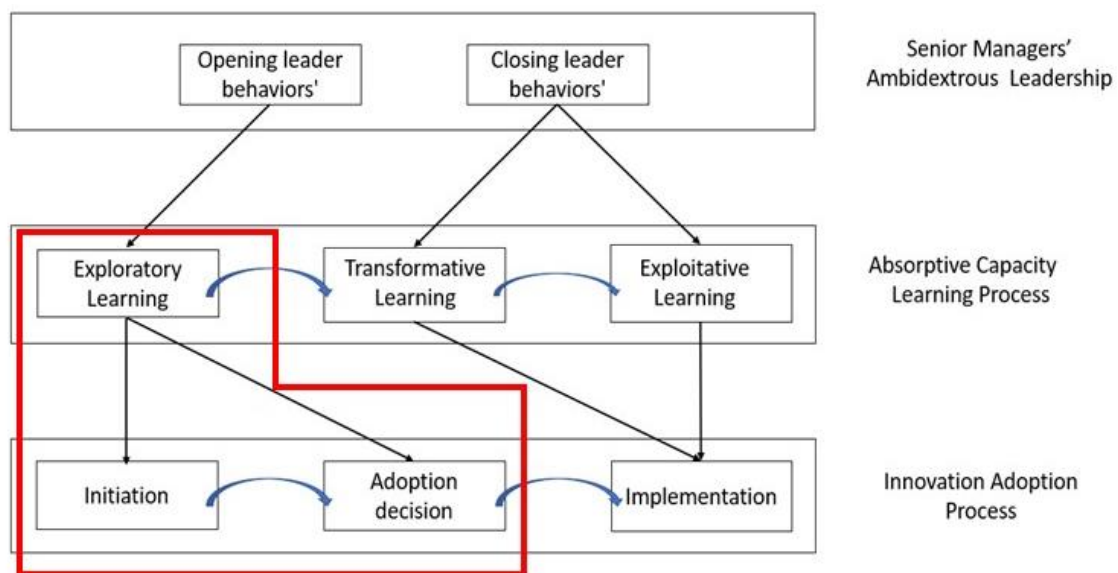


Figure 6- 1 Empirical result of the correlation between Exploratory Learning and Initiation and Adoption Decision

6.2.2 The relationship between Transformative Learning Process and the implementation in IAP

The relationship between transformative learning process and implementation in innovation adoption process identified in three case firms are summarised in following **Table 6-2**.

Table 6-2 The relationship between the Transformative Learning Process and the Implementation in Innovation Adoption process

	Company Alpha	Company Beta	Company Chi
Corresponding activities performed in innovation implementations	Trails and errors	Trails and errors	Trails and errors
	Experimentations	Experimentations	Simulations
	Developing prototypes	Developing prototypes	Developing prototypes
Approaches adopted to facilitate these activities	Delegation	Delegation	Graduation design
	Cross functional collaboration	Cross functional collaboration	Cross functional collaboration
	Cross functional coordination	Cross functional coordination	×
Key players	General Managers	×	×
	Department Managers	Department Managers	Department Managers
	Key individuals	Key individuals	Students
	Problem solving	Problem solving	Problem solving
	Interactions between departments	Interactions between departments	×
	Department project report	Department project report	Department seminar

Notes: × = evidence not found

All these three firms adopted functional-based organisational structures and cross functional collaborations are often required in firms' innovation implementations. Also, cross functional coordination is the most frequently adopted way to facilitate such collaborations. However, in Firm Chi, the importance of cross functional coordination is not addressed by its senior managers. In this firm, the development of new product has been given the highest priority by its senior managers, whilst functions, such as manufacturing, and material processing have only been assigned complementary roles, in the process of innovation adoption.

In firm Alpha and Beta, the dissemination of the shared understanding regarding externally acquired knowledge, are achieved through channels, such as departmental project reports that were organised by their Department Managers (DM). However, in Firm Chi, especially in its product development department, such a mechanism is missing, as their product managers, believed that such knowledge dissemination, is both unnecessary and inappropriate in the firm. Despite these key differences identified in the firms' transformative learning processes towards their innovation implementations, the majority of transformative learning activities performed by its staff members in the implementation stage of innovations significantly overlaps cross these case firms.

In all these firms, the individual and group level knowledge transformation take place in innovation-related experimentations, trials and errors and the development of prototypes. Job-related discussions and subsequent problem-solving activities performed by employees are vehicles for the transformation of knowledge to be achieved in the implementation stage of innovation adoptions.

Further, despite formal channels being developed in both Firms Alpha and Beta to facilitate the dissemination regarding knowledge externally acquired to larger groups of audiences in these firms, the actual dissemination and retention of such knowledge is achieved in individual

departments. The same feature is also identified in the manufacturing and materials processing department in Firm Chi, though orchestrated in a different manner. In Firms Alpha and Beta, it is the key individuals that participated in innovation adoptions, who have been invited to share what they have learnt with their colleagues. Whilst in Firm Chi, it is the job of the interns, mostly master students, who do so. This is quite a reasonable phenomenon. As explained in previous Chapter, these firms are manufacturing firms, and their production are organised on a functional basis. Therefore, only the relevant part of knowledge developed through the transformative learning process will be disseminated into each corresponding department to further facilitate the implementation of innovations in these firms.

The common features identified from cross case findings suggest that in all three cases, the integration of externally acquired knowledge into the existing knowledge, along with the development of shared understanding regarding the applications of such knowledge, in the implementation stage of firms' innovations, are facilitated, by its transformative learning process. This finding corroborates with the correlation between the transformative learning process in AC and the implementation in the IAP as proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), and reproduced here with the affected areas highlighted in **Figure 6-2**.

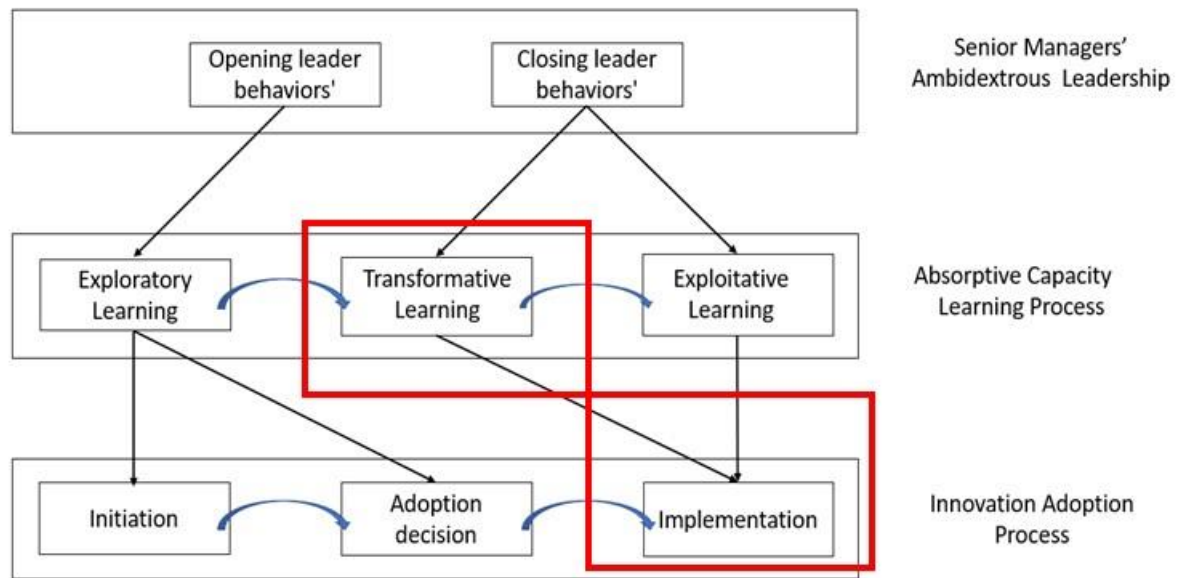


Figure 6- 2 Empirical result of the correlation between Transformative Learning and Implementation

6.2.3 The relationship between Exploitative Learning Process and implementation in IAP

As elaborated in Chapter 3, the exploitative learning process facilitates the reuse of knowledge, that been previously combined into firm's existing knowledge via the transformative learning process, in the implementation stages of firm's innovations.

As demonstrated in Chapter 5, the adoption of routinisation and standardisation to facilitate the knowledge exploitation is a common feature identified in case firms in the final stages of its innovation implementations.

However, due to the diversities regarding innovations adopted in these firms, routinisations are performed and interpreted as different things amongst these case firms and their respective departments. In firm Beta, due to the high level of customisation in its productions, the constant reuse of all knowledge generated from its customisation-oriented innovations are impossible.

Therefore, in this firm, routinisation refers to the promotion of certain valuable design principles in the design department to facilitate the continuous exploitation of new knowledge developed. Whilst in firm Alpha, routinisation has been addressed as a way for knowledge generated from e.g. cost-reduction oriented innovations to be promoted and reused in other related product lines. Even though routinisation has been given different meanings by managers in these firms, the purpose it serves is the same, which is the facilitation of the reuse regarding knowledge developed from the transformative learning process in firms' innovations implementations.

In contrast to routinisation, standardisation has been interpreted and performed in a unanimous manner in all three case firms, especially regarding innovation products which are manufactured through batch production processes. As revealed in interviews, in the final stage of the implementation of these innovations, all technical and manufacturing parameters are standardised firstly in firms' product development or design departments. Then each functions that are involved in the manufacturing of these innovation products develop their own department-specific standards to facilitate the final productions.

In sum, the final stage of innovation implementation comprises organisational activities such as batch production of innovations, along with the subsequent introduction of these innovations to the market. As revealed from the cross case findings, in all three case firms, these activities have been facilitated by firms' exploitative learning process, through standardisation and routinisation related to knowledge developed in these innovations, in the final production process. These findings corroborate with the correlation between the exploratory learning process in AC and the implementation in IAP as proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), and reproduced here with the affected areas highlighted in **Figure 6-3**.

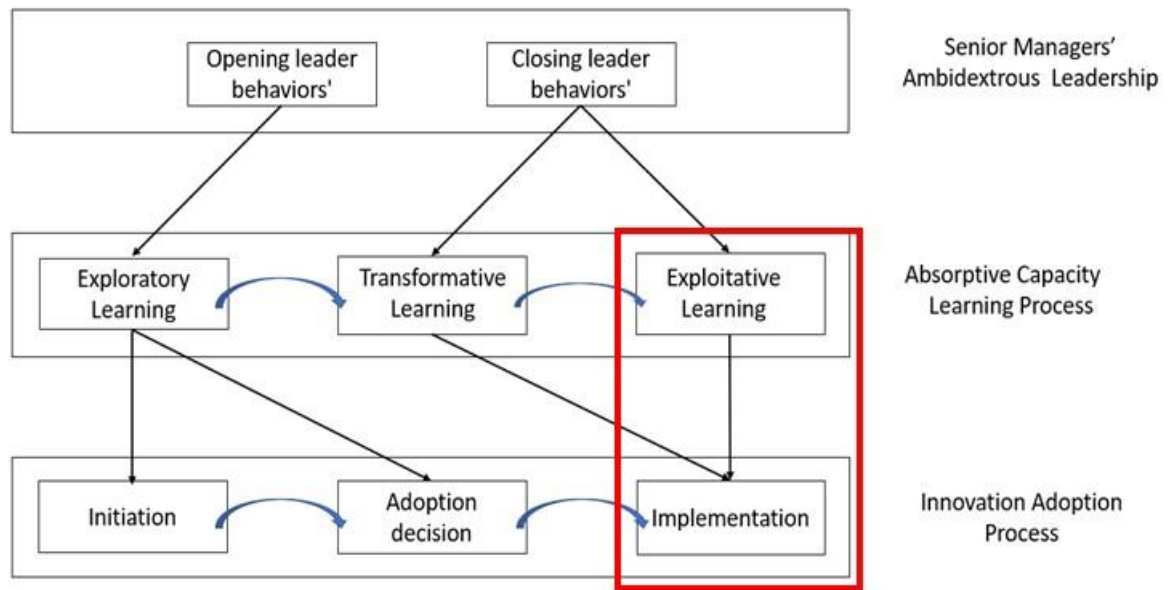


Figure 6- 3 Empirical result of the correlation between Exploitative Learning and Implementation

6.3 Comparison of the relationship between Senior Managers Ambidextrous Leadership and AC

In this section, the leader behaviours demonstrated by case firms' senior managers in facilitating the AC learning processes in its innovations will be compared. Moreover, other common factors, along with their impacts in the AC learning process regarding firms' innovation adoptions will also be introduced. Furthermore, as revealed in Chapter 5, in all case firms, the managerial focuses demonstrated by General Managers (GMs) and Department Managers (DMs) varies significantly in its innovation adoptions. Therefore, the differences regarding their managerial focus, along with the subsequent adoption of specific leader behaviours, by them, in facilitating AC learning processes in innovation adoption, will also be addressed, in following sections.

6.3.1 Senior Managers Ambidextrous Leadership in Exploratory Learning Process

The details regarding the correlation between ambidextrous leader behaviours demonstrated by senior managers in exploratory learning processes, identified with-in case analysis, are summarised in the following **Table 6-3**.

Table 6-3 Senior Managers Ambidextrous Leadership and the Exploratory Learning Process

	Company Alpha	Company Beta	Company Chi
Enablers of exploratory learning process	Connection with external knowledge sources	Connection with external knowledge sources	Connection with external knowledge sources
	Shared understanding regarding the importance of innovation for the firm	Shared understanding regarding the importance of innovation for the firm	Shared understanding regarding the importance of innovation for the firm
	Innovation friendly environment	Innovative culture	×
	×	×	General Manager's vision to make a difference
Panel A: General Managers			
Behaviour and attitude of General Managers	Communicate the shared vision in the organisation	Communicate and achieve shared vision in the organisation	×
	Suggest innovations	×	Suggest innovations

	Company Alpha	Company Beta	Company Chi
	Involve Department Managers in adoption decision making	Involve Department Managers in major innovation adoption decision making	Involve Department Managers in major innovation adoption decision making
	Routinize job rotation for Department Managers	Routinize job rotation for Department Managers	×
	Check Department Managers compliance in innovation mind-set and punish non-compliance	×	×
	×	×	Emphasise the importance of tolerance in different ideas in managers
	Openness towards new ideas	Openness towards new ideas	Openness towards new ideas
	Promotion of innovation friendly environment in the organisation	×	×

	Company Alpha	Company Beta	Company Chi
	Monitor the promotion of innovative ideas in departments	×	×
	×	Enhance the sense of shared ownership for employees in the organisation	×
<i>Opening</i> leader behaviours demonstrated by General Manager	Give room for new ideas	Give room for new ideas	Give room for new ideas
	Give possibility for independent thinking	Give possibility for independent thinking	Give possibility for independent thinking
	×	×	Encourage error learning
<i>Closing</i> leader behaviours demonstrated by General Manager	Monitor and control goal attainment	×	×
	Establish routines	Establish routines	×
	Take corrective actions	×	×

	Company Alpha	Company Beta	Company Chi
Panel B: Department Managers			
Behaviours and attitudes of Department Managers	Job delegation	Job delegation	Job delegation
	×	×	Encourage learning from mistakes
	Creation of innovation friendly organisational context	Reinforce the innovative culture in department	×
	Motivate to take limited risk in learning	Motivate to take limited risk in learning	×
	Encourage discussion between colleagues	Encourage learning and discussion between colleagues	
	Emphasise the necessity for justification before initiating projects	×	
	×	×	Encourage independent thinking

	Company Alpha	Company Beta	Company Chi
	×	Reward creative ideas proposed by employees once adopted	×
	Routinize the provision of opportunities for external learning	Routinize the provision of opportunities for external learning	Routinize the provision of opportunities for external learning
<i>Opening</i> leadership style demonstrated by Department Managers	Give room for new ideas	Give room for new ideas	Give room for new ideas
	Encourage error learning	Encourage error learning	Encourage error learning
	Give possibility for independent thinking	Give possibility for independent thinking	Give possibility for independent thinking
<i>Closing</i> leadership style demonstrated by Department Managers	Establish routines	Establish routines	Establish routines

Notes: × = evidence not found

As illustrated in the **Table 6-3**, the combined leader behaviours of case firms' senior managers is, mainly, *opening* during the exploratory learning process in firms' innovation adoptions. As revealed in interviews, firms' senior managers tend to emphasise the importance of *opening* leader behaviours, such as giving room for new ideas, encouraging error-learning and giving the opportunity for independent thinking, and its positive impacts on firms' exploratory learning process in innovation initiations.

However, *closing* leader behaviours have also been identified amongst senior managers in these case firms. For instance, as revealed in interviews, in Firm Alpha, its General Managers monitored his department managers' behaviours to check whether the latter complied with his order to embrace an innovative mind-set in their work. In addition to that, he also promoted the instalment of a job-rotation mechanism amongst his Department Managers, so that the inward-looking behaviour could be avoided by the latter. Similarly, in Firm Beta, its General Managers also deployed the same mechanism amongst his Department Managers, aiming to enhance his Department Managers' capabilities to see the bigger picture and facilitate exploratory learning in firm's innovations. In other words, these *closing* behaviours were deliberately adopted by General Managers in Firm Alpha and Beta to facilitate the development of the innovation-friendly environment and innovative culture, along with the subsequent increase of employees' self-generated initiatives in engaging exploratory learning in these organisations, respectively. Therefore, even though *closing* leader behaviours have been identified in firms' General Managers during the exploratory learning processes, the purpose these General Managers aim to achieve, through using such behaviours, is to facilitate knowledge exploration, rather than hinder it, in their organisations. The same can be said regarding the *closing* leader behaviour demonstrated by Department Managers in all three case firms. Similarly, in these firms, activities, such as inviting industrial experts to give lectures or seminars in the department, have

been routinized by their Department Managers to provide opportunities for their employees to enhance their knowledge through learning from external sources.

Additionally, as revealed in interviews, there are certain common non-managerial factors which also facilitate the exploratory learning in firms' innovations, which are summarised in the following **Table 6-4**.

Table 6-4 Non-managerial factors that facilitating an exploratory learning process

Non-managerial Factors	Impacts on exploratory learning process
Tie with external knowledge sources	Provides opportunities for external knowledge recognition, and acquisition by organisations
Accumulated knowledge in organisation	Facilitates the recognition, evaluation of external knowledge
Pro-innovation Organisational context	Stimulates and facilitates employees' self-generated initiatives in engaging exploratory learning

Further, it is worth noting that, despite firms' exploratory learning processes being predominantly supported by *opening* leader behaviours, demonstrated by its senior managers, the details regarding activities performed by them to support such process varies, although not significantly, as summarised in the following **Table 6-5**.

Table 6-5 Ambidextrous Leadership behaviours adopted by senior managers in facilitating exploratory learning process

Panel A: General Managers' Leadership					
Code	Sub-code	Examples from data	Company A	Company B	Company C
<i>Opening</i> behaviours	Give room for new ideas	Emphasise the importance of pro-innovation organisational environment	√	√	√
		Openness towards new ideas	√	√	√
		Encourage the generation of creative ideas	√	√	
		Emphasise the importance regarding managers' tolerance towards different ways of doing things			√
	Encourage error learning	Motivate employees to take limited risk in learning			√

		Give possibilities for independent thinking	The communication of a shared vision in the organisation to motivate employee's initiatives in proactive learning	√	√	√
			Encourage discussion in innovation decision adoptions	√	√	√
<i>Closing</i> behaviours	leader	Monitor and control goal attainment	Check Department Managers compliance in adopting innovation mind-set	√		
			Monitor the promotion of valuable creative ideas in departments	√		
		Establish routines	Routinize Department Managers' rotation	√	√	
		Take corrective actions	Remove Department Manager if he/she fails to embrace and promote innovation mind-set	√		

Panel B: Department Managers' Leadership

Code	Sub-code	Examples from data	Company A	Company B	Company C
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<i>Opening</i> behaviour	leader	Give room for new ideas	Promote innovation friendly environment in the department	√	√	√
			Encourage discussions and learning between colleagues	√	√	√
		Encourage error learning	Motivate to take limited risk in learning	√	√	
		Give possibilities for independent thinking	Job delegation	√	√	√
			Have confidence in key individuals do their job independently	√	√	√
			Require justification before actions	√		
<i>Closing</i> behaviours	leader	Establish routines	Routinize the provision of opportunities to learn from external experts	√	√	
			Routinize the provision of opportunities to learn from internal experts			√

Notes: √ = evidence found

By referring to findings summarised from within case analysis, in these case firms, the exploratory learning process in firms' innovation adoptions are mainly supported by firms' senior managers *opening* leader behaviours. These findings corroborate with the correlation between the senior managers' opening leader behaviours and the exploratory learning process in the AC proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), and reproduced here with the affected areas highlighted in the following **Figure 6-4**.

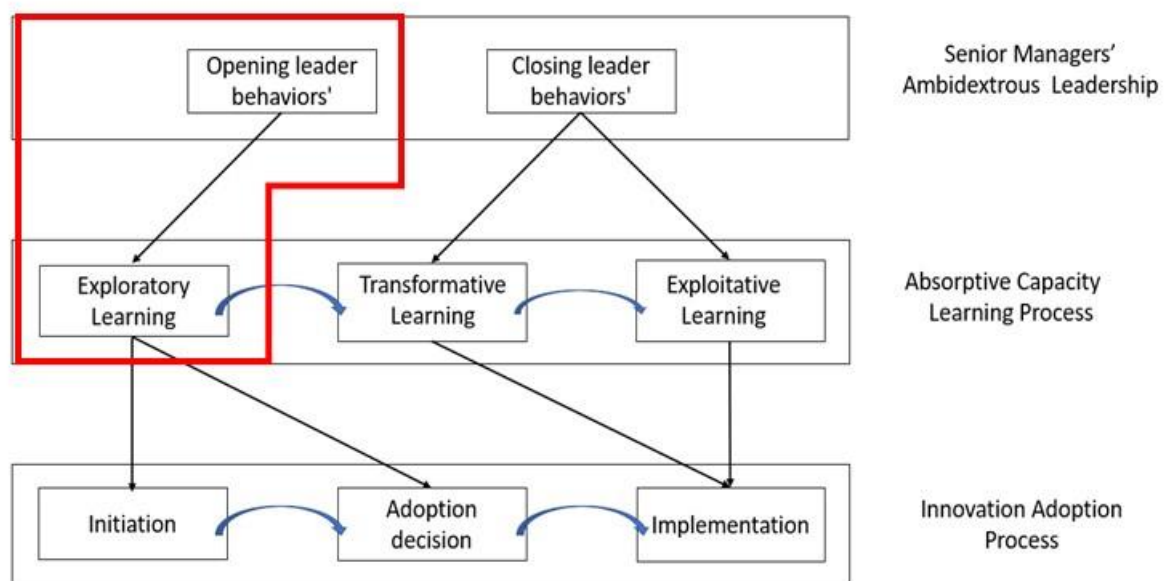


Figure 6- 4 Empirical result of the correlation between Senior Managers' Opening leader behaviours and Exploratory Learning process

6.3.2 Senior Managers Ambidextrous Leadership in Transformative Learning Process

Transformative learning process enables the integration of external knowledge into firm's existing knowledge, along with the development of shared understanding regarding the application of such knowledge in innovation adoption processes (Sun and Anderson, 2010).

Additionally, it also enables the retention, along with the preparation of the reuse of this knowledge in innovation adoptions (Lane, Koka, and Pathak, 2006).

Referring to the discussions in Chapter 5, details regarding key enablers of transformative learning processes in case firms' innovations, along with behaviours adopted by firms' senior managers to facilitate this process are summarised in the following **Table 6-6**.

Table 6-6 Cross case findings in correlation of Senior Managers' Ambidextrous Leadership and the transformative learning process

	Company Alpha	Company Beta	Company Chi
Enablers of transformative learning process	Effective collaborations between departments	√	√
	Cross-functional coordination	√	×
	Senior managers' intention	√	√
	Senior Managers' trust and confidence in key individuals' capabilities	×	√
General Manager's behaviours and attitudes	Trust Department Managers with their jobs	×	
	Organise coordination meetings	√	×
	Emphasize the importance of innovation friendly environment	Emphasize the importance of innovation mind-set	√
	Address the importance regarding speed in innovation	Address the importance regarding speed in innovation	√

	Company Alpha	Company Beta	Company Chi
	×	×	Check the progress with Department Managers
	×	Willingness to take risk	Willingness to take risk
<i>Opening</i> leadership styles demonstrated by General Manager	Give room for new ideas	Give room for new ideas	Give room for new ideas
	×	Encourage error learning	Encourage error learning
	Give possibility for independent thinking	×	Give possibility in independent thinking
	Support experimentation	√	√
<i>Closing</i> leadership styles demonstrated by General Manager	Monitor the progress	Monitor the progress	Monitor the progress
Department Managers' behaviours and attitudes	Emphasize the importance of learning from mistakes	√	√

	Company Alpha	Company Beta	Company Chi
	Provide support in innovation and learning	√	√
			Organize internal meetings to facilitate the dissemination and retention of knowledge
	√	Address the importance of speed	Address the speed in innovations
	√	Encourage learning and discussion between colleagues	√
	√	Trust and delegation	√
	√	Supervise the progress made in innovation	√
	Consider individuals capabilities	×	×
<i>Opening leader</i> behaviour	Give room for new ideas	√	Give room for new ideas
	Encourage error learning	Encourage error learning	Encourage error learning

	Company Alpha	Company Beta	Company Chi
demonstrated by Department Managers	√	Give possibility for independent thinking	√
<i>Closing</i> leader behaviour	×	×	Monitor progress in tasks
demonstrated by Department Managers	Establish routines	Establish routines	Establish routines

Notes: √ = evidence found, × = evidence not found

As summarised in Table-21, the predominant leader behaviours demonstrated by General Managers from case firms in the transformative learning process in its innovations are macro-level-oriented, whilst, leader behaviours demonstrated by its Department Managers are more micro level or task oriented.

Moreover, as revealed in Chapter 5, due to macro-level-orientation exhibited by firms General Managers, they are not directly involved in most innovations implemented in their firms. Therefore, in these case firms, General Managers facilitate the transformative learning process in firms' innovations in an indirect way.

For instance, though not addressed in the same explicit manner or wording, General Managers from case Firms all emphasised the importance of the existence of innovation-friendly organisational contexts in firms' innovation adoptions. In Firm Beta, the General Managers talked about the importance of the rejuvenation of the firm's innovative culture in facilitating its innovations. However, in Firm Chi, the General Managers emphasised the importance of professors (as Department Managers) not to impose their ideas on their staff (students) in product development processes.

Subsequently, given the significance of General Managers in these case firms, along with the power possessed by them, their emphasis, regarding the importance and necessity for providing innovation-friendly environments in their organisations, provided a solid foundation for innovations to be facilitated by their staff members. The result was that the exploratory and transformative learning process occurred in these innovations, as demonstrated in Chapter 5.

In addition, as demonstrated in the preceding Chapter, certain *closing* leader behaviours adopted by firms' General Managers also positively influenced this learning process in firms' innovations (see details in **Table 6-7**). It is evidenced from the data analysis that General Manager's emphasis regarding the speed in innovation development have a positive effect on

the increase of efficiency and effectiveness regarding the transformative learning process occurring in firms' innovations

Table 6-7 Coding and examples of General Managers' leadership styles in the transformative learning process

Codes	Sub-codes	Example from data	Company Alpha	Company Beta	Company Chi
<i>Opening</i> leadership style	Give room for new ideas	Emphasize the importance of the development of innovation friendly environment	√	√	√
	Give room for independent thinking	Trust Department Managers with their jobs	√	×	√
	Encourage error learning	Willingness to take risks	×	√	√
<i>Closing</i> leadership style	Monitor the progress in tasks	Organize coordination meetings	√	√	×
		Check progress with Department Managers	×	×	√

Codes	Sub-codes	Example from data	Company Alpha	Company Beta	Company Chi
		Emphasize the importance regarding speed in innovation development	√	√	√

Notes: √ = evidence found, × = evidence not found

In contrast to the predominantly *opening* leadership style, demonstrated by firms' General Managers in the transformative learning processes, in its innovations, leadership style demonstrated by firms' Department Managers are both *opening* and *closing* in this learning process, as summarised in **Table 6-8**.

Table 6-8 Coding and examples of Departmental Managers' leadership styles in the transformative learning process

Codes	Sub-codes	Example from data	Company A	Company B	Company C
<i>Opening</i> leadership style	Give room for new ideas	Encourage learning and discussion between colleagues	√	√	√
		Support experimentation	√	√	√
	Encourage error learning	Emphasize the importance to learn from mistakes	√	√	√
		Support trials, experimentations	√	√	√
	Give room for independent thinking	Provide support in innovation and learning	√	√	×
		Delegation	√	√	√

Codes	Sub-codes	Example from data	Company A	Company B	Company C
<i>Closing</i> leadership style	Monitor the progress in tasks	Address the importance regarding speed in product development	√	√	√
		Supervise the progress made in innovations	√	√	√
	Establish routines	Organise internal meetings to facilitate the dissemination and retention of knowledge	√	√	√

Notes: √ = evidence found, × = evidence not found

As revealed in Chapter 5, in the transformative leaning process, firms' Department Managers' attentions are being devoted to activities that facilitate the integration and development of shared understanding regarding knowledge acquired from external sources in organisations. These objectives have been addressed by, predominantly *opening* leader behaviours, such as encouraging and giving room for new ideas, demonstrated by these Department Managers. However, as revealed by interviews, firms' efficiency and effectiveness in achieving knowledge integration and dissemination also have significant impact on its market performance.

Therefore, *closing* leader behaviours, such as monitoring the progress in innovation development, have been adopted by firms' Department Managers to address such issues.

Overall, by referring to findings summarised from within case analysis, in these case firms, during the transformative learning process, the integration and development of shared understanding regarding external knowledge are achieved by, mainly, *opening* behaviours adopted by firms' senior managers. Moreover, it is revealed that to balance the operational pressure, such as meeting the pre-planned target in innovations, *closing* behaviours have also been adopted by Department Managers to speed up the knowledge integration and disseminations of knowledge newly acquired in organisations. Therefore, it is reasonable to argue that, the transformative learning process in firms' innovations is being supported by firms' senior managers' capabilities in demonstrating both *opening* and *closing* leader behaviours simultaneously.

As proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), it is senior managers' *closing* leader behaviours that facilitate the transformative learning process in innovations. However, as demonstrated from preceding discussions, the cross case findings suggest otherwise. Through referring to the original theoretical model (section 3.6.3, **Figure 3-6**), the overall correlation between SMAL and transformative learning process in the AC as identified from cross case analysis, and its difference with the original model, are highlighted in the following **Figure 6-5**.

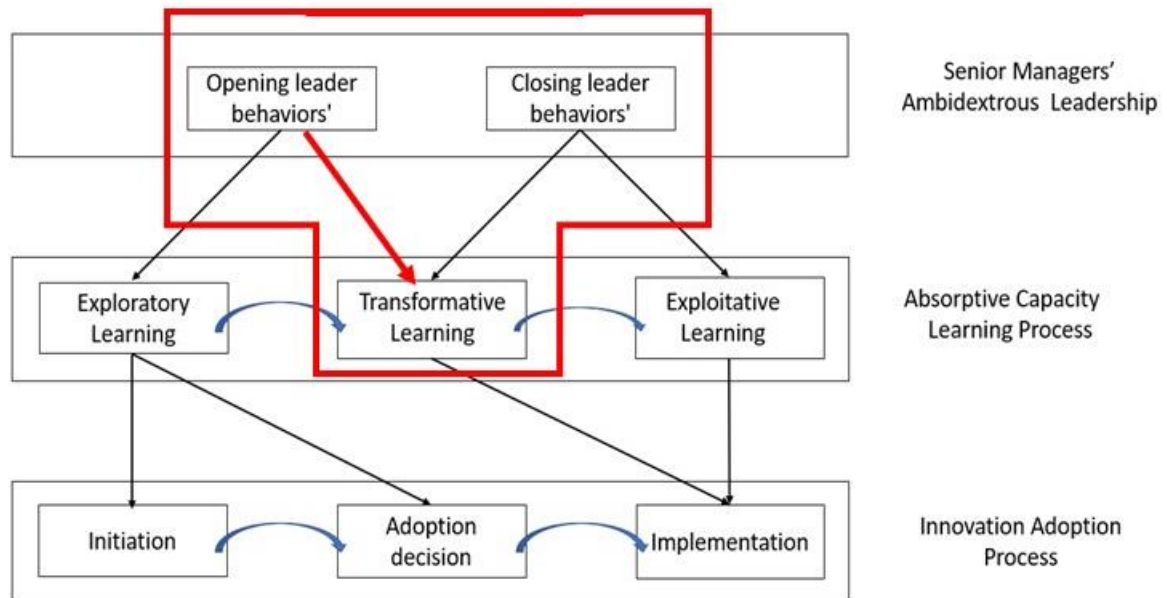


Figure 6- 5 Empirical results of the correlation between SMAL and Transformative Learning Process

6.3.3 Senior Managers Ambidextrous Leadership and Exploitative Learning Process

As demonstrated in Chapter 3, the exploitative learning process refers to the application of knowledge integrated through the transformative learning process in innovations implemented by organisations. In these case firms, exploitation of knowledge is achieved predominantly through approaches, such as, routinisations and standardisations in the final stage of its innovation adoptions. At this stage, managerial focus moved toward the promotion of the development of shared understanding of externally acquired knowledge and the integration of such knowledge to the improvement in efficiency and effectiveness regarding its applications in organisations. Subsequently, the leader behaviours demonstrated by firms' senior managers moved from both *opening* and *closing*, to *closing* only in this learning process, as summarised in the following **Table 6-9**.

Table 6-9 Managerial Focus and Senior Managers Ambidextrous Leadership in the Exploitative Learning Process

	Company Alpha	Company Beta	Company Chi
Managerial Focus	Speed	Speed	Speed
	Quality	Quality	Quality
	Efficiency	Efficiency	Efficiency
General Manager's behaviours and attitudes	Emphasise the importance to stick to production plan (I)	Emphasise the importance of quality control (I)	Emphasise the importance of quality control (I)
Leadership style demonstrated by General Managers	<i>Closing</i>	<i>Closing</i>	<i>Closing</i>
Department Managers' behaviours and attitudes	Develop routines to facilitate efficiency in knowledge exploitation (I)	Develop routines to facilitate efficiency in knowledge exploitation (I)	Develop routines to facilitate efficiency in knowledge exploitation (I)

	Company Alpha	Company Beta	Company Chi
	Emphasise the importance in maintaining consistent performance in jobs (I)	×	×
	Develop standard procedures and process in batch production (I)	Develop standard procedures and process in batch production (I)	Develop standard procedures and process in batch production (I)
	Impose Total quality management in production (I)	Impose Total quality management in production (I)	Impose Total quality management in production (I)
	Monitor and control deviations (D, O)	Monitor and control deviations (I, D, O)	Monitor and control deviations (I, D)
Leadership style demonstrated by Department Managers	<i>Closing</i>	<i>Closing</i>	<i>Closing</i>

Notes: I=data from interview, D=data from documents, O=data from observations, × = evidence not found

Similar to the phenomenon identified in the transformative learning process, case firms' General Managers are not directly involved in the exploitative learning processes in their firms' innovation either. Nevertheless, these General Managers still influence this process in innovations adopted in their firms, for reasons explained in preceding section. Subsequently, it is firms' Department Managers who played the key role in facilitating and supervising knowledge exploitation activities in the final stages of firms' innovations.

Further, as demonstrated in Chapter 5, routinisation is the predominant way adopted by Department Managers to enhance the efficiency in knowledge exploitation in innovations. In contrast, standardisation is the approach employed by these managers to maintain the consistency regarding their employees' performance in manufacturing firms' innovation products. Additionally, the development, along with the subsequent supervision and reinforcement regarding employees' compliance, of these routines and standards are achieved through *closing* style leadership demonstrated by Department Managers, as summarised in the following **Table 6-10**.

Table 6-10 Department Mangers' Leadership Behaviours in the Exploitative Learning Process

Codes	Sub-codes	Example from data	Company Alpha	Company Beta	Company Chi
<i>Closing</i> leader behaviours	Establish routines	Develop design and processing routines based on useful insights generated from innovation development process	√	√	×
		Develop operational routines		√	√
	Monitor and control goal attainment	Standardize certain control criterion and monitor deviations	√	√	√
		Specify processing procedures	√	√	√
		Monitor the overall manufacturing	√	×	√

Codes	Sub-codes	Example from data	Company Alpha	Company Beta	Company Chi
	Monitor the process in tasks	Emphasize time to the market	√	√	√

Notes: √ = evidence found × = evidence not found

Overall, by referring to the previous discussion, in the final stage of firms' innovations, the managerial focus emphasised by its senior managers are task oriented, such as efficiency and consistency regarding their employees' performance in the final production of innovations. Subsequently, *closing* leader behaviours, such as developing routines and standards in the manufacturing processes, were adopted by them, to guarantee the achievement of efficiency and consistency by their employees in the exploitative learning process of these innovations. Additionally, it is worth noting that, despite these General Managers not being directly involved in facilitating this learning process, the *closing* leader behaviours demonstrated by them still exerted a positive influence in this process, though in an indirect way, as explained previously. Therefore, in contrast to the exploratory and transformative learning process, which has been facilitated by both *opening* and *closing* leader behaviours demonstrated by senior managers, in all case firms', its exploitative learning process in innovation adoptions were facilitated by the *closing* leader behaviours adopted by firms' senior managers solely. These findings corroborate with the correlation between the senior managers' *closing* leader behaviours and the exploitative learning process in the AC as proposed in the theoretical model (see section 3.6.3, **Figure 3-6**), and reproduced here with the affected areas highlighted in the following **Figure 6-6**

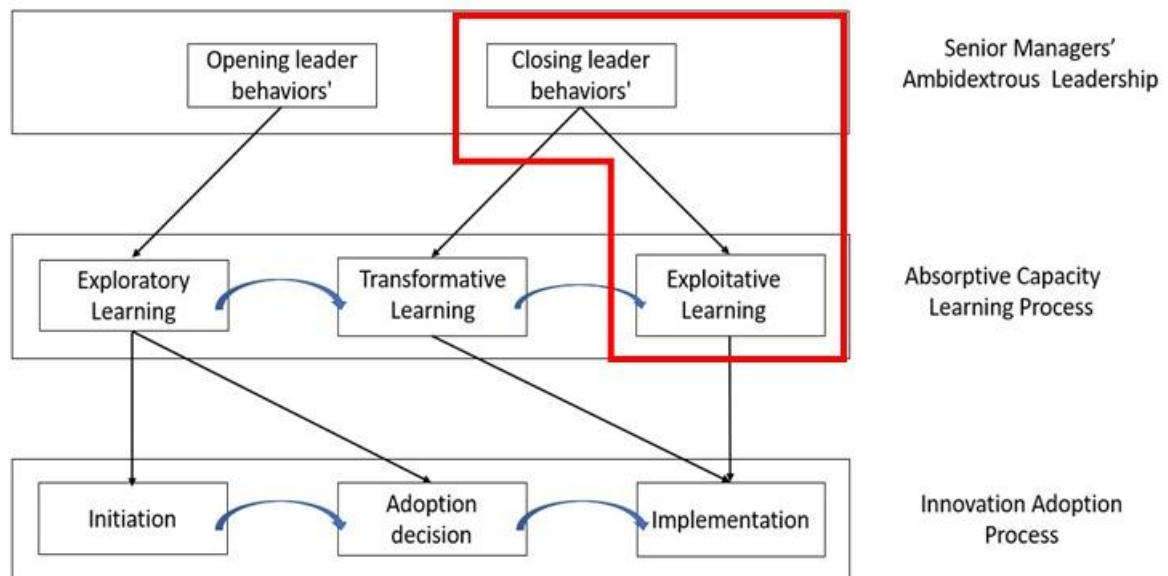


Figure 6- 6 Empirical result of the correlation between Senior Managers' closing leader behaviours and Exploitative Learning

6.4 Conclusion

In this Chapter, the pattern regarding the correlations amongst the senior managers ambidextrous leadership, AC and innovation adoption processes in organisations are revealed through the comparison and contrast of findings derived from with-in case analysis.

In all three firms, external knowledge recognition and evaluation in the initiation and adoption decision stages of innovation adoptions are facilitated by the exploratory learning process. The integration and application of external knowledge in the implementation of firms' innovations is achieved through transformative and exploitative learning processes.

Further, both *opening* and *closing* leader behaviours are adopted by firms' senior managers in facilitating the exploratory and transformative learning processes in innovation adoptions. Whilst in the exploitative learning process, leader behaviours demonstrated by firms' senior managers are unanimously *closing*.

Additionally, it is worth noting that, though firms' General Managers are considerable less involved into details in its innovations, the *opening* leader behaviours demonstrated by them significantly facilitated, albeit not only, employees' exploratory learning activities in these innovations. In contrast, employees' exploitative learning activities in firms' innovation adoptions are predominantly facilitated by the *closing* behaviours adopted by Department Managers. Taken together, these common features identified suggest, it is the senior managers ambidextrous leadership that facilitated the AC learning process in firms' innovation adoptions. Moreover, it is posited in this Chapter, apart from senior managers ambidextrous leadership, factors such as the existing knowledge in organisations, its ties with external knowledge sources, organisational context, General Manager's vision, and Department Manager's trust, all significantly influence the AC learning process in firm's innovation adoptions, as demonstrated in **Table 6-11**. However, due to the first two factors being more closely related to organisational attributes rather than managerial attributes in organisations, these two factors will not be further addressed explicitly in the following discussions³⁴.

Table 6-11 Other Factors Identified

Themes matched in Cross-case analysis	AC learning process		
	Exploratory Learning process	Transformative Learning process	Exploitative Learning process
Existing knowledge	√	√	×
Ties with external knowledge sources	√	√	×

³⁴ Details evidence regarding the GM's vision and DM's trust, along with its impacts on AC are provided in **Appendix X**.

General Manager's vision	√	√	√
Department Manager's trust	√	√	√

Note: √ = evidence found, × = evidence not found

In the following Chapter, theoretical framework proposed in Chapter 3 will be revised based on cross case findings summarised, so as its validity can be further enhanced.

CHAPTER 7 DISCUSSION

7.1 Introduction

As demonstrated in Chapter 2, given Ambidextrous Leadership (AL) is an emerging concept, empirical studies regarding this concept are quite limited. Moreover, in these empirical studies the dominant research approach adopted is quantitative. And the sole focus in these studies is the exploration regarding the correlation between shop-floor managers' AL and employees' individual innovation performance; whilst leaving the relationship between Senior Managers AL(SMAL) and organisational innovation unexplored. Therefore, in order to address these research deficiencies, this research is organised to explore the relationship between SMAL and organisational innovation. Inspired by the analytical logic adopted by Rosing and colleagues (2010) in developing the construct of AL, a theoretical model is proposed in Chapter 3, incorporating Absorptive Capacity (AC) and Innovation Adoption process (IAP) in it. In the model, the Absorptive Capacity is used as the moderator in explaining the correlation between SMAL and organisational innovation; and the Innovation Adoption process (IAP) is adopted to represent the overall processes required in organisational innovations.

In this chapter, the theoretical model proposed in Chapter 3 will be revised based on patterns emerged from the empirical chapters (Chapters 5 and 6). Propositions regarding the correlations amongst these three key constructs, SMAL, AC, and IAP, will be developed through contrasting the findings in this research with previous literature. Additionally, emerging managerial factors identified through the pattern matching process in Chapter 6, will also be incorporated into the revised model, along with those propositions developed in association with these factors.

7.2 Relationship between the Absorptive Capacity and Innovation Adoption Process

As revealed in Chapters 5 and 6, the sequential assumption that has been made, regarding firms' innovation adoption process in developing the theoretical model in this research, is supported by findings summarised from data analysis. Furthermore, cross case findings also suggest that each stage of the innovation adoption process is associated with its own corresponding learning process. The overall correlations between different stages of the Innovation Adoption Process and the sub-sets of the Absorptive Capacity identified from cross case findings, remain the same as suggested in the theoretical model, as shown in the following **Table 7-1**.

Table 7-1 The Relationship between the Absorptive Capacity and Innovation Adoption

Phases of Innovation Adoption	Corresponding Activities in Innovation Processes	Corresponding Sub-sets of Absorptive Capacity
Initiation	Recognising a need, searching for solutions, becoming aware of existing external knowledge, identifying suitable knowledge and proposing some for adoption	Exploratory Learning process:
Adoption decision	Evaluation of proposed ideas from technical, financial and strategic perspectives, making the decision to accept an idea as the desirable solution, and allocating resources for its acquisition,	the recognition and evaluation of valuable external knowledge
Implementation	Transformation of knowledge acquired externally, preparing the organisation for its use, trial use, acceptance of the innovation by the users and continued use of the innovation	Transformative and Exploitative learning processes: the transformation, integration and commercialisation of external knowledge

Source: partly adopted from Damanpour and Schneider (2006, p.217) and Lane et al, (2006, p.856), with modifications

7.2.1 Relationship between the Exploratory Learning Process and the Initiation and Adoption Decisions

As revealed in previous studies, the exploratory learning process pertains to the recognition and evaluation of external knowledge by organisations (Lane, Koka and Pathak, 2006; Lichtenthaler, 2009; Todorova and Durisin, 2007). As suggested in Chapter 3, it facilitates the initiation and adoption decision phases in IAP. Findings in this research support this relationship.

As suggested by Sun and Anderson (2010, 2012), exploratory learning processes occur initially at the individual level, and the recognition of valuable external knowledge is achieved through individuals' *intuition*, a "*unique human attribute*" (Crossan, Lane and White, 1999:526). However, although Sun and Anderson (2010: 2012) successfully revealed that the recognition regarding the valuable of external knowledge through exploratory learning is predominantly an individual level phenomenon, the discussion regarding the differences between individuals in this process is absent in their study. This research reveals that the recognition of the valuable external knowledge in the initiation stage of innovation adoption is achieved by key individuals' in these organisations. This finding is in line with arguments articulated by Minbaeva et al., (2003) and Chen and Huang (2009), that employees should not be considered as equally important regarding their strategic value in firms' innovations. As, employees who are only capable of performing repetitive jobs are not likely to significantly contribute to firms' innovations (Minbaeva et al., 2003).

Additionally, as suggested by Cohen and Levinthal (1990), Lane, Koka and Pathak (2006) and Zahra and George (2002), it is firms' knowledge and past experiences that enable the recognition and evaluation of external knowledge by organisations in their innovations. However, as revealed in this research, the recognition of external knowledge is predominantly achieved through key individuals' intuition, which, as suggested by Crossan, Lane and White

(1999: 526), is a highly subjective process that is “*deeply rooted in individuals’ experiences and knowledge*”. In other words, it is key individuals’ knowledge and experiences, but not the organisations’ that enables the recognition of valuable external knowledge³⁵. These discussions suggest:

Proposition 1a: *the exploratory learning process facilitates the initiation of firms’ innovation adoption through enabling the recognition of valuable external knowledge; and the recognition of valuable external knowledge are predominantly achieved by key individuals’ intuition.*

As revealed in previous research, once the innovation adoption process progresses from initiation to the decision-making stage, the exploratory learning process will evolve from recognition to the evaluation of knowledge that has been externally identified (Sun and Anderson, 2012). Subsequently, the corresponding learning activities in the exploratory learning process will move from *intuiting* (individual level), as in the initiation stage, to *interpreting* (individual/group level) in the adoption of decisions (Sun and Anderson, 2010; Crossan, Lane and White, 1999). A linear view regarding the exploratory learning process is supported in this research.

This research also reveals that, in all case firms, the adoption decisions regarding most of its innovation adoptions are made by firms’ senior managers in board meetings, on a collective basis. This phenomenon resonates with the argument that innovation adoption decisions are

³⁵ Similar result has also been identified by Rezaei (2013). In his research Rezaei (2013:261) posited it is the CEO, R&D and Marketing managers’ knowledge and experiences that are particularly relevant in initiating innovation related knowledge exploration. However, it is revealed in this research that not only the top managers’ but also some key personals’ knowledge and experience matters significantly with regard to the knowledge exploration required in the initiation stage of innovations.

strongly influenced by firms' senior managers (Dewar and Dutton, 1986; Damanpour and Schneider, 2006:219)³⁶.

Moreover, as revealed in Chapter 6, in these board meetings, factors such as firms' existing resources and capabilities, along with the market potential regarding proposed innovation suggestions, must be discussed by firms' senior managers before any final decisions regarding the adoption of specific innovations can be reached. This process resembles the *interpreting* process in organisational learning. As suggested by Crossan and colleagues (1999:525) the *interpreting* refers to “*the explaining, through words and /or actions, of an insights or idea to one's self and to others*”, and it enables individuals within work groups to establish “*a shared understanding regarding what is possible*”. Therefore, these discussions suggest:

Proposition 1b: *the exploratory learning process facilitates the adoption decision in innovation through the evaluation of external knowledge identified by the firm; and the evaluation process comprises interpreting activities performed by firms' key individuals, especially managers, on a group basis.*

³⁶ Similar result has also been obtained by Rezaei (2013: 262). According to him, innovation adoption decisions are made between top managers only. However, finding in this research suggests otherwise. As revealed in chapter 6, the adoption decisions regarding certain less significant innovation projects are actually made by employees themselves.

Taken together, propositions 1a and 1b suggest the *initiation* and *adoption decision* in innovation adoption process are facilitated by exploratory learning process³⁷. These propositions confirm factors in the theoretical model developed in Chapter 3.

7.2.2 Relationship between Transformative and Exploitative Learning Processes and Implementation in IAP

As proposed in Chapter 3, the implementation stage of innovation adoption is facilitated by both transformative and exploitative learning processes. In the following section, the relationships between each of these two learning processes and the implementation stage of IAP will be elaborated respectively.

7.2.2.1 Relationship between Transformative Learning Process and Implementation in IAP

As demonstrated in section 3.5.1, the transformative learning process enables the integration of valuable external knowledge into firms' existing knowledge during innovation adoptions. Additionally, it also enables the development of shared understanding regarding knowledge that is newly integrated, along with its subsequent dissemination, in organisations (Lane, Koka

³⁷ As explained in footnotes 32 and 33, despite that this research agrees with the overall correlation between exploratory learning process and the initiation and adoption decisions as proposed by Rezaei (2013), details proposed in this study differ significantly from the latter. This phenomenon can be explained through comparing the differences regarding key features associated with innovations in these two studies. The case firms in Rezaei (2013)'s study are selected from the pharmaceutical industry in Iran. As revealed by the author, from the manufacturing perspective, high volume low variety is one of the key features associated with innovations (the production of new drugs) implemented in these firms (Rezaei, 2013). Additionally, given knowledge required in delivering new drugs in the pharmaceutical industry is often specialised, innovations in these case firms are mainly developed by its R&D personnel (Rezaei, 2013). In contrast, the key features associated with innovations implemented in case firms regarding this research are fundamentally different from these as revealed in Rezaei (2013)'s study. As demonstrated in this study, innovations implemented in case firms are, from the manufacturing perspective, low volume high variety, which often requires employees to work on the modification of existing designs. However, given the knowledge and information required in enabling these modifications are, in most cases, not too distanced from employees existing cognitive schema, the development of innovations in case firms are not limited to the R&D personnel only.

and Pathak, 2006; Marsh and Stock, 2006; Sun and Anderson, 2012). As suggested by Sun and Anderson (2012:39) “*this learning process requires interaction between individuals at the group/organisational level*”.

As revealed in this research, the integration along with the development of shared understanding regarding the applications of newly acquired knowledge are predominantly achieved, by key individuals involved initially in firms’ innovation adoptions. The transformative learning process occurs at this stage, and it is quite similar to the *integrating* process in organisational learning as proposed by Crossan, Lane and White (1999). As observed by Crossan and colleagues (1999:528) the *integrating* process entails the “*development of shared understanding and the taking of coordinated action by members of a workgroup*”. It is also revealed, in this research, that there are two distinguished ways for the transformative learning process to take place at individual level. The first one is quite straightforward. In this case, the external knowledge acquired is closely related to employees’ existing knowledge structure, thus can be easily integrated by them. In contrast, the second one is slightly more complicated. In this case, knowledge that needs to be integrated is relatively distanced from employees’ existing knowledge structure. Thus, new practices have to be developed by employees and firms to adapt for the integration of such knowledge. These findings resemble the argument contended by Todorova and Durisin (2009).

As suggested by Todorova and Durisin (2009), who draw from the arguments developed by Marshall (1995), the integration of new knowledge or ideas by individuals can be achieved through either of the following two processes, namely *assimilation* and *transformation*. According to Todorova and Durisin (2009:778), *assimilation* refers to situations where new knowledge fits well with employees’ existing cognitive schema, therefore, only limited alteration is required regarding this new knowledge or ideas so as to achieve their integration. Whilst *transformation* represents an alternative process to *assimilation*. As suggested by

academics, it happens in situations where knowledge acquired “*cannot realistically be altered to fit the existing knowledge structures*” (Marshall, 1995; Todorova and Durisin, 2009)³⁸. In these cases, individuals have to transform their cognitive structures to adapt to the integration of the new knowledge. These discussions suggest the following:

Proposition 2a: *transformative learning process, firstly, facilitates the initial stage of implementation in innovation adoption process through enabling the integration and the development of shared understanding, regarding external knowledge newly acquired by key individuals; and it significantly resembles the integrating process in organisational learning at this stage.*

Subsequently, as the transformative learning process progresses, knowledge is integrated, along with the shared understanding developed regarding such knowledge, and is then disseminated to corresponding departments by firms’ key individuals. As demonstrated in Chapter 6, various channels have been developed in these case firms to facilitate the dissemination, along with the subsequent preparation for its exploitation in organisations. This finding reconciles with the argument proposed by Lane, Koka and Pathak (2006), Marsh and Stock (2006), Litchenthaler (2009) and Sun and Anderson (2012). As revealed by these authors, in addition to knowledge integration, the transformative learning process, as a process linking exploratory and exploitative learning processes, also serves the purpose of knowledge retention and the preparation for its exploitation in organisations (Lane, Koka and Pathak, 2006;

³⁸ This argument is also echoed by Rezaei (2013). However, instead of providing details regarding how the knowledge transformation occurs at this stage, the author simply proposed that it is firm’s transformative capability that played a key role in enabling the knowledge transformation in innovations (Rezaei, 2013: 263). This is quite problematic as the author failed to explain: firstly, what exactly the transformative capability is; and, secondly, how it enabled the knowledge transformation from individual to group and eventually organisational level during the implementation stage of innovation.

Marsh and Stock, 2006; Litchenthaler, 2009; Sun and Anderson, 2012). These discussions suggest the following:

Proposition 2b: *the transformative learning process, then, facilitates the latter stage of implementation in innovation adoption process through enabling the dissimilation and integration of new knowledge at organisational level.*

7.2.2.2 Relationship between Exploitative Learning Process and Implementation in IAP

The exploitative learning process enables the commercialisation regarding knowledge newly integrated by organisations (Lane, Koka and Pathak, 2006; Litchenthaler, 2009). Additionally, as revealed in previous studies, this learning process occurs, following the transformative learning process, to ensure the exploitation of new knowledge in the final stage of innovation implementation (Sun and Anderson, 2012).

As contended by Lane et al., (2006) and Sun and Anderson (2010:145), in their endeavours to establish the linkage between AC and the *4I* Organisational Learning frameworks proposed by Crossan, Lane and White (1999), exploitative learning process is closely linked to the process of *institutionalising* in Organisational Learning. As observed by Crossan and colleagues (1999, p530), *institutionalising* is “a means for organisations to leverage the learning of the individual members” to the organisational level, in order to facilitate its systematic application in organisations.

Findings in this research resonate with this argument. As revealed in Chapter 6, in the transformative learning process, knowledge initially integrated by key individuals is then codified (i.e., design/operational manuals) and standardised (i.e., technique standards) to facilitate its dissimilation, integration, and its subsequent exploitation in organisations.

Moreover, as demonstrated in Chapter 6, in the final stage of innovation implementation, routines and standards are also developed and executed to guarantee the consistency of the exploitation of knowledge by organisations. These discussions suggest:

Proposition 2c: *exploitative learning process facilitates the final stage of the implementation in innovation adoption process through the process of routinisation and standardisation in manufacturing processes; and this learning process resembles the institutionalising in organisational learning.*

Overall, by referring to propositions 2a, 2b and 2c, the *implementation* in innovation adoption process is facilitated by both the transformative and exploitative learning processes. These propositions also confirm factors in the theoretical model.

7.3 Relationship between Senior Managers'³⁹ Ambidextrous Leadership and Absorptive Capacity

Based on the findings in this research, the overall relationship between firms' Senior Managers Ambidextrous Leadership (SMAL) and the AC learning process in innovation adoption as proposed in Chapter 3, is supported. Similarly, the relationship proposed in the theoretical model, exploratory learning process is generally facilitated by senior managers' *opening* behaviours, and exploitative learning process is promoted by senior managers' *closing* behaviours. However, also revealed in Chapters 5 and 6, the transformative learning process is

³⁹ As clarified in Chapter 3, in this research, the term senior managers used refers to both General Managers and Departmental Managers.

supported by a combination of General Managers' (GM) *closing* behaviours and Departmental Managers' (DM) *opening* behaviours.

Moreover, this research also revealed that, leader behaviours demonstrated by firms' senior managers in facilitating corresponding learning processes varies, albeit not to a great extent, amongst these firms. The discussion regarding these peculiarities will be provided in detail in each of the following subsections.

Additionally, it revealed in all case firms that, GMs and DMs are significantly different with regard to their managerial focuses. Leader behaviours demonstrated by the former are more strategically-oriented, whilst in the latter, are more operationally-focused. Thus, as summarised in Chapter 6, Ambidextrous Leader behaviours exhibited by GMs and DMs, along with their influence, regarding the Absorptive Capacity in innovation adoptions, varies. However, in order to avoid unnecessary repetition, this point will only be addressed in the following discussions if the threat of substantial ambiguity is imminent.

7.3.1 Relationship between SMAL and Exploratory Learning Process

As elaborated upon in section 3.5.1, exploratory learning process facilitates knowledge exploration in innovation adoptions (Jansen, Van Den Bosch and Volberda, 2006; Lane, Koka, and Pathak, 2006; Litchenthaler, 2009; Sun and Anderson, 2012). Additionally, this learning process resembles the generation of creative ideas (*creativity*) in innovation (e.g. Amabile et al., 2004; Berson et al., 2006). Subsequently, extrapolating the argument that learning activities that are aimed at the generation of creative ideas (*creativity*) in innovations are mainly supported by *opening* leader behaviours (Rosing, Frese and Bausch, 2011), in Chapter 3, the exploratory learning process in firms' innovation adoption is proposed to be positively influenced by the *opening* behaviours exhibited by senior managers.

Findings in this research support this point. It is revealed in chapters 5 and 6, that by adopting *opening* behaviours, (i.e., giving room for independent thinking and permission to do things differently) senior managers create an innovation-friendly context to support the exploratory learning in innovation adoption process. This finding resonates with the argument proposed by Amabile et al., (2004). As suggested by the authors, it is not “*only individuals’ characteristics*” but also “*the work environment that they perceive around them*” that plays a decisive role in determining individual willingness in generating creative ideas(Amabile et al., 2004, p.5-6). Moreover, as revealed in previous research, the existence or absence of the innovation-friendly context in organisations is largely as a result of managerial decisions

Proposition 3a: *opening behaviours demonstrated by firms’ senior managers facilitate the exploratory learning process in innovation adoption through creating innovation-friendly contexts.*

Moreover, as revealed by Berson et al (2006) and Koestler (1969), in order for creative ideas to be generated by individuals, valuable insights regarding the novel connection between past patterns and external knowledge has to be intuitively established by them. In other words, individuals’ capability in engaging exploratory learning is also affected by their knowledge reserve (Zahra and George 2002; Minbaeve, 2007; Woodman, Sawyer and Griffin, 1993). Findings from this research resonate with these arguments. As revealed in Chapters 5 and 6, in order to enhance employees’ capabilities in engaging exploratory learning in innovation adoptions, departmental managers actually, routinely organise job-related training.

However, as suggested by Rosing and colleagues (2011), *routinisation* is a typical *closing* leader behaviour, which is supposed to be closely related to exploitation rather than exploration in innovation process. Nevertheless, by referring to examples of *opening* and *closing* leader

behaviours provided by Rosing, Frese and Bausch (2011) (section 2.4.1, **Table 2-2**), it is reasonable to argue the term routinisation as used by the authors to imply the routinisation of operations-related activities. In this sense, routinisation indeed serves the purpose of variance reduction. But, the routinisation of training adopted by department managers in case firms is another issue. In fact, as revealed in the findings, routinisation of training is deliberately adopted by department managers to enhance their employees' capabilities when engaging exploratory learning. Thus, following the logic used by Rosing and colleagues (2011), since the routinisation of training enables knowledge exploration, it should be considered fundamentally as an *opening* behaviour. Therefore, in this research, routinisation of training is defined as an *opening* leader behaviour. However, given that the purpose of this research is to explore the relationship between senior managers' Ambidextrous Leadership and organisational innovation, this point will not be further explored. These discussions suggest:

Proposition 3b: *Departmental Managers opening behaviour can significantly enhance employees' capabilities when engaging with the exploratory learning process in innovation adoption.*

Overall, propositions 3a and 3b suggest the exploratory learning process in innovation adoptions is facilitated mainly by senior managers' *opening* behaviours.

7.3.2 Relationship between SMAL and Transformative Learning

As demonstrated in Chapter 3, transformative learning process links the exploratory and exploitative learning process in innovation. In Chapter 3 it is proposed that this learning process serves the purposes for knowledge integration and retention along with its preparation for exploitation in organisations (Lichtenthaler, 2009:825). Therefore, the key feature of learning

activities performed in this process, should be variance reduction, rather than, variance increase. Inspired by the argument that variance reduction (exploitation) learning activities in innovations are mainly supported by *closing* leader behaviours (Bledow, Frese and Muller, 2011; Rosing, Frese and Bausch, 2011), this study suggested this learning process will be facilitated by the *closing* leader behaviours demonstrated by firms' senior managers (section 3.5.3).

However, as revealed in this research, in addition to exploitation, exploration learning activities have also been performed by employees in the transformative learning process. Moreover, as summarised in Chapter 6, findings indicated both *opening* and *closing* behaviours are adopted by firms' senior managers, to facilitate learning activities in this process.

As demonstrated in Chapter 6, the integration and development of shared understanding regarding knowledge externally acquired, in this learning process, are initially achieved by key individuals in innovation project groups. Moreover, in all case firms', the development of shared understanding regarding knowledge externally acquired is achieved by employees through exploration activities (e.g. trial and error, experimentation, and collegial discussions) performed in transformative learning process in innovation adoptions.

As revealed in previous research, these learning activities performed in transformative learning process are variance increase rather than reduction in nature (Sheremata, 2000; Berson et al., 2006). Thus, they are better supported by managerial behaviours emphasising support rather than control (Sheremata, 2000; Gebert et al., 2010). However, it is also suggested that, since speed/efficiency regarding the development of shared understanding of external knowledge, along with its subsequent dissemination in organisations, matters significantly in innovations, managerial behaviours emphasising discipline and control can also positively influence this learning process (Khazanchi et al., 2006; Lewis et al., 2002; Sun and Anderson, 2012).

Findings in this research resonate with both of these complementary views. As revealed in this research, both *opening* and *closing* behaviours are adopted by firms' senior managers, to facilitate the transformative learning process in innovation adoptions. Moreover, it is revealed that the development of shared understanding, regarding external knowledge acquired, is predominantly facilitated by *opening* behaviours (e.g. encourage learning from errors, give space for independent thinking) adopted by departmental managers. Whilst the speed/efficiency issue regarding knowledge integration and dissemination are addressed by *closing* behaviours (e.g. monitoring the progress) are adopted mainly by General Managers. Moreover, also revealed in Chapter 6, general managers' engagement in this learning process is quite limited, and they just monitor the progress through listening to departmental managers reports.

These discussions suggest:

Proposition 4a: *transformative learning process in firms' innovation adoptions is facilitated by both General Managers' closing behaviours and Departmental Managers' opening behaviours;*

Proposition 4b: *opening behaviours adopted by Departmental Managers facilitate the development of shared understanding regarding external knowledge acquired in this process; whilst closing behaviours adopted by General Managers enhanced the speed of knowledge integration and dissemination in this process.*

Overall, propositions 4a and 4b suggest transformative learning process is facilitated by both *opening* and *closing* behaviours demonstrated by Departmental Managers and General Managers respectively.

7.3.3 Relationship between SMAL and Exploitative Learning Process

As demonstrated in Chapter 3, the exploitative learning process corroborates with the exploitation of knowledge integrated in firms' innovations (Lane, Koka, and Pathak, 2006; Todorova and Durisin, 2007; Lichtenthaler, 2009; Sun and Anderson, 2010, 2012). Therefore, given this learning process is explicitly linked with the *implementation* process in innovation adoption, it is proposed that this specific learning process will be positively influenced by *closing* behaviours demonstrated by firms' senior managers.

Findings in this research support this point. As demonstrated in Chapter 6, in exploitative learning process, managers' attentions are devoted to issues such as efficiency in knowledge exploitation. Subsequently, in all case firms, GMs and DMs opted to closing leader behaviours to address such issues in this learning process. This finding is in line with the argument that managerial behaviours, emphasising control and discipline, can positively influence efficiency regarding knowledge exploitation in innovations (Bernner and Tushman, 2003; Bledow, Frese and Muller, 2011; Jansen et al., 2005; Sheremata, 2000).

Additionally, as revealed in previous research, knowledge exploitation in innovation processes can be effectively facilitated through processes such as routinisation and standardisation in firms' operations (Gebauer et al., 2012; Jansen et al., 2005; Van den Bosch et al., 1999). In a similar vein, findings in this research revealed that routinisation is the predominant way adopted by DMs to enhance the efficiency in knowledge exploitation in exploitative learning process. Whilst standardisation is the approach employed by DMs to maintain consistency with regard to their employees' performances in this process. Moreover, as demonstrated in Chapter 6, firms' departmental managers adopted *closing* behaviours to supervise and reinforce employees' compliance regarding routines and standards developed to facilitate the delivery of innovation outcomes.

Furthermore, it also revealed that, similarly to the phenomenon discussed in the transformative learning process, in all case firms, GMs engagement in exploitative learning process are quite limited. Therefore, these findings suggest:

Proposition 5a: *exploitative learning process is facilitated by senior managers' closing behaviours;*

Proposition 5b: *during the exploitative learning process, employees' efficiency and consistency in knowledge exploitation are mainly facilitated by departmental managers closing behaviour such as developing standards for manufacturing and operating procedures.*

Overall, propositions 5a and 5b confirm the factors in theoretical model.

7.4 Emerging Managerial Factors Identified

Also revealed in this research, apart from SMAL, that there are other managerial factors (see details in section 6.3.1) that facilitate the AC learning processes in innovation adoption. In this section, these factors, along with their impact regarding corresponding learning processes in innovation, will be discussed.

7.4.1 GM's Vision

As revealed from Senge (1997), through envisaging a vision for the organisation, senior managers' can provide their employees *a coherent picture of the future of the organisation, a*

clear reason for wanting to reach this goal, and the core values needed to achieve it (Senge, 1997, p.51). Additionally, as proposed in previous studies, providing a vision can also significantly align employees' activities along with their effectiveness in innovations (Berson et al., 2006; Bledow et al., 2009; Conger and Kanungo, 1998; De jong and Den Hartog, 2007; Kantabutra and Avery, 2010). However, despite the importance of vision to organisations' innovation performance being largely agreed by academics, researchers often disagree with each other regarding its impact to the firms' innovations in details.

For instance, Brown and Eisenhardt (1995) identified that, thorough providing a clear vision to their employees, senior managers can effectively promote the innovation performances within organisations. In other words, the authors suggest vision affects both *creativity* and *implementation* in innovations.

In contrast, Sosik and his colleagues (1998) suggested that, in a laboratory experiment, providing a vision can significantly enhance participants' exploratory learning on brainstorming task. (Sosik, Kahai, and Avolio, 1998). This argument is further echoed by De jong and Den Hartog (2007). As revealed by the authors, once clearly communicated, senior managers' vision can effectively facilitate employees' creativity in innovations (De jong and Den Hartog, 2007, p.58).

Similar results have also been obtain by academics such as Amabile, (2004), Berson et al., (2006) and Jansen et al., (2006). As suggested by these authors, in the context of innovations, a clearly communicated vision by senior management team within organisations can provide both guidance and support for its employees to engage knowledge explorations, along with the subsequent generation of creative ideas by them (Amabile, 2004; Berson et al., 2006; Jansen et al., 2006).

Findings in this research resonate the argument proposed the latter group of authors. As demonstrated in section 6.2.1, GMs' vision regarding the importance of innovation to

organisations significantly influence the development of an innovation-friendly environment/culture, and thus the effectiveness in innovations, within organisations. More specifically, although not explicitly addressed by interviewees during data collection, findings suggest, once clearly expressed, GMs' visions can effectively guide and promote employees' endeavour in engaging with knowledge exploration in innovation adoption. Therefore, these findings suggest:

Proposition 6: *General Managers' visions facilitate the exploratory learning processes in innovation adoption through specifying directions for employees in knowledge exploration.*

7.4.2 DMs' Trust

Previous studies suggested that managers' trust can positively influence individuals' *creativity* in the processes of innovations (Amabile et al., 2004; Pelz and Andrews, 1976). As explained by academics such as, Ghoshal and Bartlett (1994) and Oldham and Cummings (1996), managers' trust toward their employees can significantly facilitate the development of a perceived supportive environment for employees within organisations. In the context of organisational innovations, the existence of a perceived supportive environment within organisation often results in an increase of employees' willingness to engage knowledge exploration in the processes of innovations (Lewis et al., 2002; McGrath, 2001)

In similar vein, empirical studies also suggested that managers' behaviours, such as giving authority and trust to their subordinates in innovation can positively enhance the latter's performances in generating creative ideas during the innovation process (Axtellet al., 2000; Frischer, 1993; Judge et al., 1997; Krause 2004; Nijhof et al., 2002; West and Wallace, 1992).

Findings in this research resonate with these arguments. As demonstrated in section 6.3.2, DMs' trust significantly enhanced their employees' willingness in engaging exploratory learning in firms' innovations.

Moreover, as revealed from the interviews, DMs' trust towards their subordinates are based on the capabilities and historical performances demonstrated by the latter in previous innovation projects. This specific finding echoed the definition of trust as proposed by academics such as Mayer et al., (1995) and McKnight et al., (1998). As posited by these authors, trust is the positive expectations individuals have about the competence, reliability of organisational members (Mayer, Davis, and Schoorman, 1995; McKnight, Cummings, and Chervany, 1998). Additionally, findings in this research further suggest that the transformative learning process, which serves the purpose for knowledge integration and preparation for its further exploitation, in innovations is also enhanced by DMs' trust (see details in section 6.3.2). As revealed in section 6.3.2, in all case firms, the integration of external knowledge absorbed in innovations are mainly achieved through activities such as industrial experiments and trails and errors. As suggested by interviewees (see sections 5.2.3.2, 5.3.3.2 and 5.4.3.2), though not explicitly expressed, employees' often perceive DMs' trust warrant a certain level of sanction for them against possible negative outcomes from these activities. In turn, this perceived sanction further enhanced employees' willingness in engaging industrial experiments and trails and errors in transformative learning process.

These findings suggests:

Proposition 7: *Departmental Managers' trust can positively influence their employees' effectiveness and willingness in engaging both the exploratory and transformative learning processes in innovation adoptions*

7.5 Revised Theoretical Framework

Based on propositions developed in preceding discussions, the original theoretical model (section 3.5.3) proposed is modified, as shown in the following **Figure 7-1**.

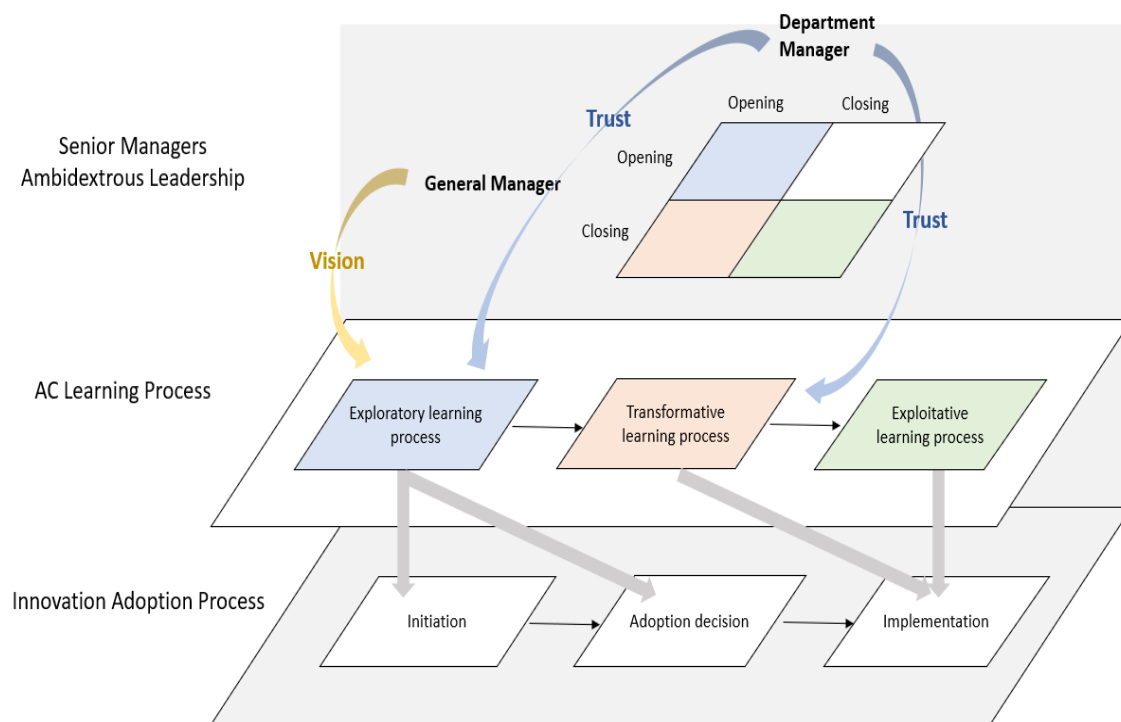


Figure 7- 1 Revised Theoretical Model

As demonstrated in the revised theoretical model, this study proposes an integrative relationship between the SMAL, the AC and IAP in organisations.

As proposed in the model, the exploration and evaluation of external knowledge in the first two stages of IAP are facilitated by the exploratory learning in organisations. Moreover, in this learning process, knowledge exploration is carried out by firms' key individuals through using their own knowledge and experience. Whilst the evaluation of valuable external knowledge is identified, it is achieved through the group-level decision-making process.

Subsequently, the implementation stage of innovation adoption is facilitated by both transformative and exploitative learning processes, although in different ways. The transformative learning process enables the integration along with the subsequent dissemination of knowledge that required for firm's innovations. Whilst, the exploitative learning process enables the systematic exploitation of these knowledge by employees in the firm.

Furthermore, the AC learning processes in firms' innovation adoption is influenced by the senior managers' Ambidextrous Leadership. Similar to relationships proposed in the original theoretical model, the revised model suggests the exploratory learning process is mainly facilitated by *opening* behaviours demonstrated by senior managers, and the exploitative learning process is supported by their adopted *closing* behaviours. Whilst, in contrast to the relationship proposed in Chapter 3, which suggests that the transformative learning process is facilitated solely by senior managers *closing* behaviours, the revised framework suggests that senior managers must demonstrate both *opening* and *closing* behaviours to facilitate this specific learning process in innovation adoptions.

Moreover, as demonstrated in **Figure 7-1**, based on findings in this research, two new managerial factors, along with their impact on the AC learning process in innovation adoptions are included in the revised theoretical framework. The first factor is the GMs' vision, which is a key determinant regarding the development of innovation strategies in organisations. Findings suggest a clearly communicated vision facilitates the exploratory learning process in innovation adoptions through guiding and promoting employees' endeavours in conducting knowledge explorations. The second factor is departmental managers' trust, regarding their employees, which positively influences knowledge exploration in both exploratory and transformative learning processes, in innovation adoption.

Taken together, the revised theoretical framework suggests the AC learning process influences the innovation adoption process through enabling the recognition, evaluation, integration and application of external knowledge in that process. Moreover, the AC learning process is facilitated by senior managers' ambidextrous leadership. The exploratory learning process is facilitated by mainly *opening* behaviours demonstrated by senior managers, and the exploitative learning process is supported by senior managers' *closing* behaviours. Whereas, in order to facilitate the knowledge integration and dissemination in transformative learning process, both *opening* and *closing* behaviours have to be adopted by senior managers. Additionally, it is also suggested that the GMs' vision can facilitate the exploratory learning process in innovation adoption. Whilst Departmental Managers' trust towards their employees positively influences both exploratory and transformative learning processes in innovation adoptions.

7.6 Conclusion

In this chapter, the theoretical framework proposed in Chapter 3 is revised in light of empirical findings in this research.

In this research, the relationship between IAP and AC in organisations is revealed. Moreover, this research verifies that different stages of the innovation adoption process are influenced by its own corresponding learning processes.

Additionally, it is revealed in this chapter that in firms' innovation adoptions, the exploratory learning process is predominantly supported by senior managers' *opening* behaviours, and the exploitative learning process is facilitated by senior managers' *closing* behaviours. In contrast, the transformative learning process in innovation adoption is facilitated by a combination of both *opening* and *closing* behaviours demonstrated by firms' General and Departmental

Managers respectively. It is also worth noting that, the selective adoption of closing behaviours by firms' senior managers can also positively influence the exploratory learning process in innovation adoption, albeit indirectly. However, given behaviours demonstrated by senior managers in facilitating exploration learning process are predominantly *opening*, their occasionally adoption of *closing* behaviours in this process is not specified in the revised theoretical model.

Furthermore, two emerging managerial factors identified in this research, namely, GMs' vision and DMs' trust, are introduced into the revised theoretical model. As demonstrated in the revised model, the former can significantly enhance the exploratory learning process, whilst the latter facilitates both exploratory and transformative learning processes in firms' innovations.

Finally, it reveals that due to the difference between the General Managers and Departmental Managers regarding their managerial focuses, the influence of the former diminishes as the learning process progresses from exploratory to exploitative in innovation adoption. On the contrary, the influence of Departmental Managers increases as the process progresses.

CHAPTER 8 CONCLUSION

8.1 Introduction

The aim of this chapter is to recapitulate the overall research process of this study. The following part of this chapter is organised as follows: firstly, a research summary will be provided, restating the structure of the thesis, along with the key points in each of the preceding chapters; then, contributions to current knowledge and the managerial applications that have been derived from this research will be presented in section 8.3; In the subsequent section, key limitations of this research will be specified, along with the provision of suggestions regarding the potential direction of any future research. Finally, a conclusion will be given, summarising the key findings of the research and its value.

8.2 Research Summary

This research set out to explore the relationship between senior managers' ambidextrous leadership and innovation adoption in organisations.

Chapter 1 covers the introductory section of this research. This chapter outlines the research rationale, along with questions and objectives that are initially explained. Subsequently the research approach that is adopted along with its selected context are elaborated upon. Finally, the overall thesis structure is specified.

Chapter 2 provides a critical review regarding extant literatures. It reveals that, despite the proliferation of innovation-related studies, a universally accepted definition of innovation is yet to be developed. Moreover, it also observes that due to the dominance of the outcome view,

the empirical results generated from the field of innovation studies are now extremely fragmented, and sometimes even beyond interpretation (Anderson et al., 2014). Thus, in order to more effectively contribute to the accumulation of knowledge in innovation studies, this research adopted the process view of innovation. The constituent elements and ambidexterity that were identified in innovation processes are then discussed. Subsequently, the relationship between Transformational and Transactional leaderships and innovation are reviewed. In light of the insufficiency regarding Transformational and Transactional leaderships in facilitating innovation, the concept of Ambidextrous Leadership is then introduced. The integrative AL-innovation model proposed by Rosing et al., (2011) is also presented. It reveals that, despite being an evolving concept, the value and effectiveness of Ambidextrous Leadership has already been proved by empirical findings, albeit in a quite limited scale. Moreover, it reveals, given limited empirical studies conducted using this construct along with the AL-innovation model that the full potential of AL is yet to be explored. Therefore, in order to address the identified deficiencies, this research proposes further exploration of the relationship between senior managers' Ambidextrous Leadership and organisational innovations.

Chapter 3 proposes the theoretical model, along with the definitions of three relevant terms used in this study. In order to identify an organisational learning process that properly addresses the complexity of learning activities associated with organisational innovation, relevant literature is examined. An argument is provided, suggesting the incorporation of AC learning process model into the theoretical model. Then, two generic innovation process models, namely innovation adoption and generation process models, are introduced. The key features associated with these models are discussed and contrasted first. Then, the rationale for incorporating innovation adoption process into the theoretical model is provided, arguing it can accurately accommodate the reality that, in most organisations, innovations are developed through learning from the external environment. In the section follows, the overall theoretical

model proposed is presented, indicating senior managers' Ambidextrous Leadership can facilitate organisational innovation through learning.

Chapter 4 is dedicated to the clarification of the methodological consideration in this research. In this chapter, different categories of research ontologies and epistemologies are firstly critically reviewed. Then the ontological and epistemological stance taken in this study is clarified. This research uses constructivism ontology and interpretivism epistemology. Subsequently, this study adopts a qualitative research approach and the case study research method. Moreover, research protocol is developed to guide the data collection in this research. In this research, data are collected through consulting mainly the following three sources, including: interviewees, company internal documents and observations of operations during the fieldwork. This is so the internal validity of the data collected can be enhanced. Additionally, the consultation of different data sources also enabled this research to achieve an in-depth understanding regarding the social phenomena under investigation. In total, 37 interviews were conducted in this research, each with an average length of about 1 and a half hours. Data collected are then analysed through using a thematic analysis, and data was coded through the use of software Nvivo 11.

The with-in case analysis and cross case findings of this research are presented in Chapters 5 and 6 respectively. In Chapter 5, the analysis is conducted in each case firm respectively. In the chapter follows (Chapter 6), findings from all three case firms are compared, in order that the overall pattern regarding the relationship amongst the three constructs might emerge. Additionally, this pattern matching process also enabled theoretical saturation to be achieved. In Chapter 7, the theoretical framework proposed in Chapter 3 is revised in light of the cross-case findings identified in Chapter 6. Moreover, propositions were posited to elaborate the details regarding specific ways in which these key constructs are correlated. The development

of these propositions is achieved through comparing and contrasting findings in this research with extant literature.

In this study, details regarding how senior managers' ambidextrous leadership facilitates the innovation adoption in organisations are explored. It reveals, senior managers' Ambidextrous Leadership facilitates innovation adoptions in organisations through the AC learning process. More specifically, the exploratory learning and exploitative learning processes in innovation adoption are facilitated by the *opening* and *closing* behaviours adopted respectively by firms' senior managers. Whilst, the transformative learning process in innovation adoption is facilitated through the combination of General Managers' *closing* behaviour and Departmental Managers' *opening* behaviours. Moreover, the findings in the research also suggest the significance regarding General Managers' (GM) influence in the AC learning process diminishes as it progresses from exploratory to transformative, and, eventually exploitative learning. In contrast, the significance of departmental managers' influence in the AC learning process increases as it advances. Additionally, findings in this research also revealed, in addition to ambidextrous leadership, General Managers' vision and departmental managers' trust also considerably influence the AC learning process in innovation adoption. As revealed in this study, the former guides and promotes employees' endeavours when engaging knowledge exploration, whilst the latter facilitates both the exploratory and transformative learning processes in innovation adoption.

8.3 Contributions to Knowledge and Managerial Implications

The outcomes of this research are stated in the form of future testable propositions leading up to the contributions covering the following two aspects:

8.3.1 Contributions to Knowledge

As demonstrated in Chapter 2 (section 2.5), despite Rosing and colleagues (2011) explicitly suggested that managers' ambidextrous leadership facilitates innovation through those learning processes that underlie it, the authors did not provide details regarding how these constructs are correlated. Moreover, despite the authors explicitly emphasising the significance regarding the construct of AL in organisational level innovations, they did not provide a comprehensive model explaining the correlation between AL and organisational innovations.

Thus, this study contributes to the innovation management literature by proposing an integrative theoretical model (as shown in **Figure 7-1**, section 7.5) explaining the relationship between Ambidextrous Leadership (AL), the AC learning process, and Innovation adoption in organisations. Based on the theoretical model developed, this research proposes to claim the following theoretical contributions:

Firstly, the theoretical model proposed in this research is the first theoretical model that comprehensively explains the how senior managers' AL can facilitate organisational through the perspective of learning. Moreover, as proposed in the theoretical model, it is the General and Department managers' opening leader behaviours that facilitate the exploratory learning process associated with the initiation and adoption decision stages in organisational innovation. Whereas, it is the combination of General Manager's closing and Department managers' opening leader behaviours that facilitate the transformative learning process associated with the early phase of the implementation stage in organisational innovation. Additionally, it is the General and Department managers' closing leader behaviours that enables the exploitative learning process associated with the later phase of the implementation stage in organisational innovation.

Moreover, the developed theoretical model provides an integrative analytical lens for academics in the future pursuit of senior managers' AL and its relationship with innovation at organisational level. As revealed in Chapter 2 (section 2.4.1), the original AL-Innovation model proposed by Rosing and her colleagues (2011) is an extremely simple. In fact, this point is even acknowledge by the authors (Rosing, Frese and Bausch, 2011) (see details in section 2.5). In contrast, the development of the theoretical model in this research is inspired by the themes derived from extant literature and validated by data collected from fieldwork. Thus, this integrative model that has been developed provides a solid foundation for innovation management scholars to further develop a more comprehensive AL-Innovation model in future studies.

Furthermore, as suggested by Rosing and her colleagues (2011, p.971), in future Ambidextrous Leadership studies, the complexity associated with innovation processes should be considered. Therefore, through incorporating a more generic innovation process model into the theoretical model, this research also answers the call from the authors. In addition to that, in the field of innovation management, academics often refrain their discussions on innovation process models from a purely theoretical perspective and often without validation. In contrast, through using data collected from field work, this research successfully approved the validity of the Innovation Adoption process model in the context of Heavy Equipment Manufacturing industry in China. This provides some useful thoughts for future innovation management scholars in pursuing their own innovation studies in related industries.

Additionally, through using a case study approach, this research successfully revealed the multi-level nature of the AC learning process in great detail. In so doing, this research provides solid evidence to support the conceptual affinity between the Absorptive Capacity and the Organisational Learning process as proposed in previous research (Lane, Koka and Pathak, 2006; Sun and Anderson, 2010; Vera et al., 2011).

Moreover, although the correlation between AC learning process and organisational innovation has already been pointed in previous studies, empirical evidences that validate this argument are quite limited, with the exception of Sun and Anderson (2012). Thus, by proving the validity of the AC learning process model and its correlations with organisational innovation through using data collected from the Heavy Equipment Manufacturing industry in China, this research significantly contributed to the future development of the learning process view of AC, and its related literature.

This study is also the first empirical study that has analysed the relationship between senior managers' Ambidextrous Leadership and organisational innovations. The results in this research provided evidence supporting the argument that senior managers need to be ambidextrous to effectively facilitate organisational innovation (Bledow et al., 2009a, 2009b; Jansen et al., 2008; Rosing et al., 2011; Tushman et al., 2011).

In addition to the contributions to current knowledge, this research also generates some valuable insights for industrial practitioners.

8.3.2 Contributions to Practice

As revealed in this research, firms' GM are particularly relevant to the development of an innovation-friendly environment in organisations. Therefore, in order to promote innovation in organisations, GM should commit to the development of this environment if it is lacking in those organisations.

Additionally, data in this research also suggests, departmental managers, who are the conduit linking the upper and lower level hierarchy of an organisation, are particularly relevant in enhancing and reinforcing employees' attitude towards learning and innovation. Therefore, in

order for innovations to be effectively facilitated in organisations, departmental managers' must also embrace an innovation-oriented mind-set.

Furthermore, as revealed in this research, due to variances in managerial focuses, in comparison to GMs', the departmental managers are often more closely involved in innovation process. Moreover, given departmental managers are often required to balance employees' innovation endeavours and operational pressures, their capabilities in adopting ambidextrous leadership are particularly relevant in facilitating organisational innovation.

Finally, this research also reveals in this specific industry, that General Managers' *visions* are particularly relevant to firms' innovation performances. Moreover, it also reveals that departmental managers' *trust* towards their employees can also significantly enhance their willingness to actively engage innovation-related activities, and subsequently leads to the overall improvement of organisational innovation performances. Therefore, in order to more effectively facilitate organisational innovations, GM should provide a specified vision so that his/her employees endeavours regarding knowledge exploration might be more focused. Similarly, in order to facilitate employees' willingness to actively engage innovation-related activities, departmental managers should demonstrate certain levels of trust in their employees.

8.4 Limitations and Future Research

Despite the propositions along with the theoretical model that has been developed in this research filling in certain gaps in the existing ambidextrous leadership-innovation studies, there are still some limitations that warrant mention in this research.

Firstly, although sufficient for theory generalisation, the external validity (representativeness and generalisability) of case study research design is often criticised by commentators.

Although the use of multiple cases and cross-case analysis enabled this research to generate some valuable insights and contributions that are generalizable pertaining to Heavy Equipment Manufacturing (HEM) firms based China, they are debatable to other industrial sectors and countries.

Thus, this research recommends further empirical studies to test the generalisability of propositions and theoretical developments in this research through quantitative research designs. Moreover, given that the key feature of organisational innovations in HMM firms from China are intensively application-oriented, this research recommends future empirical study to use data collected from industries where innovations are more R&D oriented.

8.5 Conclusion

This aim of this chapter is to recapitulate the overall research process in this study, in the second section of this chapter, a summary of this thesis is provided to explain how the research objectives identified in Chapter 1, are achieved in this study. Then, contributions to both knowledge and practice generated from this study are presented. This chapter concludes with the limitations associated with this research along with suggestions for future research.

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APPENDIX I INNOVATION PROCESS MODEL

Process of Innovation		
Study	Innovation Generation	Innovation Adoption
Hage and Aiken (1970)	-	Evaluation → initiation → implementation → routinization
Kanter (1988)	Idea generation → coalition building → idea realization →	→ transfer or diffusion
Klein and Sorra (1996)	Research → development → testing → manufacturing → packaging → dissemination	Awareness → selection → adoption → implementation → routinization
Roberts (1998)	Recognition of opportunity → idea formulation → problem solving → prototype solution → commercial development →	→ Technology utilization and/or diffusion
Rogers (1995)	Needs/problems → research (basic and applied) → development → commercialization →	→ Diffusion and adoption
	-	Agenda-setting → matching → redefining/restructuring → clarifying → routinizing
Rothwell and Robertson (1973)	Idea generation → project definition → problem solving → design and development → production → marketing	-
Tornatzky and Fleischer (1990)	Research → development → deployment	Adoption → implementation → routinization
Angle and Van de Ven (2000)	Initiation → development →	→ Implementation/termination
	-	Knowledge awareness → attitudes formation → (adoption) decision → initial implementation → continued-sustained implementation
Damanpour and Wischnevsky (2006)	Recognition of opportunity → research → design → development → deployment →	Initiation → adoption decision → implementation

APPENDIX II Consent From

Interview Consent Form

This aim of this research is to explore the relationship between Senior Managers' Ambidextrous Leadership, Absorptive Capacity learning process and Innovation in organisations. This research is conducted in partial fulfilment of the requirements for PhD degree in University of Birmingham, UK.

By participating into this research, you (interviewee) are agreeing with:

- 1) Participating in this research voluntary
- 2) To be interviewed for the purposes outlined for this research
- 3) Information that you supplied will be collected and retained by the researcher for the purpose of this research only
- 4) Information that you supplied is accessible to the researcher only
- 5) To have the right to stop and withdraw from participating in this research
- 6) To have the right to withdraw information provided to the researcher
- 7) This research is for partial fulfilment of the requirement for a PhD degree

Information collected in this research will be processed by the researcher in accordance with the provisions of Data Protection Act 1998.

Based upon the above, I agree to take part in this study.

Name of participant.....

Date.....

Signature.....

Name of the researcher: Heng Li

Contact information: HXL814@bham.ac.uk

Date.....

Signature.....

Appendix III Coding Books

Construct	Sources	References
Absorptive Capacity Learning process-AC	47	597
Exploratory Learning Process-ACE1	44	388
Identification and acquisition of useful knowledge from external sources-ACE1-1	37	162
Innovation related knowledge and information sharing between colleagues-ACE1-2	23	39
Monitor business environment for valuable new knowledge and information-ACE1-3	40	175
Exploitative Learning process-ACE2	41	99
Applying new knowledge in final innovations-ACE2-1	18	33
Routinisation of process and procedures for knowledge application-ACE2-2	22	38
Standardize new knowledge developed-ACE2-3	17	28
Transformative Learning process-ACT1	29	110
Collegial job related discussion-ACT1-1	13	17
Cross functional collaborations-ACT1-2	8	9
Develop shared understanding regarding new knowledge acquired-ACT1-3	19	34
Interaction and dialogue between key individuals in project teams-ACT1-4	9	11
Modification and integration of new knowledge through trials and errors-ACT1-5	16	37
Ambidextrous Leadership-AL	31	186
Closing leader behaviours-ALC	24	74
Establish routines-ALCE	14	25
Develop operational routines-ALCE-1	6	8

Routinise department managers' job rotations-ALCE-2	5	6
Routinise the provision of opportunity to learn from external experts-ALCE-3	6	7
Routinise the provision of opportunity to learn from internal experts-ALCE-4	4	4
Monitor and control goal attainment-ALCM1	11	17
Impose quality control and monitor deviations-ALCM1-3	8	9
Monitor the promotion of creative ideas-ALCM1-1	1	1
Specify processing procedure in innovation-ALCM1-2	5	6
Monitor progress in tasks-ALCM2	13	23
Emphasise the importance regarding speed in innovation development-ALCM2-1	9	11
Supervise the progress made in innovation process-ALCM2-2	10	11
Take corrective actions-ALCT	5	9
Replace personal-ALCT-1	3	5
Take corrective actions-ALCT-2	3	3
Opening leader behaviours-ALO	30	112
Encourage error learning-ALOE	18	36
Emphasise the importance to learn from mistakes-ALOE-1	12	14
Motivate employees to take limited risk in learning-ALOE-2	4	6
Support trials and experimentations-ALOE-3	6	13
Give possibility for independent thinking-ALOG1	2	2
Encourage independent thinking-ALOG1-1	8	17
Delegation-ALOG1-2	8	10
Provide support in innovation-ALOG1-3	17	29
Give room for new ideas-ALOG2	27	72

Encourage creative thinking-ALOG2-1	8	17
Encourage communications-ALOG2-2	12	13
Openness towards new ideas-ALOG2-3	15	23
Promote innovation friendly environment or culture-ALOG2-4	7	13
Tolerating different ways of doing things-ALOG2-5	1	1
Emerging Managerial Factors-EMF	31	80
Department Managers' Trust-EMFT	18	40
Trust employees with their capabilities in generating creative ideas-EMFT-1	10	18
Trust employees with their capabilities to solve innovation related problems-EMFT-2	14	22
GM's Vision-EMFV	20	40
Have a clear mind for firm's strategic priorities-EMFV-1	7	10
Communicate shared vision within the organisation-EMFV-2	18	29
Innovation Adoption Process-IAP	31	150
Adoption Decisions-IAPA	17	29
Determine the innovation direction-IAPA-1	9	12
Group discussions regarding potential solutions-IAPA-2	10	16
Initiation-IAPI1	20	49
Identify potential innovation options-IAPI1-1	16	33
Search for new opportunities or better solutions-IAPI1-2	10	16
Implementation-IAPI2	24	72
The development of innovation-IAPI2-1	12	16
Experimentation-IAPI2-2	8	16

Final innovation prototype-IAP12-3	6	7
Final production-IAP12-4	16	32

Appendix IV Relationship between AC and IAP-Alpha

Category 1- Exploratory Learning Process related to the Initiation

	Sources	References	Empirical Evidence
CE1→ IAPI1			
ACE1-1→IAPI1-1	10	12	“we use multiple sources, not only knowledge and experiences accumulated here” Correspondent E1D2
ACE1-3→IAPI1-2	4	4	“external information is a major source for our innovations” Correspondent GM1
ACE1-2→IAPI1-1	3	4	“the discussions between colleagues sometimes can be very helpful as well. It is quite possible things that cannot used by you can be quite useful for the others...” Correspondent J1

Category 2- Exploratory Learning Process related to the Adoption Decisions

	Sources	References	Empirical Evidence
ACE1→ IAPA			
ACE1-2→IAPA-2	2	2	“we discussion innovation suggestions on board meetings, the decision making process is executed on collective basis” Correspondent E1D1
ACE1-3→IAPA-1	4	4	“they [as employees] will discuss [information gathered from external environment] firstly. They will not report to us until they are quite certain.....” Correspondent DJ1

Category 3- Transformative Learning Process related to the Implementation

	Sources	References	Empirical Evidence
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ACT1→ IAPI2			
ACT1-1→IAPI2-1	2	2	“the most commonly adopted approach [by our employees] is to ask their colleagues, those who are more experienced ones....if they still cannot work out the problem, we have some experts here as well..... ” Correspondent J1
ACT1-2→IAPI2-3	5	5	“cross-functional collaboration is often required to produce the prototypes” Correspondent DG1
ACT1-5→IAPI2-2	5	8	“if it is necessary, there will be some small experimentations to be conducted to make sure we got things right” Correspondent N1
ACT1-3→IAPI2-1	6	8	“it is quite important for shared understanding to be developed in the team, otherwise there will be no synergy” Correspondent K1
ACT1-4→IAPI2-1	7	8	“the effective collaborations between these key individuals, and sometimes, their department managers, are quite important at this stage” Correspondent DGM1

Category 4- Exploitative Learning Process related to the Implementation

	Sources	References	Empirical Evidence
ACE2→ IAPI2			
ACE2-1→IAPI2-4	5	6	“the application of new knowledge can take many forms, such as in the design, in the quality of the material, or in the function.....it is not always as explicit as in some other industries, it is often embedded in the final products” Correspondent F1
ACE2-2→IAPI2-4	6	6	“we will have our department operational routines developed [by then] to make sure the new way for doing things are followed by them [as employees]” Correspondent E1D1
ACE2-3→IAPI2-4	4	5	“the detailed [manufacturing] standards will be developed....this is a firm, there will be rules to follow” Correspondent DJ1

Appendix V Relationship between SMAL and AC-Alpha

Category 1-Relationship between SMAL and Exploratory learning process

- *Opening* leader behaviours facilitate Exploratory learning process

	Sources	References	Empirical evidence
ALOG2→ ACE1			
ALOG2-1 → ACE1-1	1	1	“In this firm, we encourage employees to learn from external environment ...I believe it is necessary [for innovation]” Correspondent GM1
ALOG2-2 → ACE1-2	2	3	“In fact, the discussion between colleagues is actually a quite effective channel for employees and sometime even us [as managers] to share potentially useful information [that are relevant to innovation]....” Correspondent J1
ALOG2-2 → ACE1-3	4	6	“it is impossible for any individual to say he/she has got all the information or knowledge, there will be always something new, something we don’t know. But you [as an individual] can cover them all, therefore [information] sharing is necessary so that we can know what is going on out there” Correspondent DMG1
ALOG2-3 → ACE1-1	6	6	“As a manager, you must be open-minded. If you yourself cannot be bothered with new ideas, how could your employees to actually do so?” Correspondent E1D2
ALOG2-3 → ACE1-3	3	5	“I would never say things like “that is meaningless” to new ideas that proposed by my employees, no matter how insignificant that is.....I guess this is why they are willing to keep on searing for useful information [for innovations]” Correspondent E1D1
ALOG2-4 → ACE1-1	5	7	“I totally agree with our boss that environment is the key [for innovation]. We reward our employees if they engage in proactive learning [from external knowledge sources] and contribute what they have learned to firm, not only in the form of suggestions regarding innovations, there are other ways as well.....”

			Correspondent G1
ALOG2-4 → ACE1-3	7	9	“The [organisational] environment matters significant, especially for us [as a SOE], I believe one of the reason that we can be so innovative is because of in this firm, we have created an innovation friendly environment for employees, so they are willing to walk the extra miles for the firm.” Correspondent H1
ALOG1→ACE1			
ALOG1-1→ACE1-1	6	6	“we don’t have to intervene regarding the decision making [in cost or efficiency oriented innovations], in most of the time. They [as employees] can make their own choices, and if they are not certain about it, they can always consult those who have more experiences firstly.” Correspondent N1
ALOG1-2→ACE1-1	9	10	“I provide some useful information to them [as employees], but there is no way to guarantee what I provided is definitely the most relevant or appropriate for their job, they have to do their own homework as well” Correspondent J1
ALOG1-2→ACE1-3	6	8	“we [as managers] can’t get involved in everything, we delegate and manage things here, I think that happens to every firm” Correspondent G1

- *Closing* leader behaviours facilitate Exploratory learning process

	Sources	References	Empirical evidence
ALCE→ ACE1			
ALCE-3 → ACE1-1	4	6	“employees need to have some general ideas regarding what is going on outside, otherwise how can they the importance and necessity to learn? Of course, we have some employees who are keen to learn by themselves, but not everyone. And, honestly, they don’t have that much time to learn, this is a factory not university. So, we arrange it for them....periodically” Correspondent J1

ALCE-3 → ACE1-3	6	6	“This is manufacturing industry, we do not come across a lot of totally new things in our daily operations.....And, not everyone in this firm get a lot of opportunities to see what is happening outside the firm. So it is quite normal for people to feel: we are doing just fine, what is the point to learn? That is why we routinize learning for them by inviting experts, even scholars, to teach our employees.” Correspondent E1D1
ALCE-2→ACE1	5	9	“It is quite normal for them[as department managers] to become too narrowly focused, that is I rotate them, so they can expand their horizon and become more open-minded” Correspondent GM1
ALCM1→ACE1			
ALCM1-1 → ACE1	1	1	“For those ideas that I forwards to these managers, I don’t just forward it to them, I check with them, randomly, to see how’s things going. You have to show to your employees, you are not just a talker but a doer. I think this approach works fairly well” Correspondent GM1
ALCT → ACE1			
ALCT-1 → ACE1	1	1	“they [department managers] are conduit, and the key. You have to make sure you got the right person there to execute the plan. But we are SOE, so you can’t expect everyone to share the same mind-set with you. Indeed, there are people who don’t think innovation is important, they think we are just fine.....I’ve replaced one of them, and I will see what to do next for the next year” Correspondent GM1

Category 2-Relationship between SMAL and Transformative learning process

- *Opening leader behaviours facilitate Transformative learning process*

	Sources	References	Empirical evidence
ALOG2→ACT1			
ALOG2-2→ACT1-1	5	6	“I always encourage them to learn from each other. We actually have this tradition for these who are more experienced to be the teacher for these newly recruited. It is quite a effective way for knowledge to be past to them” Correspondent DG1

ALOG1→ ACT1			
ALOG1-3 → ACT1-2	1	1	“in cases when they[as department managers] cannot coordinate things, I will intervene. But if everything is ok, I would prefer to not get too involved. As a General Manager, you should know how to do your job” Correspondent GM1
ALOG1-2 → ACT1-3	5	6	“it is up to our employees after the job is assigned to them. They can then decide how to do it” Correspondent J1
ALOG1-1 → ACT1-3	4	6	<i>“the discussion between colleagues is often the way for finding the solutions. I think it is a common sense, we are all adults, you cannot expect your supervisors to do everything for you, right?”</i> Correspondent DGM1
ALOG1-3 →ACT1-5	3	3	“I’m a leader in one of the innovation projects, so sometimes people do come to me for some suggestions. But there are occasions that even we [as managers] don’t know how to proceed, it happens. In this kind of situations, we will consult experts outside the firm, if necessary” Correspondent E1D2
ALOE→ ACT1			
ALOE-1→ ACT1-4	5	6	“for these major innovation projects, the collaboration of personal between different apartments are often required. There will always be some problems or disagreements in this kind of collaborations. The design personal may just work out something which are too difficult for the processing department to achieve, etc., ...it is basically a iterative process, people who are involved have to communicate again and again, it is quite normal.” Correspondent G1
ALOE-2→ ACT1-5	6	7	“risk is always there[in innovations], cause they are trying to things in new ways. But the key is it has to be manageable.” Correspondent N1
ALOE-3→ ACT1-5	7	8	“it is the standard. Every new type of product we produce, there must several rounds of industrial experiments to be conducted before the finalisation of it. we will modify things based on the results” Correspondent J1

- *Closing* leader behaviours facilitate Transformative learning process

	Sources	References	Empirical Evidence
ALCM2→ACT1			
ALCM2-1→ACT1-3	3	4	“of course time to the market matters, that is why everyone is under pressure. It is good thing, it keeps us going” Correspondent DG1
ALCM2-2→ACT1-3	3	3	“it is my job to check with the progress that been made in these innovation projects. There will be deadlines, and people know that quite clearly, they will not miss it” Correspondent DJ1
ALCM2-2→ACT1-5	1	2	“the progresses made in innovations have to be shown in their work report, so I can how’s things going in the firm. They [as department managers] know it” Correspondent GM1
ALCE→ACT1			
ALCE-4→ACT1-3	4	4	“we routinize this kind of internal meeting for our employees to learn from their colleagues who are more experienced. We also organise internal seminars. The keynote speakers are usually those who are involved in major innovation projects. We ask them to be the teacher” Correspondent J1

Category 3-Relationship between SMAL and Exploitative learning process

- *Closing* leader behaviours related to Exploitative learning process

	Sources	References	Empirical Evidence
ALCE→ACE2			
ALCE-1→ACE2-2	6	8	“the consistency is usually guaranteed through routines” Correspondent E1D1
ALCM1→ACE2			
ALCM1-2→ACE2-1	7	8	“each department will have its own [manufacturing] procedure developed by then, so people are quite clear regarding how to do it” Correspondent DGM1

ALCM1-3→ ACE2-1	7	7	“we have a department to monitor and check.....you have to be sure the standards is always followed” Correspondent GM1
ALCM1-3→ ACE2-3	6	8	“the goals for standardisation are two folds. The first one is for the purpose of application, and the second is for control” Correspondent J1

Appendix VI Relationship between AC and IAP-Beta

Category 1- Exploratory Learning Process related to the Initiation

	Source	Reference	Empirical Evidence
ACE1→ IAPI1			
ACE1-1→IAPI1-1	6	8	“we don’t limit ourselves to this industry.....from my perspective, there are so many sources outside” Correspondent DPJ2
ACE1-2→IAPI1-1	3	4	“sometimes we can even get valuable information from our sales personals” Correspondent HR2
ACE1-3→IAPI1-2	4	4	“we attended conferences, visit other factors, sometimes even universities ” Correspondent PJ2

Category 2- Exploratory Learning Process related to the Adoption Decisions

	Source	Reference	Empirical Evidence
ACE1→ IAPA			
ACE1-2→IAPA-1	2	2	“for major innovation project, it is often decided by us during board meetings....ideas proposed by employees from various levels [of the organisation] will be discussed” Correspondent E2D1
ACE1-2→IAPA-2	3	5	“prior to that, they will work with each other to decide what they are going to propose” Correspondent DGM2

Category 3- Transformative Learning Process related to the Implementation

	Source	Reference	Empirical Evidence
ACT1→ IAPI2			
ACT1-1→IAPI2-1	2	2	“the discussion between colleagues is often the quite effective”

			Correspondent DFD2
ACT1-2→I API2-3	4	6	“we need to work together closely, otherwise, it is going to take forever for us to get the job done” Correspondent PJ2
ACT1-3→I API2-3	3	5	“there will be compromises, we need to be realistic....there is no such a such thing as perfect innovation” Correspondent PJ2
ACT1-4→I API2-1	5	6	“continuous communication is definitely necessary in the [product development] process, you can’t be too narrowly focused” Correspondent E2D1
ACT1-5→ I API2-3	5	8	“thing work in theory may not work in practice, there are so many other factors....you have to do your own work...that is how we are so innovative whilst some others are not..” Correspondent DGM2

Category 4- Exploitative Learning Process related to the Implementation

	Source	Reference	Empirical Evidence
ACE2→ I API2			
ACE2-2→I API2-4	4	4	“we will modify our routines to accommodate these innovations to achieve its actualisation in the final production of our products” Correspondent FD2
ACE2-3→I API2-4	6	6	“for the new product, we will have detailed material processing standers developed prior to the batch production.....they [as manufacturing department] will have their own in their own department as well” Correspondent E2D1

Appendix VII- Relationship between SMAL and AC-Beta

Category 1-Relationship between SMAL and Exploratory learning process

- *Opening* leader behaviours facilitate Exploratory learning process

	Source	Reference	Empirical evidence
ALOG2→ACE1			
ALOG2-1 → ACE1-1	6	8	“When I was the manager in the manufacturing department, I always encourage people to think of the box and learn from outside knowledge sources. And I think they still do it now” Correspondent HR2
ALOG2-2 → ACE1-2	5	9	“from my perspective, [job related] discussions between employees are quite useful, people can learn a lot from each other...it is like a spider web...sometimes it is faster to learn from each other than just learn by yourself, right?” Correspondent E2D1
ALOG2-3 → ACE1-1	8	8	“You have to be open-minded, cause people [employees] are watching you. And you have to show them, explicitly, otherwise, they will not be bothered [to make the effort to learn from external knowledge sources], right? This is a SOE...” Correspondent PJ2
ALOG2-3 → ACE1-3	4	6	“People only do things they believe worthy of doing. If you make them feel you are willing to listen to either the information or suggestions they provide you, they will be more motivated to do it repeatedly. This is my experience in this firm” Correspondent DMG2
ALOG2-4 → ACE1-1	1	1	“It is our culture, and I’m proud of it. I believe it is because of the existence of such culture is the key drive.....it also explains why people are willing to learn and innovate proactively.. Correspondent GM2
ALOG2-4 → ACE1-3	5	7	“As a matter of fact, monitor the external environment [for valuable knowledge sources] is quite a common practice in this firm, even for our sales personals. I think it is in the culture, so people do it unconsciously” Correspondent G2
ALOG1→ACE1			

ALOG1-1→ACE1-1	4	5	“we always group the experienced [employees] with new ones, so the latter can learn from the former regarding why they did it in that way and how they figured out the way for doing it etc., More importantly, this kind of combination sometimes can actually lead to some really good results..... ” Correspondent FD2
ALOG1-2→ACE1-1	3	4	“Usually I tend to not get too involved in these projects. I can do not want to dedicate everything. The truth is, I cannot even I want do so. Actually it is good for them, as by doing these independently, they actually sharpens their skills and improves their capabilities” Correspondent DPJ2
ALOE→ACE1			
ALOE-1→ACE1-1	3	3	“Yes, there were occasions that our employees made some mistakes, but not much. Personally, I think it is ok. As according to my experience, people always learn more from mistakes they made than the success they achieved. Therefore, [in these situations] I just tell them, I believe you, do not worry. Guess what...they all get things right eventually ” Correspondent PJ2

- *Closing* leader behaviours facilitate Exploratory learning process

	Source	Reference	Empirical evidence
ALCE→ ACE1			
ALCE-3 → ACE1-1	4	4	“Indeed, it is a bit challenging for our employees to keep up with the pace regarding the development of knowledge, as they all got a lot to do every day. That is why we invite experts from outside the company to give them seminars. It is a routine, not only for this apartment....from my perspective, it works....” Correspondent E2D1
ALCE-2 → ACE1-3	6	6	“We rotate these managers so that they can know what is happening in other departments, and eventually bring what they learned back to their own department....the benefit for doing this is, they[as department managers] can then pass these knowledge to their employees, so the latter can have a more comprehensive view....” Correspondent GM2
ALCE-2→ACE1	3	3	“In fact, I just got rotated to this department. I think it is quite useful. Because innovation has never been a one-man job, we all have to look the big picture. But how can you know

			where and what to look at if you only have knowledge limited to your own department. So that is why I'm here, to teach them [employees in that department] something, but most importantly, to learn something from them as well" Correspondent DPJ2
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Category 2-Relationship between SMAL and Transformative learning process

- *Opening leader behaviours facilitate Transformative learning process*

	Source	Reference	Empirical evidence
ALOG1→ ACT1			
ALOG1-2 → ACT1-3	6	6	“once we agreed on the target, I will just leave the details to them. To be honest, they are better than me in some details, that is their job.....I'm the manager, I've got many other things to do every day..” Correspondent FD2
ALOG1-3 → ACT1-2	3	4	“in cases when people are not willing to compromise or unable to do so, I will make the judgement call. I'm the coordinator for them.” Correspondent GM2
ALOG1-3 →ACT1-5	3	3	“I'm the mentor. They actually know more than me in details. But I've more experience than them, and I can provide some suggestions when they need, such as how to use it” Correspondent DFD2
ALOG2→ACT1			
ALOG2-2 → ACT1-1	4	6	“we talk to each other every day. If you want, you can definitely pick up something from the others.....I always ask them to share what they have learnt to the others” Correspondent DPJ2
ALOG2-2→ ACT1-4	4	4	“I just told them in the meeting, don't be afraid to make mistakes, the most important thing is you keep on communicating with each other. You cannot say what you suggested is the best, if they cannot follow up, it is their problem.....the key is you have to work with each other, but not against each other” Correspondent PJ2
ALOE→ ACT1			

ALOE1→ ACT1-3	1	1	“as long as we can get everything right before the finalisation of the product, it should be ok” Correspondent E2D1
ALOE-3→ ACT1-5	6	7	“in our department, we have budget to support these [trials and errors] in innovations. Our employees can apply for it if their need it in their project” Correspondent FD2

- *Closing* leader behaviours facilitate Transformative learning process

	Source	Reference	Empirical Evidence
ALCM2→ ACT1			
ALCM2-1→ ACT1-3	2	4	“I would say the faster the better, and I take every opportunity to remind my employees regarding this....I think they have improved” Correspondent DPJ2
ALCM2-2→ ACT1-3	5	8	“in this department we always have timetables for innovation project. It is a reminder for our employees regarding the priorities” Correspondent DFD2
ALCE→ ACT1			
ALCE-4→ ACT1-3	4	6	“from my perspective, for these major projects, the most effective way is internal seminar....we always ask these who are involved in these projects during the early stage to share their experiences with their colleagues ” Correspondent E2D1

Category 3-Relationship between SMAL and Exploitative learning process

- *Closing* leader behaviours facilitate Exploitative learning process

	Source	Reference	Empirical Evidence
ALCE→ ACE2			
ALCE-1→ACE2-2	2	2	“we will develop some operational if it is relatively unfamiliar to us” Correspondent PJ2
ALCM1→ ACE2			
ALCM1-3→ ACE2-1	1	1	“of course we monitor quality [in the final production], it people’s live are at stake”

			Correspondent GM2
ALCM1-2→ ACE2-3	3	5	“before the final production, we will have all details specified, in various form, such as standards for, material processing, manufacturing, and assembly etc.” Correspondent DGM2

Appendix VIII Relationship between AC and IAP-Chi

Category 1- Exploratory Learning Process related to the Initiation

	Source	Reference	Empirical Evidence
ACE1→ IAPI1			
ACE1-2→IAPI1-1	3	5	“Sometimes, knowledge and information provided by these intern students can be quite useful for our employees...” Correspondent E3D1
ACE1-3→IAPI1-1	3	3	“yes, we are experts, there must be something valuable that we do not know, so we have to pay attention to the market” Correspondent PGM3

Category 2- Exploratory Learning Process related to the Adoption Decisions

	Source	Reference	Empirical Evidence
ACE1→ IAPA			
ACE1-2→IAPA-2	2	2	“firstly, we get feedbacks from our product managers....then we will search for solutions...this kind of search are usually fairly focused, as we know what we should be looking for” Correspondent CMD3
ACE1-3→IAPA-1	4	4	“Product-differentiation is the general direction that we follow. But in terms of the finalisation of innovation decisions, we actually have consulted several information channels...” Correspondent GM3

Category 3- Transformative Learning Process related to the Implementation

	Source	Reference	Empirical Evidence
ACT1→ IAPI2			

ACT1-1→IAP12-1	2	2	“these master students are extremely valuable in these innovations.....and our [formal] employees can offer some suggestions from the perspective of practices in this process ” Correspondent E3D1
ACT1-3→IAP12-1	3	5	“we use simulation software for the design....it is like a common language, and it is quite effective for us to communicate in this way” Correspondent DPGM3
ACT1-4→IAP12-2	3	5	“They [as intern students] are quite willing in participating these [experimentations]. It is process of mutual learning between them and our employees” Correspondent E3D1
ACT1-5→IAP12-3	4	4	“it is a iterative process...they [the product design department] give us the design and details, we try to work out what they want. But if we cannot, we will tell them, so they can modify certain details in the design or the manufacturing parameters, then we will do it again....till things are finalised ” Correspondent CMD3

Category 4- Exploitative Learning Process related to the Implementation

	Source	Reference	Empirical Evidence
ACE2→ IAP12			
ACE2-1→IAP12-4	3	5	“the application of knowledge is reflected in the product itself, otherwise it will not be called innovation, isn’t it?” Correspondent PGM3
ACE2-2→IAP12-4	3	3	“routines will be developed in the processing and assembly departments in the final stage to ensure the consistency in the production” Correspondent DGM3
ACE2-3→IAP12-4	2	4	“we will finalise these parameters [in the product design department] first and pass them to the other departments. They will then develop their own standardised procedures in the final production ” Correspondent DPGM3

Appendix IX Relationship between SMAL and AC – Company Chi

Category 1-Relationship between SMAL and Exploratory learning process

- *Opening leader behaviours facilitate Exploratory learning process*

	Source	Reference	Empirical evidence
ALOG2→ACE1			
ALOG2-1 → ACE1-1	3	5	“From my perspective, innovation, in this firm, is identify new knowledge and apply it into the machinery we manufacture. It is similar to a research project” Correspondent PGM3
ALOG2-2 → ACE1-2	3	3	“I always tell them [employees] to take every opportunities to learn from these intern students, so they can pick up something from them” Correspondent E3D1
ALOG2-3 → ACE1-1	1	1	“Yes, we are professors, but this is not an excuse for us to say we know everything. Actually, I told my students [managers in the firm], we must be open-minded when it gets to innovation, and willing to learn from outside. I think we are doing well in this perspective”. Correspondent GM3
ALOG2-3 → ACE1-3	2	3	“there are so many firms [with strong innovation capabilities] in this industry, and there are so many things we can learn from them, for sure” Correspondent DPGM3
ALOG2-4 → ACE1			“The only thing I think we [as both manager and Professors] have to careful about is we should never underestimate the creativity of our students. We need to encourage and support them but not to force our ideas into them in innovations. We are managers, but above all, we are their teachers” Correspondent GM3
ALOG1→ACE1			
ALOG1-1→ACE1-1	4	5	“As a teacher, I always welcome my students to discuss with each other. Especially for my PhD students who work in the same project group. It is like pooling all the information gather by each of them together, which provides a better coverage [regarding valuable external information] for them, isn’t it?”

			Correspondent PGM4
ALOG1-2→ACE1-1	3	4	“like I said, it is conducted as research projects, in a gradually sense, as I explained. In this sense, yes, these students are have to their own job independently” Correspondent PGM5
ALOE→ACE1			
ALOE-1→ACE1-1	3	3	“it is perfectly normal for them [as students] or even us [as professors] to make some mistakes, This is why I said it needs re-search. I always tell my students, if you fail, fail fast and fail forward. As for any problem, there must be solution there, all we need to do is to find it” Correspondent DGM3

- *Closing* leader behaviours facilitate Exploratory learning process

	Source	Reference	Empirical evidence
ALCE→ ACE1			
ALCE-4 → ACE1-1	4	5	“it is a routine in our department to organise these intern students to teach our full-time staff. It is a good opportunity for them[staff] to learn and improve their capabilities” Correspondent E3D1

Category 2-Relationship between SMAL and Transformative learning process

- *Opening* leader behaviours facilitate Transformative learning process

	Source	Reference	Empirical evidence
ALOG1→ ACT1			
ALOG1-2 → ACT1-3			“during the early stages, a lot of work, such a drafting the design, etc., are done by my students.” Correspondent PGM3
ALOG1-3 → ACT1-3	4	4	“they [the product design departments] are the core for the firm....but we still need to work together so as to actualise their designs. There are so many thing we need to discuss, from the perspective of material processing...we need to support each other, it is for the benefit of everyone in the firm”

			Correspondent E3D1
ALOG1-3 → ACT1-5	3	3	“it is my responsibilities as both the supervisor[in the university] and the manager [in the firm] to help them in these experimentations. In comparison with them, we are more experienced, from a lot of perspectives” Correspondent PGM4
ALOG2→ACT1			
ALOG2-2→ ACT1-4	4	4	“for them, it is their research project, so it must be new, to some extent. But it also need to be a doable, right? It is always good to have someone to discuss, when you are doing a research, isn’t it.” Correspondent DPGM3
ALOE→ ACT1			
ALOE-1→ ACT1-3	1	1	“it is quite normal if we have different opinions.....we cannot be always right...it is a progress itself if we can to identify the mistakes we made...I always say, the earlier, the better ” Correspondent GM3
ALOE-3→ ACT1-5	3	3	“Chairman Mao always say, practice is the only way to test the truth. It is especially true in this industry. Manufacturing these machineries are not as simple as teaching theories in classes, we must conduct a lot of experimentations so as the design can be finalised ” Correspondent PGM3

- *Closing* leader behaviours facilitate Transformative learning process

	Source	Reference	Empirical Evidence
ALCM2→ ACT1			
ALCM2-1→ ACT1-3	3	5	“we are a small firm, so we need to be the first one. The key is, the sooner we can finalise the design, the earlier we can get is patented” Correspondent CMD3
ALCM2-2→ ACT1-3	4	4	“it is a standard procedure, the school need to know the progress, they [as project leaders] have to show it” Correspondent GM3
ALCE→ ACT1			

ALCE-4→ ACT1-3	3	4	“these intern students are the key. They are always helpful in terms of communicating what our staff need to know [in innovations]” Correspondent E3D1
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Category 3-Relationship between SMAL and Exploitative learning process

- *Closing* leader behaviours facilitate Exploitative learning process

	Source	Reference	Empirical Evidence
ALCE→ ACE2			
ALCE-1→ACE2-2	3	3	“we will have certain new routines developed to ensure the efficiency” Correspondent FD3
ALCM1→ ACE2			
ALCM1-3→ ACE2-1	4	5	“we are small firm, quality matters significantly. For our customers, constancy and stability are the most important thing, so yes, we always keep our eyes opened in the stage of manufacturing” Correspondent GM3
ALCM1-2→ ACE2-3	2	4	“sometimes they try to outsmart you, cut corners....so, now I try to standardise things in these department, the more detailed, the better” Correspondent E3D1

Appendix X Relationship between Emerging Managerial Factors and AC

Company Alpha

Category 1: General Manager's Vision facilitates Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFV → ACE1			
EMFV-1 → ACE1-1	2	2	"innovation is the only way for us to survive, especially under current circumstances....it is a consensus [in the firm] now" Correspondent GM1
EMFV-2 → ACE1-3	3	4	"you have to let them know...I've emphasised this several times during meetings...I think now they fully understand it, and it is a consensus...I think they are doing quite well now [regarding monitoring business environment for valuable knowledge and information]" Correspondent GM1

Category 2: Department Managers' Trust related to Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFT → ACE1			
EMFT-1 → ACE1	2	2	"we [as managers] can't get involved in everything, we delegate and manage things here.....our employees are quite capable in working on their own in this kind of projects" Correspondent K1

Category 3: Department Managers' Trust related to Transformative Learning Process

	Sources	References	Empirical Evidence
EMFT → ACT1			

EMFT-2→ACT1	1	1	“they all have at least one year on-job intern experience before they start their job.....I think they are capable in doing these” Correspondent E1D2
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Company Beta

Category 1- General Manager’s Vision facilitates Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFV→ACE1			
EMFV-1→ACE1-1	1	1	“from my perspective, innovation [performance] had been enhanced from the [following] three perspectives: the first one is the [firm’s senior managers] emphasis regarding the importance of the innovation culture [in the organisation].....” Correspondent GM2
EMFV-2→ACE1-3	1	1	“we have to be open-minded regarding creative ideas and methods that proposed by our employees. This has to be more than empty talks...” Correspondent GM2

Category 2: Department Managers’ Trust related to Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFT→ACE1			
EMFT-1→ACE1	2	2	“there will be limitations....But overall, most of them are achievable, as it is often job related. So, it is not too difficult for our employees to assimilate them” Correspondent E2D1

Category 3: Department Managers’ Trust related to Transformative Learning Process

	Sources	References	Empirical Evidence
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EMFT→ACT1			
EMFT-2→ACT1	1	1	“you have to trust them, and give them freedom and opportunities to work out problems they encountered...” Correspondent PJ2

Company Chi

Category 1: General Manager’s Vision facilitates Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFV→ACE1			
EMFV-1→ACE1-1	1	1	“Products we used to produce are quite profitable, but these are not tech-intensive products. Sure, we can make profit out of them, but they are vulnerable to imitations.... the most important thing is I think we should do something valuable and meaningful regarding the future development of the industry. I’ve spent my whole life doing research in this field, I want to contribute something to the industry” Correspondent GM3

Category 2: Department Managers’ Trust related to Exploratory Learning Process

	Sources	References	Empirical Evidence
EMFT→ACE1			
EMFT-1→ACE1	2	2	“Our innovation projects are organized as research projects....we don’t get too involved in details, they are mature students, they know what they are doing” Correspondent PGM3

Category 3: Department Managers’ Trust related to Transformative Learning Process

	Sources	References	Empirical Evidence
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EMFT → ACT1			
EMFT-2 → ACT1	2	2	“regarding these intern students in our department, they have strong capabilities. And they are fairly creative...So I always encourage them to try what they think is appropriate” Correspondent E3D1

APPENDIX XI ANALYTICAL TEMPLATES

Template one: AL-AC Matrix

				Absorptive Capacity-AC										
				Exploratory Learning process-ACE1			Transformative Learning process-ACT					Exploitative Learning process-ACE2		
				ACE1-1	ACE1-2	ACE1-3	ACT1-1	ACT1-2	ACT1-3	ACT1-4	ACT1-5	ACE2-1	ACE2-2	ACE2-3
Ambidextrous Leadership-AL	Opening leader behaviours - ALO	Give possibility for independent thinking-ALOG-1	ALOG 1-1											
			ALOG 1-2											
			ALOG 1-3											
		Encourage error learning-ALOE	ALOE-1											
			ALOE-2											
			ALOE-3											
		Give room for new ideas-ALOG-2	ALOG 2-1											
			ALOG 2-2											

			ALOG 2-3											
			ALOG 2-4											
			ALOG 2-5											
	Closing leader behaviours- ALC	Monitor and control goal attainment- ALCM1	ALCM 1-1											
			ALCM 1-2											
			ALCM 1-3											
		Monitor progress in tasks-ALCM2	ALCM 2-1											
			ALCM 2-2											
		Establish routines- ALCE	ALCE- 1											
			ALCE- 2											
			ALCE- 3											
			ALCE- 4											
		Take corrective actions- ALCT	ALCT- 1											
			ALCT- 2											

Template two: AC-IAP Matrix

			Absorptive Capacity-AC										
			Exploratory Learning process- ACE1			Transformative Learning process- ACT					Exploitative Learning process- ACE2		
			ACE1-1	ACE1-2	ACE1-3	ACT1-1	ACT1-2	ACT1-3	ACT1-4	ACT1-5	ACE2-1	ACE2-2	ACE2-3
Innovation Adoption Process- IAP	Initiation - IAPI1	IAPI1 -1											
		IAPI1 -2											
	Adoption Decision -IAPA	IAPA -1											
		IAPA -2											
	Impleme ntation- IAPI2	IAPI2 -1											
		IAPI2 -2											
		IAPI2 -3											
		IAPI2 -4											

Template three: EMF-AC Matrix

			Absorptive Capacity-AC										
			Exploratory Learning process			Transformative Learning process					Exploitative Learning process		
			-ACE1			- ACT					-ACE2		
			ACE1-1	ACE1-2	ACE1-3	ACT1-1	ACT1-2	ACT1-3	ACT1-4	ACT1-5	ACE2-1	ACE2-2	ACE2-3
Emerging Managerial Factors- EMF	GM' vision- EMFV	EMFV-1											
		EMFV-2											
	DM' trust- EMFT	EMFT-1											
		EMFT-2											