Learning Process Analysis of Absorptive Capacity on Organisational Innovation: the Influence of Leadership Styles

A thesis submitted for the degree of Doctor of Philosophy

By

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Abstract

The research in this thesis investigates the learning processes of absorptive capacity (AC) as an element within organisation innovation. An analysis of leadership 'styles' is undertaken and factors for effective innovation adoption are considered. It is apparent that AC has been well researched in recent years but there is evidence that little attention has been given into important influences such as leadership. Consequently, AC is determined to involve managerial learning through three processes. These include: (1) exploratory learning as an ability to value and acquire external knowledge, (2) transformative learning to assimilate this knowledge, and (3) exploitative learning to use knowledge for innovation. However, there is little known about interventions of AC learning towards innovation and the effects of top and middle managers' leadership styles on these processes. Therefore, the research initially attempts to investigate the relationship between AC, innovation, and leadership styles with a view to exploring valuable theoretical insights into the learning processes involved.

A conceptual model is formulated which suggests a relationship between the learning processes of AC with different stages of innovation adoption. In this respect, the role of managers is investigated through attention to 'transformational' and 'transactional' leadership styles where the former changes employees' values for achieving common goals and the latter encourages exiting practices.

The methodology adopted involved a qualitative strategy with data collected through three substantive case studies from research sites in Iran. In total 31 Semi-structured interviews were conducted with respondents to explore the learning processes of AC and leadership styles on innovation. Secondary documents and non-participant observations provided further insights by triangulating the data. Data was analysed in two stages (i) a description of each case was reported (ii) a thematic analysis was used in order to compare the case companies collectively.

The findings supported the effects of the learning processes of AC on innovation adoption. It was also found that the leadership behaviours of top and middle managers change from transformational to transactional leadership styles during the exploitative learning process. The influence of top managers' knowledge, middle managers' intention, and trust in middle managers also emerged as important constructs in the learning processes.

The research contributed to the learning processes of AC and the influence of managerial leadership styles by adding new insights to organisational theory. The results will also be of value to practitioners by providing prescriptive analysis when using external knowledge effectively for adopting innovation.

Keywords: *Absorptive capacity, learning processes, innovation, and leadership styles*

Dedication

I would like to dedicate this thesis to my wife, Mrs. Nakisa Hamzehei Moghaddam, and my son, Mr. Sadra Rezaei Zadeh, who gave me courage and enthusiasm for this great accomplishment.

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This thesis cannot be achieved without help of others. First and foremost, I would like to give huge thanks to my first supervisor, Professor Raymond A. Hackney, for his support and advice. I am thankful to my second supervisor, Professor Ashley Braganza, for his advice. I also like to express my deep appreciation to those academics provided me feedback in my annual reviews. There are other academics and PhD students who gave me guideline in conferences and PhD symposiums. I acknowledge their help, too.

I am grateful to all interviewees who agreed to give me their valuable time. Without permission of the three case companies' CEOs, collecting data could not be achieved. I am utterly tankful to all of the CEOs. I would also like to appreciate my father-in-law (Dr. Akbar Hamzehei Moghaddam) and other people who gave me advice and supported me to gain access to the case companies.

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Chapter 1: Introduction

1.1 Introduction

Absorptive capacity (AC) refers to the potential of organisations to value, acquire, assimilate, and implement knowledge which resides outside their boundaries, or so called 'external knowledge' (Cohen and Levinthal, 1990). It is comprised of three sequential learning processes which include: (1) exploratory learning as an ability to value and acquire external knowledge, (2) transformative learning as an ability to assimilate this knowledge, and (3) exploitative learning as an ability of organisation to implement knowledge (Lane et al., 2006). It is found that AC increases innovation (Cohen and Levinthal, 1990; Zahra and George, 2002; Escribano et al., 2009; Murovec and Prodan, 2009; Cepeda-Carrion, 2012). Accordingly, this thesis suggests that accomplishing the learning processes of AC may lead to innovation.

It is evident that innovation allows organisations to be competitive and increase their performance (Fang et al., 2011; Gumusluoğlu and Ilsev, 2009). Creating and maintaining knowledge become an important core of organisational competitiveness and innovation (McEvily and Chakravarthy, 2002; Grant, 1996$_a$). Most of the leading innovative organisations such as Cisco, Microsoft, and Procter and Gamble (P&G) enhance their innovativeness by using external knowledge (Chesbrough, 2003; Laursen and Salter, 2006). Therefore, the potential of organisations to acquire and use external knowledge becomes an important driver of organisational innovation (Volberda et al., 2010).

Increased competition in recent years has resulted in organisations paying more attention to their innovativeness (Gumusluoğlu and Ilsev, 2009). It is also suggested that organisations need to search actively for external knowledge when considering innovation activities (Harrington and Guimaraes, 2005; Newey and Zahra, 2009; March and Simon, 1958; Laursen and Salter, 2006). Cohen and Levinthal (1990) note, not all organisations can acquire and use external knowledge effectively for innovation. Therefore, understanding the learning processes of AC is a valuable element which allows researchers and practitioners to develop more innovative strategies.

Section 1.2 discusses the need for in-depth understanding about the successful management of the learning processes of AC for enhancing organisational innovativeness. The aim and objectives of this thesis are explained in sections 1.3 and 1.4 respectively. Section 1.5 states the research design. Section 1.6 provides an overview of this thesis structure. Finally, a summary of this chapter is explained in section 1.7.

1.2 Research Problem

Despite increasing studies into innovation processes, it is not clear how organisations make it successful (Kim and Huarng, 2011). There is still a need to understand the key drivers of innovation and investigate new models for increasing innovativeness (Damanpour and Schneider, 2006; Subramaniam and Youndt, 2005). Since innovation is accomplished through a process, developing a process-based model may be helpful for understanding how organisations manage their innovation activities effectively. This is particularly important as knowing how the process of innovation remains an important topic for investigation (Ota et al., 2013).

It is suggested that innovation drives by using new knowledge (Escribano et al., 2009). Although the empirical studies show the importance of knowledge, the nature of knowledge, and its influence on innovation have received little attention (Carlo et al., 2012; Volberda et al., 2010; García-Morales et al., 2008_a; Gopalakrishnan and Bierly, 2001). The nature of knowledge could be tacit or explicit. Tacit knowledge is personalised and context related and therefore it is difficult to communicate (Nonaka and Takeuchi, 1995). Explicit knowledge, on the other hand, can be communicated systematically (Nonaka and Takeuchi, 1995). It is found that when knowledge for innovation is explicit, organisations are more likely source it from external environment (Gopalakrishnan and Bierly, 2001). In this situation, organisations prefer to adopt innovation from external sources because the process of using explicit knowledge is easier to manage and it involves less cost (Gopalakrishnan and Bierly, 2001). The example of studies which highlights the importance of explicit knowledge is Gopalakrishnan and Bierly (2001) and Zack (1999).

As the importance of external knowledge for innovation increases, this thesis argues that more organisations may prefer to use explicit knowledge. Accordingly, the processes of AC may lead to better understanding of how organisations use explicit

knowledge within their innovation processes. It is suggested that the AC study should be clear about the type of knowledge that organisations seek to absorb (Volberda et al., 2010). Consistence with this suggestion, Damanpour and Wischnevsky (2006) propose that researchers should focus on a particular type of innovative organisation. By considering these suggestions, this thesis considers innovation adopting organisations because this type is more likely to rely on AC. Moreover, organisations adopt innovations in order to enhance their performance, when they would face tight competition, environmental ambiguity, scarce resources, and increasing demand from customers and public for high quality and more advance products (Jansen et al., 2006; Boyne et al., 2003; Roberts and Amit, 2003).

Moreover, some scholars, who reviewed the publications in the field of AC, noticed that the existing studies on AC focus on its antecedents, outcomes, and nature (e.g., Volberda et al., 2010; Lane et al., 2006; Zahra and George, 2002). Only a few studies investigate empirically the processes of AC (Lewin et al., 2011; Easterby-Smith et al., 2008_a). We observed that the number of papers about the processes of AC has increased. However, the current literature on AC has mostly investigated the capabilities or mechanisms involved in its processes in order to extend and/or modify Zahra and George's (2002) model. For example, Todorova and Durisin (2007) criticised the linearity assumption of the capability-based processes of AC. On the other hand, some researchers, such as Sun and Anderson (2010), Easterby-Smith et al. (2008_a), and Jones (2006), supported the linearity assumption of the processes of AC and they added new dimensions. For instance, Easterby-Smith et al. (2008_a) added the 'power' and 'boundaries' dimensions as enablers of AC. One weakness of these studies is that they focused on the capability aspects of the processes of AC rather than on the processes themselves. The reason is that Zahra and George (2002) developed their model by considering the capabilities and routines involved in the processes of AC. Moreover, these studies do not explicitly investigate the influence of AC on the process of innovation. The current studies mainly show that AC is positively correlated with innovation performance (e.g., Escribano et al., 2009; Murovec and Prodan, 2009; Cepeda-Carrion, 2012). It is suggested that the lack of knowledge about the processes of AC hinders the applicability of this theory in providing a guideline for organisations and understanding its nature (Volberda et al., 2010; Easterby-Smith et al., 2008_a). It is argued that AC is comprised of different processes and the nature of them is different

(Lane at al., 2006). This means that the processes of AC may require different management approaches.

Lenox and King (2004) report that managers influence AC by providing information to organisational members in order to adopt a new practice. It is also suggested that managers' behaviours affect AC and innovation (García-Morales et al., 2012; Sun and Anderson, 2012; Rosing et al., 2011; Volberda et al., 2010; Zahra and George, 2002). Managerial behaviour patterns refer to leadership style (Bass, 1995_a). It is argued that 'transformational leadership' style has more positive influence on learning and innovation than 'transactional leadership' style (García-Morales et al, 2008_b). Transformational leaders support their employees to achieve a collective interest, while transactional leadership style is based on satisfying the leaders' interests for achieving objectives and monitoring the outcomes (Bass and Avolio, 2000). On the other hand, some studies show that the top and middle management transformational and transactional leadership styles are essential for learning (e.g., Sun and Anderson, 2012). Because of the difference between the origins of the processes of AC, the success of acquiring and using external knowledge for innovation may depend on both transformational and transactional leadership styles.

These limitations provide the motivation for the research and to develop and validate a process-based conceptual model for innovation in order to understand the influence of managers on the constructs of AC theory.

1.3 Research Aim and Questions

The leadership styles of top and middle managers are a determinant of AC (Sun and Anderson, 2012) and innovation outcomes (Gumusluoğlu and Ilsev, 2009). Despite the influence of the leadership styles of top and middle managers on AC and innovation, there is little known about how the combinative influence of top and middle managers influence AC (Sun and Anderson, 2012). It is suggested that the influence of leadership is best understood by combining different levels of management (Hannah and Lester, 2009; Yukl, 2009). Moreover, the existing studies investigate the influence of leadership styles on AC and innovation separately (e.g., Sun and Anderson, 2012; Vaccaro et al., 2012; Rank et al., 2009; García-Morales et al., 2008_a). Synthesising these concepts may lead to understanding about the success of innovation processes. This thesis focuses on the process of innovation adoption which enables organisations to

develop new products. Comparing different types of organisational innovations, product innovation has more market focus by considering the customers' needs (Martinez-Ros, 2000; Schilling, 2005). It is argued that increasing competition is positively associated with the organisational intentions towards product innovation (Fritsch and Meschede, 2001; Cohen and Klepper, 1996; Kraft, 1990). Therefore, product innovation increases organisational performance more than other innovation types (Yalcinkaya et al., 2007). Accordingly, the aim of this thesis is to:

> ***Explore the influence of top and middle management leadership styles on AC for product innovation adoption***.

Investigating this aim is extremely important. Investigating new models and the key drivers of innovation is highly crucial because the products have shorter life-spans as a result of intensive competition (Gumusluoğlu and Ilsev, 2009). Moreover, most of the studies examine the influence of leadership styles in innovation outcomes (e.g., García-Morales et al., $2008_{a, b}$; Rank et al., 2009; Vaccaro et al., 2012). Some other studies investigated the internal and external factors which increase innovation (e.g., Gumusluoğlu and Ilsev, 2009). However, the influence of leadership styles on learning processes is not received much attention. It is suggested that the learning processes influence organisational innovation (Jansen et al., 2009). Therefore, it is worth to investigate the influence of leadership styles in the learning processes.

Synthesising the learning processes of AC and innovation helps to explain the commercial application of external knowledge (Kostopoulos et al., 2011; Lane et al., 2006). This thesis argues that accomplishing the exploratory, transformative, and exploitative learning processes allows organisations to innovate. The exploratory learning process occurs at the individual level, the individual level learning turns into the group level through the transformative learning process and finally, the group level learning turns into the organisational level through the exploitative learning process (Sun and Anderson, 2010). Similarly, Cohen and Levinthal (1990) suggest that individual AC influences organisational AC. This shows that organisations by transferring individual to organisational AC achieve innovation. Therefore, this thesis initially seeks to answer the following question in order to understand how accomplishing each stage of the learning processes influence innovation:

Question 1: How do the exploratory, transformative, and exploitative learning processes influence the process of product innovation adoption?

Answering question one leads to understanding the nature of organisational activities which leads to innovation. This understanding may explain the management leadership styles throughout the learning processes of AC. The central part of innovation and learning is human resources (Bornay-Barrachina, 2012), and leadership styles affect them (Sun and Anderson, 2012; Rosing et al., 2011). It is found that top and middle managers plays a significant role in stimulating AC and learning (Sun and Anderson, 2012; Jones, 2006). However, only a few studies investigated the combinative influence of top and middle management leadership styles on AC (e.g., Sun and Anderson, 2012). Even these studies do not attempt to establish a direct link between AC and innovation. For example, Sun and Anderson (2012) investigated the combinative influence of top and middle managers on organisational ambidexterity, which is about balancing exploratory and exploitative learning, but not on innovation. Due to the importance of top and middle managers in AC, the following research question is posed:

Question 2: How do the top and middle managers' leadership styles influence the exploratory, transformative, and exploitative learning processes to adopt a product innovation?

Investigating these two research questions is significantly important. Firstly, more organisations prefer to adopt innovation (Pérez-Luño et al., 2011). This shows the significant of AC on innovation. Moreover, answering the questions provides an understanding about the actual implementation of external knowledge and the role of top and middle managers in organisational innovativeness.

1.4 Research Objectives

The following objectives are followed for addressing the aim and questions of this thesis:

1. To critically review AC literature with particular attention to 'processes' in order to understand its influence on innovation and explore the effects of leadership styles.

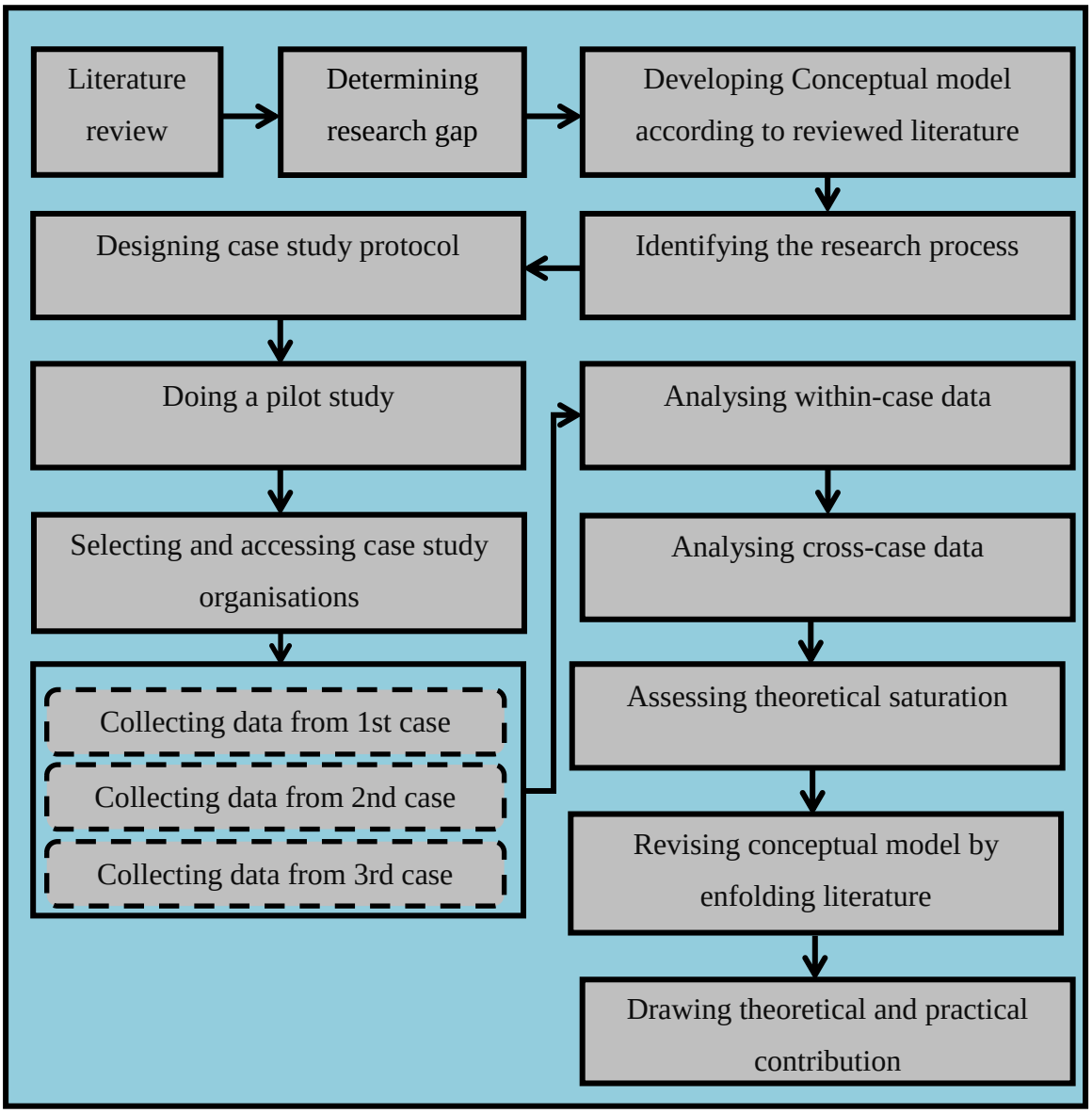
2. To develop a conceptual model, based on comprehensive literature review, which provides a valuable insight about the relationship between AC, innovation, and leadership styles.
3. To empirically validate the conceptual model by collecting data from pharmaceutical industry in Iran and reflects the findings.
4. To revise the conceptual model based on the empirical findings which contributes to AC literature in general and provides guidelines for the managers in pharmaceutical industry in Iran in particular.

Furthermore, the research design is described which considers how the thesis accomplished its objectives.

1.5 Research Design

As explained in section 1.1, AC theory is comprised of three learning processes. To investigate these three learning processes in relation with innovation and leadership styles, a qualitative multiple case study method was followed. This thesis combined the recommendation of Yin (2009) and Eisenhardt (1989) in order to develop a 'roadmap' (Figure 1.1) for research design, data collection, and data analysing.

Figure 1.1: Research roadmap



Source: Adopted with modification from Yin (2009) and Eisenhardt (1989)

Figure 1.1 therefore illustrates the stages that this thesis followed. In the first step, the related literature is reviewed extensively. Doing extensive literature review helps to identify research gaps. This thesis then developed its conceptual model based on the literature reviewed in order to fulfil the research gaps. Next stage is about developing a case study protocol and examines it through a pilot study. Conducting the pilot study enables this thesis to choose and access its cases. The cases are discussed separately and then the cases are compared together. Comparing the outcomes of the cases together helps to assess whether this thesis reaches theoretical saturation or not. Moreover, the

proposed conceptual model is revised based on the results of comparing cases and enfolding the literature. Finally, theoretical and empirical contributions are achieved based on revising the conceptual model.

We seek to achieve the following theoretical and practical contributions. Our main contribution comes from our unique conceptual model which shows how organisations use external knowledge effectively to adopt innovations. Moreover, successful adoption of innovations is associated with the learning processes of AC. An investigating into the relationship between innovation adoption and AC would enable us to explore the way learning processes occurs. Adopting a qualitative research strategy allows us to explore further factors which influence the learning processes. The last two contributions come from exploring the roles of particular managers and the leadership styles which facilitate each of the learning processes which are associated with AC.

We achieved making theoretical and practical contributions by evaluating our proposed conceptual model through empirical data and by developing some propositions. We developed the propositions in order to allow future researchers to investigate our conceptual model statistically.

1.6 Thesis Structure

This thesis is structured based on the recommendation of Philips and Pugh (2005). This thesis is organised into eight chapters. Table 1.1 shows chapters that this thesis is comprised of.

Table 1.1: Thesis structure

Background theory	**Chapter 1**	Introduction
	Chapter 2	Literature review
Focal theory	**Chapter 3**	Conceptual model for using AC for adopting innovation
Data theory	**Chapter 4**	Research methodology
	Chapter 5	Within-case findings
	Chapter 6	Cross-case findings
Novel contribution	**Chapter 7**	Revising conceptual model
	Chapter 8	Conclusion

Chapter 1 (the present chapter) is an introductory chapter. This chapter provides a broad explanation about the research background. It includes sections which explain the research background, research problem, aim, questions, objectives, and a brief discussion about the research design. This chapter concludes by briefly providing an overview of the chapters included in this thesis.

Chapter 2 provides a theoretical base for this thesis. This theoretical base is achieved through reviewing the existing studies into AC and the relationship between this concept and innovation. Reviewing these studies helps this thesis to identify the research gaps by collating the existing studies. Chapter 2 first defines the key concepts including innovation, knowledge, learning, and the relationship between them. Then, the competing theory with AC is explained. Then, the studies into AC explain which enables this study to understand the nature of AC from different perspectives. After that, the influence of AC on innovation reviews in order to understand how the processes of AC affect innovation. In the last part of Chapter 2, the research gaps are identified and explained.

The conceptual model is presented in Chapter 3. The proposed conceptual model provides a guideline for this thesis to investigate the way organisation fulfil the learning

processes of AC in order to adopt innovation and the influence of leadership styles on the learning processes.

Chapter 4 outlines the research methodology. This chapter explains ontological and epistemological paradigms of this thesis. Then, based on ontological and epistemological positions, the qualitative nature of this thesis justifies. Chapter 4 is followed by explaining the research design, methods, and data analysing techniques.

The findings of this thesis present in Chapter 5 and 6. An overview of the learning processes of AC, innovation adoption, and leadership styles at each case company explains separately in Chapter 5. Then, the findings of each case company compare to other case companies. Comparing findings from case companies together enables this thesis to evaluate whether theoretical saturation achieved or not.

Comparing cases together also helps to revise the conceptual model in Chapter 7. In this chapter, the findings of this thesis compare with existing literature in order to evaluate the results of this thesis. This thesis makes some propositions by combining the findings of this thesis with related literature in order to modify the proposed conceptual model.

Chapter 8 is the last chapter of this thesis. In Chapter 8, an overview of this thesis and its findings is presented. Theoretical and practical contribution of this thesis is given in Chapter 8 which concludes by highlighting possibilities for future research.

1.7 Conclusion

This chapter provided a foundation for the research in the thesis. Chapter 1 explained the research aim and questions based on a significant research problem as well as the research objectives. Moreover, an overview of the research design and chapters of this thesis were given. In the following chapter (Chapter 2), the related literature regarding the research questions are critically reviewed.

Chapter 2: Theoretical Considerations

2.1 Introduction

This chapter aims to review the related research in the field of absorptive capacity (AC) in order to identify gaps in the existing body of knowledge. This chapter is divided into three primary parts. Firstly, the key concepts including innovation, knowledge, and learning are defined. Secondly, the justification for adopting AC theory is provided by contrasting dynamic capability (DC) theory with industrial organisation (IO) and resource-based view (RBV) theories. Thirdly, the chapter includes the critical discussion about AC. Following these three primary parts enables this thesis to provide a solid foundation in order to develop the conceptual model presented in Chapter 3.

The related articles for reviewing and understanding key concepts, theories, and AC are chosen mainly from high ranking journal in the field of management. Eisenhardt and Graebner (2007) mentioned that “sound empirical research begins with strong grounding in related literature”.

The Chapter is organised as follows. Firstly, the key concepts are defined including innovation, knowledge, and learning. There are different definition of innovation, knowledge, and learning. The intention is to adopt an appropriate definition of innovation, knowledge, and learning by reviewing their existing definitions. Moreover, the relationship between knowledge, learning, and innovation is explained. Secondly, different theories are compared which relate innovation to competition in order to justify the adoption of AC theory. Finally, the existing body of knowledge is critically reviewed in order to identify state-of-art drawbacks in AC studies. Identifying these drawbacks is essential because it facilities the development of the conceptual model and justifies the research design.

2.2 Defining Key Terms

There are three main concepts which need to be defined before reviewing the literature relate to: innovation, knowledge, and learning (Ghauri and Grønhaug, 2010). Innovation and knowledge clearly have different definitions and related concepts are important because they reflect a researcher's perspective on the existing literature.

2.2.1 Innovation

Innovation is defined in different fields including psychology, engineering, sociology, economy, and management and each views the process differently (Gopalakrishnan and Damanpour, 1997; Damanpour and Wischnevsky, 2006). This thesis only includes definitions of innovation from management studies because of its focus on organisational perspectives, as illustrated in Table 2.1.

The property between different innovation definitions is the concept of novelty, or so-called 'newness' (Slappendel, 1996; Gopalakrishnan and Damanpour, 1997; Damanpour and Wischnevsky, 2006). The concept of newness enables a distinction between innovation from change management generally (Slappendel, 1996). However, the problem with this assumption in the existing innovation definitions is that who perceives an innovation as new, i.e. society, industry, organisations, or individuals? It is suggested that answering these questions can be provided by understanding the degree of newness to the unit of adoption (Damanpour and Wischnevsky, 2006). Studies in the field of management studies choose organisations as their unit of adoption because innovation takes place inside organisations (e.g., Damanpour and Wischnevsky, 2006). Accordingly, this research considers the degree of newness from an organisational perspective.

Table 2.1: Innovation definitions

Study	Definition
Crossan and Apaydin (2010)	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.

Naranjo-Gil (2009)	Any practice, process, product, or service which is new to the environment of the organization.
Afuah (1998)	Innovation is the use of new knowledge to offer a new product or service that customers want.
Damanpour (1991)	The generation, development and adaptation of novel ideas on the part of the firm.
West and Farr (1990)	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.
Dosi (1988)	The search for, and the discovery, experimentation, development, imitation and adoption of new products, new production processes and new organizational setups.
Rogers (1983)	The adoption of ideas that are new to the adopting organisation.
Zaltman et al. (1973)	An idea, practice, or material artefact perceived as new by the relevant unit of adoption.

The degree of newness can be examined by distinguishing between generating and adopting innovation (Damanpour and Wischnevsky, 2006). The generation of innovation refers to developing products, services, and/or technologies which perceive new to organisations, while the adoption of innovation refers to acquiring or imitating the innovation of other organisations (Damanpour and Wischnevsky, 2006). Figure 2.1 illustrates that there are three types of innovative organisation.

Figure 2.1: Organisational type and innovation

		Generation of innovation	
		High	Low
Adoption of innovation	High	**Innovative organisation**	**Innovation-adopting organisation**
	Low	**Innovation-generating organisation**	**Non-innovative organisation**

Source: Damanpour and Wischnevsky (2006)

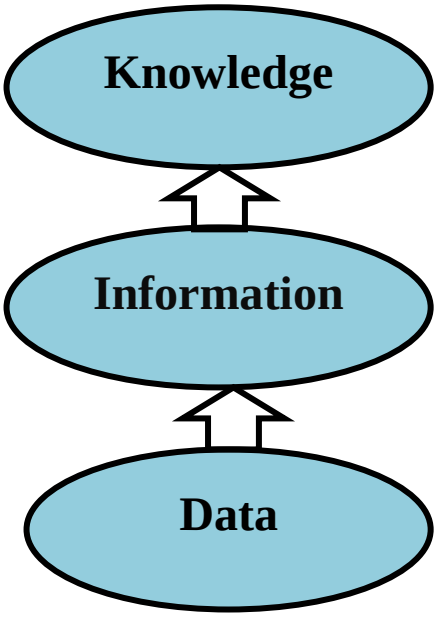
Organisations may therefore manage their innovation processes differently based on the degree of newness that they want to achieve. This may explain the inconsistency in the innovation literature as several researchers noticed (e.g., Calantone et al., 2010; Damanpour and Wischnevsky, 2006). Accordingly, this thesis focuses on product innovation in innovation-adopting organisations. The discussion here shows the importance of including the degree of newness or change as it clarifies type of innovative organisations.

As noted in Chapter 1 increasing competition motivates organisations to continually adopt innovation in order to survive. The research therefore adopted a market-oriented definition of innovation as suggested by the Damanpour's (1991). In this respect, innovation can be seen as new products or services, new technologies, new administrative systems, or new plans which are perceive new to the organisational members. It is argued that accommodating different types of innovation reduces biases in Damanpour's definition (Keupp et al., 2012). Moreover, this definition includes different types of innovative organisations. Our research focuses on product innovation due to its influence on organisational performance. Therefore, innovation is defined as introduction of new products or services in order to fulfil customers' needs (Damanpour, 1991).

2.2.2 Knowledge Definition

Knowledge may also be defined in different ways. There are two schools of thought for defining knowledge (Shin et al., 2001). The first defines knowledge by distinguishing it from data and information. For example, Hislop (2009) suggests that one way to define knowledge is to distinguish it from what it is not knowledge. According to Hislop (2009), the best way to define knowledge is to distinguish knowledge from data and information (Figure 2.2). The importance of distinguishing knowledge is that it actually represents more than information and data (Tuomi, 2000).

Figure 2.2: Data, Information, and Knowledge



Data refers to observations and facts, information gives meaning to data within a specific context (Zack, 1999). Accumulating information in a structured way leads to knowledge through communication, experience, and interface (Zack, 1999). The definitions of data, information, and knowledge reveal that these concepts are not really separated phenomena because a hierarchical relationship exists between them. It is obvious that knowledge is more than data and information because data leads to information, and information leads to knowledge. Defining knowledge through the hierarchical relationship simplifies the concept of knowledge. It is argued that defining knowledge requires addressing its complexity (Braganza and Sharif, 2010).

Some researcher considers the reverse direction between data, information, and knowledge because considering reverse order between them has more practical implications (Sharif, 2006; Braganza, 2004; Tuomi, 2000). For example, Tuomi (2000) suggests that reverse direction between knowledge, information, and data has better use for studying knowledge management and organisational memory phenomenon.

Another limitation of defining knowledge by distinguishing it from information and data refers to overlap between these concepts (Shin et al., 2001). For example, it is suggested that information is explicit knowledge (Tuomi, 2000). There are two types of knowledge, tacit and explicit knowledge. Tacit knowledge is hard to communicate and it transfers through experiencing and acting, while explicit knowledge is formally articulated and easier to communicate (Zack, 1999). An example regarding how information can be seen as explicit knowledge refers to storing decontextualizing information in computers (Zack, 1999). It is argued that distinguishing between data, information, and knowledge is essential because it leads to the creation of strategic value (Kogut and Zander, 1992). Since distinguishing between data, information, and knowledge is blurred, adopting the hierarchical relationship may not lead to strategic value.

The second school of thought views knowledge as an application process (Zack, 1999; Kogut and Zander, 1992). As illustrated in Table 2.2, knowledge may be implemented and managed differently. For example, Nonaka (1994) considers knowledge as 'justified belief' which enables effective actions. Individuals justify their beliefs according to their prior observation of the world (Nonaka et al., 2006). This means that beliefs are justified through individuals' experience, sensibility, and opinions (Nonaka and Takeuchi 1995). On the other hand, Spender (1996) mentions that knowing occurs as a result of a process of developing meaningful knowledge. Reviewing these two views shows that Nonaka (1994) adopts a 'state of mind' perspective, due to focusing on individuals' beliefs, while Spender (1996) adopts a 'process perspective', because of focusing on the process of knowing: Figure 2.2 illustrates these examples of perspectives on knowledge.

Table 2.2: Perspectives on knowledge

perspectives	Description	Implications
Knowledge vis-à-vis data and information	Data is facts, raw numbers. Information is processed/interpreted data. Knowledge is personalized information.	Exposing individuals to potentially useful information and facilitating assimilation of information
State of mind	Knowledge is the state of knowing and understanding.	Enhancing individual's learning and understanding through provision of information
Object	Knowledge is an object to be stored and manipulated.	Building and managing knowledge stocks
Process	Knowledge is a process of applying expertise.	Focusing on knowledge flows and the process of creation, sharing, and distributing knowledge
Access to information	Knowledge is a condition of access to information.	Organizing access to and retrieval of content
Capability	Knowledge is the potential to influence action.	Building core competencies and understanding strategic know-how

Source: Alavi and Leidner (2001)

Organisational knowledge creation research improves prior studies regarding its definitions and knowing (Nonaka et al., 2006). Knowledge has three characteristics noted as, 'justified true belief' which enables organisations to determine a situation and perform accordingly through distinguishing between tacit and explicit knowledge (Nonaka et al., 2006). Secondly, organisational knowledge resides in the

firm and it either has been used or will be used for production in the future (García-Morales et al., 2008_a). Thirdly, knowledge is not value free and it affects the organisational actions, therefore, our research defines knowledge as "beliefs that guide organisational action; it is causal understanding that may or may not fully reflect the realities of the environments a firm faces" (Chakravarthy et al., 2003).

2.2.3 Learning at Organisational Level Linking Knowledge to Innovation

Knowledge and innovation in general, and product innovation in particular, have a mutual effect upon each other. Innovation is achieved through application of new knowledge and, at the same time, implementing new knowledge motivates change and innovation (Murovec and Prodan, 2009). Organisations achieve innovation through performing complicated activities for exploiting external knowledge for commercial ends (Escribano et al., 2009). New knowledge can be created internally or acquired externally. Suggesting a direct link between knowledge and innovation may be problematic, when the importance of learning to organisational level, or so called 'organisational learning' ignores. Organisational learning enables organisations to generate, acquire, and implement new knowledge for innovation (Weerawardena et al., 2006).

Organisational learning is defined differently (Friedman et al., 2005). However, organisational learning definitions mainly acknowledge it as a process (Sun, 2003). The process of learning involves interrelated processes. For example, Huber (1991) suggests four interrelated processes including knowledge acquisition, information distribution, information interpretation, and organisational memory. Innovation can be viewed as an organisational learning process (Lloréns Montes et al., 2005). Put it differently, innovation is an outcome of organisational learning (Lane et al., 2006). On the other hand, some scholars suggest that innovation and organisational learning are intertwined because both of these concepts are dealing with change in business environment and they enable organisations to gain competitive advantages (Holt, 1999). Therefore, both organisational learning and new knowledge lead to innovation.

Clarifying the relationship between organisational learning and new knowledge is important because it shows how they drive innovation. Knowledge itself cannot drive the innovation processes (Nonaka and Takeuchi, 1995) but innovation

increases through organisational knowledge which is enhanced by organisational learning (Cohen and Levinthal, 1990). Organisational knowledge is comprised of three parts including physical artifacts (equipment, layout, database and documents), organisational structures (roles, reward systems, and procedures), and people (skills, values, beliefs, and practices) (Carroli et al., 2003). Organisational learning facilitates the development of new skills and knowledge which enhances the organisational capability to act effectively and achieve higher performance (García-Morales et al., 2008_b). The process of learning increases knowledge at a single point (Chakravarthy et al., 2003). In other words, accomplishing a learning process, which is embedded in organisational learning, allows organisations to innovate by enhancing their organisational knowledge.

2.3 Justification for Adopting AC Theory

It is important to explain the reasons for implementing AC theory for studying innovation. As noted in section 2.2.1 organisations innovate in order to deal with competition and environmental uncertainty. Accordingly, the first step is to review and adopt adequate theory about organisational competition. Then, link this theory to innovation in order to review the literature and the development of a conceptual model.

For our research, there are three relevant theories relating to competition: Industrial Organisation (IO), resource-based view (RBV), and dynamic capability theory, as illustrated in Table 2.3.

Table 2.3: Competition theories

Requirements / Models	Level of analysis	Focus area	Environments characteristics	Competitive forces
IO	industry	Industry environment	Stable	- entry barriers - threat of substitution - bargaining power of buyer - bargaining power of supplier - rivalry between companies
RBV	Firm	Organisation's resources	Stable	Valuable, rare, inimitable, and non-substitutable resources
DC	Firm	Internal and external resources as well as market	Dynamic	Organisational behaviour and processes for developing, creating, integrating, and reconfiguring organisational resources

These three theories have some similarities and differences. For example, both IO and RBV theories can be best applied in a stable environment. On the other hand, IO and RBV theories suggest different root for organisational competitiveness. While

IO theory suggests the importance of industrial structure in organisational competitiveness, RBV highlights the importance of organisational resources. These theories are explained further in sections 2.3.1, 2.3.2 and 2.3.3.

2.3.1 Industrial Organisation Theory

Industrial organisation theory suggests that organisational performance and their competitiveness moderate by industry structure (Parnell, 2011). According, the industrial characteristics such as entry barriers and industry growth affect the firms' decisions on pricing policy, research and development activities, and investments strategies. Porter's five forces model is the most used framework in IO studies (Teece et al., 1997). The assumption behind this model is that firms' performance increases through identifying and neutralising external threats (Porter, 1980). Porter's model explained how firms can cope with environmental threats. This model has five components including threat of entry, the power of suppliers, the threat of substitute, the power of buyer, and rivalry among existing competitors. Porter (2008) described these factors as follows:

1. Threat of entry. New entrants attempt to achieve higher market shares and this diminishes the profitability of incumbents. He suggests that reducing price or increasing investment may deter new rivals.
2. The power of suppliers. Powerful suppliers may increase their profitability by charging incumbents at higher price. This will decrease the profitability of incumbents. For example, Microsoft by increasing the price of its operation system put the profitability of personal computer (PC) manufacturers under pressure, because their customers can switch to other PC makers which offer them lower price.
3. The power of buyers. Like suppliers, customers may erode the incumbents' performance by asking for lower price, demanding for higher quality product, or requesting better services. All of these increases incumbents costs which may lead to diminishing firms abilities to compete in markets.
4. The threat of substitutes. Substitute products have similar functions as current products but their applications are different. For example, travelling can be substituted with videoconferencing. Industry profitability

will be eroded as threat of substitute increases. In such environment, incumbents should increase products' performances and invest more in marketing in order to decline the substitution threat.

5. Rivalry among existing competitors. Competition between firms can have similar forms such as innovating products, reducing prices, improving services, and advertising. High degree of competitions between organisations shrinks their profit to lower level. When the rivalry is based on issues like brand image, product features, and services than price, companies may ask for higher price. In such situation, it prevents new comers to enter to such markets.

Porter's model has application for organisations which created a monopoly in their markets. One way to secure this is to obtain patents for innovative products which is common in some industry such as biotechnology and nanotechnology (Asheim, 2007). The problem here is that not all innovative products can obtain patent. The other weakness of IO perspective is that it ignores market dynamics and changes. This makes this view static because the focus is on industry rather than on firm characteristics. Some scholars have criticised IO because of not considering organisational factors as a driver for increasing firms' competitiveness (e.g., Rumelt, 1991; Caloghirou et al., 2004). These scholars suggested that internal factors are more important than industrial elements. For example, Rulmet (1991) found that choice of strategy is more important than the industrial context, as noted in Table 2.4.

Table 2.4: Comparing the importance of firms strategy and industry

Choice of industry and strategy	%
Choice of industry	8.3 %
Choice of strategy	46.4 %
Parent company	0.8 %
Not explained- random	44.5 %

Source: Rumelt (1991)

These weaknesses highlight the importance of using internal resources and capabilities. This shifted the scholars' attention towards adopting RBV theory.

2.3.2 Resource-Based View

The Resource-based view proposes that having scarce resources increases performance rather than creating benefits from organisational positions in the market (Tecce et al, 1997). The RBV links industry environment to managerial discretion and innovation in order to increase organisational performance (Amit and Schoemaker, 1993). Moreover, it is suggested that not all resources are beneficial (Ambrosini and Bowman, 2009). Firms' competitiveness enhances if they have ownership of VRIN resources. VRIN resources refer to those resources which are valuable, rare, inimitable, and non-substitutable (Ambrosini and Bowman, 2009). The features of VRIN resources are:

1. Valuable resources. Resources consider as valuable when they enable firms to follow strategies, in which enhances their efficiency and effectiveness (Barney 1991). These resources use in a way to add value to organisations by exploiting available market opportunities and neutralising threats.
2. Rare resources. If competitors have same resources and capabilities, they may be able to exploit them in similar ways (Barney, 1991). In such situation, achieving higher benefits may not be easily achieved.
3. Inimitable resources. Valuable and rare resources increase organisational performance, if they are hard to imitate by competitors (Barney, 1991). As competitors realised the advantages of particular resources, they may invest in acquiring such resources. If rivals achieved to acquire such resources, the benefits of them will be diminished.
4. Non-substitutability. The firms' benefits from valuable, rare, and inimitable resources can be sustained as long as there are no other substitutes for them. Barney (1991) reports that the resource substitution can occur in two forms. First, organisations may create new resources which enable them to use them in the same way as their rivals. Further, organisations may own strategic resources which are different from their competitors but using them lead to the same results such as having formal planning systems.

Having VRIN resources highlights the importance of resource heterogeneous in order to increase organisational competitiveness. This suggests that a specific set of resources enables organisations to be competitive and successful in the market by keeping away its competitors from imitating its products. Therefore, resource-based view like IO emphasises on a monopolistic way for enabling organisations to have more market share. Legal protections like patent help innovative organisations to benefit from their products based on RBV because of inhibiting their rivals from imitating their products and resources. Legal mechanisms are organisational resources and they categorised as intangible resources (Fernández et al., 2000). Intangible resources are those resources which involve information or knowledge and organisational competitiveness depends on them (Fernández et al., 2000).

Although RBV emphasises on internal factors, benefiting from innovation still relies on external protection. Accordingly, this model faces same problems as IO perspective which limits the application of it. Moreover, shorten product life-cycle means that few firms may benefit from their VRIN resources. It demonstrates that benefiting from innovation resides not only in having resources. Resource-based view has more drawbacks. For example, Kraaijenbrink (2010) points out that the main weakness of RBV refers to its practicality by managers. This theory does not predict until when organisations can benefiting from their VRIN resources. The assumption of owning VRIN resources to be competitive ignores the effects of market changes in production. Therefore, this theory, like IO perspective, becomes a static theory due to ignoring the effects of environmental changes on organisations. This may inhibit the application of this theory especially in dynamic markets. Accordingly, RBV may be best applicable to a stable environment.

This theory does not explain how and why some firms are able to sustain their market position in long term in dynamic environment (Eisenhardt and Martin, 2000). Therefore, firms which operate in such environments may not implement RBV. To overcome such weaknesses, Tecce et al (1997) developed a new paradigm which is known as dynamic capability theory.

2.3.3 Dynamic Capability Theory

Dynamic capabilities are defined as organisational processes which enable organisations to modify, change, delete, enhance, or reconfigure their resources

(Ambrosini and Bowman, 2009). Dynamic capability theory aims to establish a link between firms' resources and markets in order to explain how some organisations are successful over time. This theory development is based on RBV by considering how to renew capabilities through changes in markets (Tecce et al, 1997). It is applicable to 'high-velocity' and moderately dynamic markets (Eisenhardt and Martin, 2000). The characteristics and definition of these two markets are illustrated in Table 2.5. The type of DCs is different based on market dynamism. In moderately dynamic markets, managers develop their DCs by linking their experience together which enable organisations to deal with both current and new situations through elaborating and extending DCs (Eisenhardt and Martin, 2000). Dynamic capabilities develop gradually in moderately dynamic environment which cause the linear development of these capabilities predictable. In a dynamic environment, the development of DCs relates to selecting adequate capabilities to develop rather than elaborating and extending them gradually, which requires managers to decide which experience to use (Eisenhardt and Martin, 2000). The development path of DCs in high velocity markets is not linear which make them dynamic. Forecasting outcomes of dynamic capability in high velocity markets therefore cannot be easily achieved.

Table 2.5: Dynamic capability and types of dynamic markets

	Moderately dynamic markets	**High velocity markets**
Market definition	Stable industry structure, defined boundaries, clear business models, identifiable players, linear and predictable change	Ambiguous industry structure, blurred boundaries, fluid business models, ambiguous and shifting players, nonlinear and unpredictable change
Pattern	Detailed, analytic routines that rely extensively on existing knowledge	Simple, experiential routines that rely on newly created knowledge specific to the situation
Implementation	Linear	Iterative
Stable	Yes	No

Outcomes	Predictable	Unpredictable
Key to effective evaluation	Frequent, nearby variation	Carefully managed selection

Source: Eisenhardt and Martin (2000)

The application of DCs to different business environments depends on firms' abilities to develop and use their capabilities (Wang and Ahmed, 2007). To understand the nature and application of DCs, it is therefore important to distinguish between terms capabilities and DCs. Capabilities are firms' resources. Barney (1991) defines resources as "all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". Capabilities refer to ways organisations adapting, combing, and reconfiguring organisational resources in order to cope with market changes (Tecce et al, 1997). This means that capabilities are simply processes. In this respect, there is no difference between capabilities and traditional definition of DCs because both of them focus the way organisations influence their resources. The difference between DCs and capability comes from the term dynamic. The term dynamic does not mean change in environment or changing capabilities over time, but this refers to change in firms' resource bases (Ambrosini and Bowman, 2009). This means that organisations need to improve their resources bases constantly in order to cope with change in market demands (Ambrosini and Bowman, 2009; Helfat and Peteraf, 2003).

Despite of the extensive research on DC theory, studies are inconsistent (Wnag and Ahmed, 2007; Zahra et al., 2006). For example, the effect of dynamic capability on performance is up to some debates. The seminal paper on DC theory by Tecce et al (1997) suggests a direct link between DCs and performance. The advocates of this view argue that DCs enable a company to adopt to market and technological change through developing new products and processes or applying a more effective business model (Teece, 2007). They assume that having DCs leads to application of them. Therefore, the concern for a firm is to build on its DCs. Some studies considered an indirect link between dynamic capability and performance. For example, Zott (2003) suggests that rents generate indirectly by dynamic capabilities

through its effects on organisations' resource bases. The followers of this view argue that DCs does not contribute directly to the outcomes of organisational activities but rather they influence the operational capabilities (Helfat and Peteraf, 2003). They support their argument by referring to the definition of DCs as illustrated in Table 2.6. According to these definitions, DCs refers to those organisational processes which affect organisational resource bases.

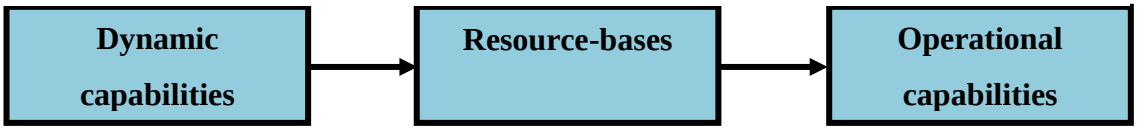
Table 2.6: Definitions of dynamic capabilities

Authors	Dynamic capabilities definitions
Ambrosini and Bowman (2009)	"A dynamic capability is a process that impact upon resources".
Wang and Ahmed (2007)	"A firm's behavioural orientation constantly to integrate, reconfigure, renew, and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage."
Helfat et al (2007)	"The capacity of an organisation to purposefully create extent or modify its resources base".
Zahra and George (2002)	"Dynamic capabilities are essentially change-oriented capabilities that help firms redeploy and reconfigure their resource base to meet evolving customer demand and competitors strategies".
Eisenhardt and Martin (2000)	"The firm's processes that use resources – specifically the processes of integrate, reconfigure, gain and release resources- to match or even create market change. Dynamic capabilities thus are the organisational and strategic routines by

	which firms achieves new resources configuration as market emerge, collide, split, evolve and die".
Tecce et al. (1997)	"The firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments".

Our research suggests an indirect link between DCs and organisational performance (Figure 2.3). The existing literature on DCs has not clearly determined the role of DCs on organisational outcomes such as performance. The definition of this concept mainly links it to the organisational resources. Earlier research suggests that DCs influence on operational capabilities (e.g., Helfat and Peteraf, 2003; Winter, 2003; Cepeda and Vera, 2007). Winter (2000) defines an operational capability as 'a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type.' It is suggested that routines in operational capability definition refers to 'repetitive pattern of activities' (Nelson and Winter, 1982). By considering the definitions of DCs (Table 2.6) and their effect on operational capability, DCs directly affects organisational resource bases and indirectly on operational capability and performance, as illustrated in Figure 2.3.

Figure 2.3: Relationship between DCs and operational capability



Dynamic capabilities have two components: path and position. Path shows that the history of organisations is matter (Teece et al., 1997). It is noted that past and present events shape the future of an organisation (Ambrosini and Bowman, 2009). This highlights the importance of past learning. Organisations therefore may identify and exploit an opportunity based on its prior experiences. Such learning obviously

influence on ways that organisations seek to acquire and improve their resource. Position refers to the specific assets of organisations (Teece, 2007). Dynamic capabilities therefore are not about searching and upgrading all type of organisational assets. Since this theory improved the RBV, those specific assets address VRIN resources which organisations improve over time according to the environmental change. This dynamic aspect of this theory makes it more applicable to innovation studies because shorten product life cycle highlights change in market constantly. To deal with market change, innovative organisations should constantly improve their VRIN resource in order to continue their innovativeness and competitiveness. Moreover, VRIN resources are hard to imitate and therefore constant improving them let organisations to increase its performance. Most of these resources are intangible and they cannot be easily copied. Therefore, dynamic capabilities are mainly about improving intangible resources, as illustrated in Table 2.7.

Table 2.7: Organisational resources

Name of resources	Description
Technological assets	It refers to the stock of a firm's know-how.
Complementary assets	Using know-how depends on using related assets to develop and introduce a product to a market.
Financial assets	It enables organisations to achieve its strategic goals.
Reputational assets	Reputation is information about a firm which shapes the reaction of its customers, competitors, ad suppliers.
Structural assets	It refers to the degree of hierarchy.
Institutional assets	This is about public policy and regulations such as intellectual property regime.
Market assets	It deals with a company's market share in a market.
Organizational boundaries	It is about the degree in which a firm expands its boundaries vertically and horizontally.

Source: Teece et al. (1997)

Three theories (IO, RBV, and DC) were reviewed. These were selected because they considered innovation as a tool for increasing organisational performance. This shows that these theories are market–oriented because they focus on performance in the light of market competition. Between these three theories, DC theory is more appropriate than IO and RBV to study innovation because it is dynamic in nature. This theory considers the importance of improving particular organisational resources in line with environmental changes. Improving organisational resources enables innovative organisations to constantly upgrade their resource base in order to maintain innovativeness.

2.3.4 Applying Absorptive Capacity for Studying Innovation

The problem with adopting DC theory is that there are different types of DCs. For example, Wang and Ahmed (2007) reviewed the existing research about this theory and they identified three common types of DC:

1. Adoptive capability. This allows organisations to identify new market opportunities.
2. Innovative capability. This shows the ability of organisations to combine innovation strategies with innovation processes within organisations for developing new products and/or markets.
3. Absorptive capacity. It refers to valuing, acquiring, assimilating, and exploiting external knowledge for commercial benefits.

The influence of DCs on each other has not received much attention (Ambrosini and Bowman, 2009). This may prevent existing studies to identify which DCs are more influential on organisational performance. The other possible explanation may drive from DCs definitions because they do not determine which resources organisations should invest as change occurs in the business environmental. The applicability of this theory may not be that beneficial for studying organisational innovation and performance. The reason may drive from the lack of understanding about which resources organisations should develop. Identifying an adequate type of DCs is important for studying innovation because it addresses which resource organisations should invest.

Accordingly, a focus on absorptive capacity (AC) is important to guide the development of a framework for studying innovation for several reasons. Developing new products resides in application of new knowledge as explained in Chapter One. Organisational growth and survival depends on their capabilities to innovate products continually. Therefore, organisations need to constantly improve their knowledge. The importance of using external knowledge is increased in recent years for innovating products (Ireland et al., 2002; Zollo et al., 2002) because competition is getting tighter and products have shorter life-span. Therefore, the business environment is uncertain and reliance on creating knowledge internally does not lead to innovation success (Chen, 2004).

Acquiring external knowledge has some advantages over developing it internally. Knowledge acquisition requires lower resources (Cassiman and Veugelers, 2006; Cohen and Levinthal, 1990). Moreover, few organisations are able to internally develop new ideas and knowledge due to high speed of technological change (Ahuja, 2000; Mitchell and Singh, 1996). Some of the leading innovative organisations such as Cisco System and Micorsoft extensively apply external knowledge (Chesbrough, 2003; Dyer et al., 2004). This example shows the importance of external knowledge acquisition from outside organisational boundaries and its role in innovation success. Therefore, AC is essential for innovation success (Cohen and Levinthal, 1990).

2.4 An Overview of Absorptive Capacity Studies

Absorptive capacity theory may be integrated with other theoretical approaches as illustrated in Table 2.8. It is suggested that there is an overlap between AC and other field of management studies such as organisational learning and knowledge management (Volberda et al, 2010; Easterby-Smith et al., 2008_a). Each of theoretical perspectives applies AC theory differently. For example, organisational learning studies relate organisational AC to the experiences, routines, and histories of organisations to value, acquire, assimilate, and exploit external knowledge. These studies focus at different level of analysis including individuals, organisations, dyads, and networks. On the other hand, innovation studies focuses on the interaction between R&D and AC in order to increase innovation and organisational knowledge.

Table 2.8: Theoretical lenses integrated with absorptive capacity

Theories	Main contributions	AC-related constructs	Implications
Learning	Fiol and Lyles (1985) Levitt and March (1988) Cohen and Levinthal (1989, 1990) Lyles and Salk (1996) Lane and Lubatkin (1998) Lane et al. (2001) Reagans and McEvily (2003) Dhanaraj et al. (2004) Lane et al. (2006)	● Organizational learning is based on direct experience and routines, history-dependent and target-oriented and influenced by contextual factors. ●Prior related knowledge is the most important antecedent of AC. ●Relative AC is more relevant for interorganisational learning than R&D-based AC.	●AC consists of three dimensions: recognition, assimilation and exploitation. ●(Inter)organizational context matters for AC ●Levels of analysis: individuals, organisations, dyads and networks
Innovation	Kedia and Bhagat (1988) Cohen and Levinthal (1989, 1990) Cockburn and Henderson (1998) Feinberg and Gupta (2004)	●The influence of technological opportunity and appropriability regimes on innovation is mediated by AC. ●R&D and AC interact to increase a firm's knowledge	●AC influences innovative performance. ●AC as by-product of R&D ●Cultural differences between countries affect AC ●(Inter)organizational context matters for

	Rothaermel and Alexandre (2009) Benson and Ziedonis (2009)	base and innovation. There is more to AC than just R&D; several (inter) organizational characteristics play a key role.	AC.
Managerial cognition	Bettis and Prahalad (1995) Prahalad and Bettis (1986) Lyles and Schwenk (1992) Calori et al. (1994) Dijksterhuis et al. (1999) Van den Bosch and Van Wijk (2001) Sanchez (2001) Lenox and King (2004) Minbaeva et al. (2003)	●Complexity tends to be resolved by a dominant logic. ●More diversity in a firm's activities increases the comprehensiveness and complexity of the CEO's mental map of the environment. ●Management logics greatly influence a firm's actions in the competitive landscape as well as the emergence of new organizational forms. ●Providing information by managers as well as individuals' abilities and	●Management logics, through organizational forms, influence absorptive capacity, especially in complex environments ●Managers can develop AC by directly providing information. ●Individuals' abilities as well as their motivations enhance AC.

		motivations enhances AC.	
Knowledge-based view of the firm	Kogut and Zander (1992) Starbuck (1992) Garud and Nayyar (1994) Grant ($1996_{a, b}$) Van den Bosch et al. (1999) Van Wijk et al. (2003) Foss and Pedersen (2004) Andersen and Foss (2005) Malhotra et al. (2005) Matusik and Heeley (2005) Lichtenthaler and Lichtenthaler (2009)	●Combinative capabilities play a key role in leveraging organizational knowledge. ●The knowledge characteristics of the Environment influence the characteristics of the knowledge absorption by the firm. ●Organizational form determines the characteristics of AC. ●Network properties influence the level of AC.	●High AC increases the amount and productivity of knowledge. ●Combinative capabilities, organizational form and knowledge characteristics all influence the firm's AC. ●AC is particularly relevant when knowledge is shared.
Dynamic capabilities	Cohen and Levinthal (1994) Grant (1996_{b}) Van den Bosch et al. (1999) Floyd and Lane (2000)	●AC is a capability and thus requires investments. ●AC, being itself a high level capability, is also the result of lower level organizational	●AC is a high level capability, supported by other capabilities. ●Potential AC consists of knowledge acquisition and Assimilation

	Zahra and George (2002) Jansen et al. (2005) Lichtenthaler (2009)	or combinative capabilities. ●Potential and realized AC (PAC and RAC) can be broken down into knowledge acquisition, assimilation, transformation and exploitation capabilities.	capabilities and is increased by coordination capabilities. ●Realised AC consists of knowledge transformation and exploitation capabilities and is increased by systems and socialization capabilities.
Coevolution	Cohen and Levinthal (1994, 1997) Koza and Lewin (1999) Lewin et al. (1999) Lewin and Volberda (1999) Van den Bosch et al. (1999) Huygens et al. (2001) Volberda and Lewin (2003)	●Macro-coevolutionary effects: Knowledge environments coevolve with the emergence of organizational forms and combinative capabilities that are suitable for absorbing knowledge. ●Micro-coevolutionary effects: Increasing levels of AC lead to more readily accumulating additional	●AC enables or restricts firm adaptation. ●AC coevolves with the knowledge environment. ●Levels and direction of AC are shaped by the joint effect of managerial actions and developments in the knowledge environment.

		knowledge in subsequent periods. ●Higher levels of AC raise the aspiration level and increase the level of exploration adaptation.	

Sources: Adopted from Volberda et al. (2010) with modification

Despite the difference in implementing AC from different theoretical lenses, there are some commonalities among them. For example, both organisational learning and innovation studies consider the importance of organisational context for developing AC. Cohen and Levinthal in both of their papers in 1989 and 1990 linked innovation to organisational learning through AC theory. It should be noted here that Cohen and Levinthal in 1980 focused more on organisational innovation, while they focused more on organisational learning and abilities in their paper in 1990. The differences and similarities between the implications of different theoretical lenses to AC theory reflect that AC has different dimensions. It is suggested that AC is a multi-dimensional construct (Matusik and Heeley, 2005). It is therefore important to define AC in a way which can be applied to different theoretical approaches in order to identify its different dimensions.

2.4.1 Defining Absorptive Capacity

There are limited studies into AC which provide an in depth theoretical discussion and define it as a multi-dimensional constructs (Murovec and Prodan, 2009). There are also different definitions of AC identified through four sets. Each of these definitions focuses on particular dimension from different theoretical lenses. The definition of AC has been changed over time. For example, Camisón and Forés (2010) coin that Cohen and Levinthal (1990) define AC through linking this construct to not only as a by-product of R&D activities, as they did in 1989, but also as outcomes of organisational knowledge, experience, a shared language, cross-functional interface, the mental models, and the problem solving ability of

organisational members. The diversity of definition inhibits the evaluation and comparison of AC studies together (Lane et al., 2006), as illustrated in Table 2.9.

Table 2.9: Main absorptive capacity definitions

Study	Dimensions of AC	Theoretical lens	Definition of AC
Lichtenthaler and Lichtenthaler (2009)	Exploration of external knowledge	Knowledge management	An ability to explore external knowledge
Lane et al., (2006)	Exploratory, transformative and exploitative learning process	Processes-based organisational learning	An organisational ability to implement external knowledge through learning processes
Zahra and George (2002)	Acquisition, assimilation, transformation and exploitation	Dynamic capability	Set of organisational routines and processes
Kim (1997)	Learning and solving problems	Organisational capability	Individuals' knowledge and their efforts to solve problems.
Cohen and Levinthal (1994)	Evaluating, assimilating and applying	Dynamic capability	Ability to evaluate technological and commercial knowledge, assimilate it and apply it for commercial ends
Cohen and Levinthal	Valuing, acquiring,	Cognitive aspect of learning process	An organisational ability to value,

(1990)	assimilating and exploiting		acquires, assimilate, implements external information for commercial ends
Cohen and Levinthal (1989)	Identification, assimilation and exploitation	Organisational innovation	Ability to learn from external knowledge providers

Frequently, AC definitions highlight different aspects of this construct which shows the awareness of scholars about its multi-dimensional aspects. Moreover, reviewing the main definitions of AC shows that these definitions drive from interrelated theoretical lenses. Nevertheless, scholars consider different dimensions based on the theoretical lenses that they adapted to their studies. For example, Zahra and George (2002) consider four dimensions of AC including acquisition, assimilation, transformation, and exploitation from dynamic capability lens.

However, studies mostly adopt AC definition which was given by Cohen and Levinthal in 1990 (Murovec and Prodan, 2009; Lane et al., 2006; Van den Bosch et al., 2003). It is coined that a few study, which followed Cohen and Levinthal (1990) definition, provided in-depth explanation of AC (Lane et al., 2006). Cohen and Levinthal published three papers and they slightly modified the definition of AC in each of these papers, as illustrated in Table 2.10. In their paper in 1989, they considered the AC as an organisational ability to identify, assimilate, and exploit external knowledge. They proposed similar definition in 1994. However, they considered one more dimensions, which is acquisition, in their paper in 1990. Valuing knowledge does not lead to acquisition (Todorova and Durisin, 2007). There are reasons which inhibit organisations from knowledge acquisition. It is suggested that organisations share their knowledge with a third party when they can benefit from it (Spender, 1996). Acquisition dimension is important because it links valuing to assimilating and to exploiting stages. The popularity of Cohen and Levinthal's AC definition in 1990 may be because of its comprehensiveness.

Table 2.10: Overlap between Cohen and Levinthal's definitions

Year	Valuing	Acquiring	Assimilating	Exploiting
1994	•	N/A	•	•
1990	•	•	•	•
1998	•	N/A	•	•

Kim (1997) focuses on individual ability to solve problems. The importance of individuals' knowledge and their level of AC are widely acknowledged (Cohen and Levinthal, 1990; Jones, 2006). However, there is a problem with Kim's AC definition. Organisational AC is not equal with sum of individuals' AC (Cohen and Levinthal, 1990). There are factors such as organisational structure affects organisational AC (Van den Bosch et al., 1999). Too much emphasising on individuals' AC confers the application of Kim' definition to organisational level.

Another definition of AC is given by Zahra and George in 2002. They reviewed AC papers and they introduced four sequential and interrelated capabilities including acquisition, assimilation, transformation, and exploitation, as illustrated in Table 2.11. The linear assumption between these four capabilities is problematic due to the overlap between assimilation and transformation capabilities. Todorova and Durisin (2007) suggest that transformation is not a stage after assimilation but rather these two capabilities either substitute with each other. According to them, assimilation capability happens when organisations modify new ideas to fit with the existing cognitive structure. Organisations rely on their transformational capability when the new idea cannot match with the existing knowledge structure.

Table 2.11: Definitions of four interrelated capabilities

Dimension of AC	Description
Acquisition	A firm's capability to identify and acquire externally generated knowledge that is critical to its operation
Assimilation	A firm's routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources

Transformation	A firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge
Exploitation	A firm's routines and processes which enables refining, extending, and leveraging existing competencies or to create new ones by incorporating acquired and transferred knowledge into its operations

Source: Zahra and George (2002) with modification

Lane et al. (2006) definition of AC is based on organisational learning as, "Absorptive capacity is a firm's ability to utilize externally held knowledge through three sequential processes: (1) recognizing and understanding potentially valuable new knowledge outside the firm through exploratory learning, (2) assimilating valuable new knowledge through transformative learning and (3) using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning". Furthermore, Lichtenthaler and Lichtenthaler (2009) view AC from a knowledge management perspective. Here AC enables organisations to acquire external knowledge. This definition of AC ignores the importance of assimilating and exploitation stages.

It is evident that these definitions are mainly intertwined with organisational learning, dynamic capability, and knowledge management perspectives. Similarly, Easterby-Smith et al. (2008_a) point out that studies into AC have included elements of organisational learning, dynamic capability, and knowledge management perspectives. Therefore, adopting a definition which locates between these three fields helps to achieve a comprehensive understanding about the nature of AC. It was explained in section 2.2.3 that organisational learning enables organisations to develop new knowledge for its innovation. Moreover, AC is a form of DCs which enables organisations to acquire and use external knowledge. Since external knowledge, organisational learning, and AC are essential components for innovation, this study adopt Lane et al. (2006) definition of AC. Lane et al.'s (2006) definition of AC is in line with traditional definition of this construct which was given by Cohen and Levinthal's in 1990 as they mentioned. As observed through the above

explanation, most of the definitions of AC did not properly include all dimensions of AC which was proposed by Cohen and Levinthal (1990).

2.4.2 Antecedents of Absorptive Capacity

The second stage is to understand what enable organisations to buy and/or develop AC. It is argued that AC can be bought when organisations recruit new employees, contract with consultancy organisations, or purchase other companies (Cohen and Levinthal, 1990). Developing AC, on the other hand, depends on its antecedents, illustrated in Table 2.12. Due to multi-dimensionality of AC, it is expected that building AC may depend on different antecedents. A few of these factors are cited by more than one researcher. For example, Prior related knowledge and organisational R&D capabilities have been widely acknowledged as antecedents of AC from different theoretical lenses. There is an agreement about the importance of prior related knowledge and R&D activities on building AC. Organisations can value and acquire knowledge quicker when they have some prior knowledge in similar area (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998). R&D activities also enable organisations to build AC. Most of the studies use R&D proxies such as R&D intensity (e.g., Cohen and Levinthal, 1990; Tsai, 2001; Mowery et al., 1996) to measure organisational AC (Camisón and Forés, 2010). It is suggested that R&D activities cannot be a determinant of AC in low- and medium-tech industries like wood industry because innovation in this industries does not rely much on R&D activities (Spithoven et al., 2011). Therefore, R&D activities cannot be essential for developing AC in all industries.

Table 2.12: Antecedents of absorptive capacity

Study	Antecedent of AC	Theoretical lens	Level of analysis
Volberda et al. (2010)	Managerial antecedents (combinative capabilities, management cognition/dominant logic, individual knowledge development/sharing), intraorganisational antecedents (Organizational form, Incentive structures, Informal networks, Internal communication), and interorganisational antecedents (knowledge creation and sharing, alliance management systems, dyad and network knowledge development and transfer and relatedness of organizations)	Integrating multiple perspectives	Multi-levels
Murovec and Prodan (2009)	Internal R&D, training of personnel, innovation cooperation and attitude towards change	Absorptive capacity	Organisation
Fosfuri and Tribó (2008)	R&D cooperation, Contract R&D and experience with knowledge search	Dynamic capability	Organisation
Vega-Jurado et al. (2008_a)	R&D activities, organizational knowledge, formalization and social integration mechanisms	Absorptive Capacity	Organisation
Todorova and Durisin (2007)	Knowledge source and Prior knowledge	Dynamic capability	Organisation

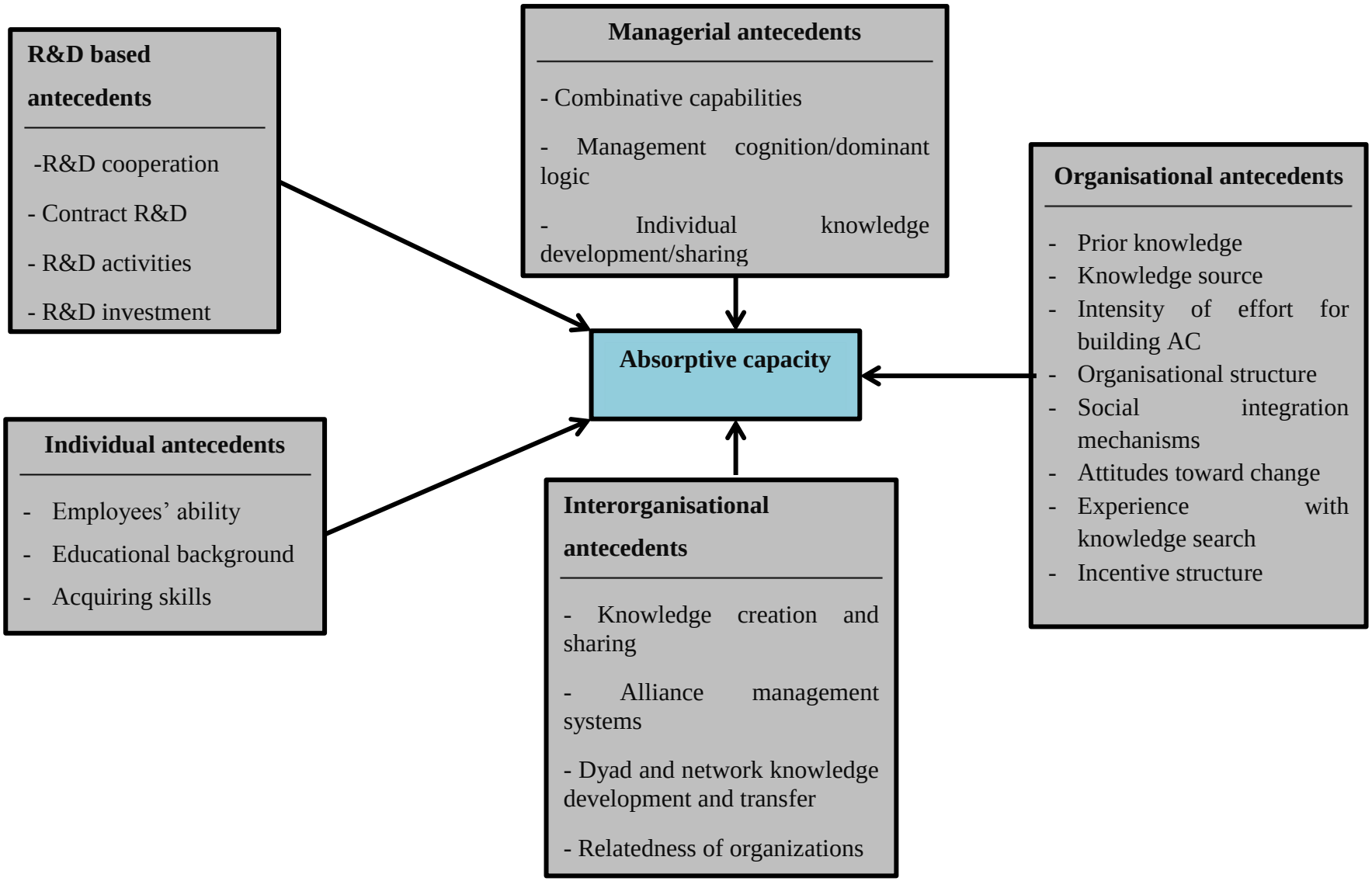
Jansen et al. (2005)	**Potential AC:** Mechanisms associated with coordination capabilities such as cross-functional interfaces, participation in decision making and job rotation **Realised AC:** Mechanisms associated with socialization capabilities such as connectedness and socialization tactics	Dynamic capability	Organisation
Zahra and George (2002)	Knowledge source and Prior knowledge	Dynamic capability	Organisation
Van den Bosch et al. (1999)	Prior organisational knowledge, organisational forms and combinative capabilities	Absorptive capacity	Organisation
Lane and Lubatkin (1998)	Similarity of both firms' (1) knowledge bases, (2) organizational structures and compensation policies and (3) dominant logics	Organisational learning	Dyad-level
Kim (1997)	A prior knowledge base and an intensity of effort	Organisational capability	Organisation

Cohen and Levinthal (1990)	Prior organisational knowledge, knowledge source, employees' ability, educational background, acquiring skills, job-related competences, intensity of effort to develop AC, Investment in R&D and structural configuration and external factors	Cognitive aspect of learning process	Organisation

Furthermore from Table 2.12 is that scholars consider different antecedents for building AC. Few scholars in recent years try to categorise these antecedents (e.g., Volberda et al., 2010). Cohen and Levinthal (1990) consider the antecedents of AC at different levels. At individual level, they (1990) mention factors like employees' ability and educational background. They (1990) include factors such as investment in R&D at organisational level. They (1990) finally consider the effect of external factors such as appropriability regimes on building AC. However, the problem with Cohen and Levinthal's work is that they do not explicitly categorise the antecedents of AC. Some scholars like Jansen et al. (2005) categorise the antecedents of AC based on potential and realised AC. Conceptualising AC as potential and realised AC is problematic due to overlap between them (See Todorova and Durisin, 2007).

We therefore categorises the antecedents of AC into five groups, as illustrated in Figure 2.4. The main advantage of this categorisation of the antecedents of AC over the existing models is that it can be applied to both R&D and non-R&D based industries. Lewin et al. (2011) mention that industry affects the way organisations build their AC. First type of antecedents refers to R&D based. Since AC drives not only by R&D activities, the influence of this antecedent varies across industries. The second type of the antecedents of AC refers to individual AC. These antecedents are important because it is one of the main parts of organisational AC (Cohen and Levinthal, 1990). Increasing individual capabilities and skills increases partly organisational knowledge (Cohen and Levinthal, 1990). One way in which organisations increases their individual AC is through recruiting highly educated personnel. Some scholars apply level of education in order to measure organisational AC (e.g., Mangematin and Nesta, 1999).

Figure 2.4: Antecedents of absorptive capacity



The seminal work of Cohen and Levinthal (1990) notes that individual AC results into organisational AC through implementing communication strategy. Adopting adequate communication strategy enables organisations to build on their AC. However, some of the AC antecedents are path-dependent including prior organisational knowledge and experience with knowledge search (Zahra and George, 2002). Organisations are able to acquire, assimilate, and exploit external knowledge effectively, when they have some prior understanding about it (Cohen and Levinthal, 1990; Zahra and George, 2002; Todorova and Durisin, 2007). Accordingly, it is suggested that accumulating organisational knowledge in one particular area helps organisations to predict future technological change in related area (Cohen and Levinthal, 1990). Moreover, it is suggested that organisations prefer to acquire knowledge from those organisations which have been already acquired knowledge from them successfully. For example, Bierly et al. (2009) report a positive relationship between past successful collaboration with universities and organisational innovation. Moreover, drawing on interorganisational antecedents of AC, Lane and Lubatkin (1998) explain that similarities between two organisations structure, policies, and knowledge structures enables the recipients to absorb the senders' knowledge effectively. Therefore, both interorganisational and individual antecedents of AC shape organisational AC.

Finally, managerial antecedents of AC are important because they influence individual and organisational AC. It is mentioned that particular individuals have a determinant role in organisational AC and these individuals facilitate organisational access to external environments and transfer of knowledge to subunits (Cohen and Levinthal, 1990). Managers play a significant role in building AC (Van den Bosch et al., 1999; Zahra and George, 2002). Turning individual AC into organisational AC depends on organisational routines and processes which facilitate communication, sharing, and transferring individual knowledge (Cohen and Levinthal, 1990). Managers have a critical role in communicating and transferring knowledge because of their positions. Moreover, cognitive basis rely on individual prior knowledge (Cohen and Levinthal, 1990). Cognitive basis of managers enables organisations to improve AC. It is suggested that managers are gatekeepers and organisational AC relies on them (Cohen and Levinthal, 1990). In similar line, Jones (2006) reports that

new recruited middle managers can act as a change agent in order to enhance organisational AC.

The third managerial antecedents are combinative capabilities. Kogut and Zander (1992) define it as firms' capabilities which enables organisation to combine and implement new acquired knowledge with their own knowledge. Van den Bosch et al. (1999) categorise combinative capabilities into three types which are system capabilities, coordination capabilities, and socialisation capabilities. System capabilities enable organisations to integrate explicit knowledge through providing direction, policies, procedures, and manuals. Coordination capabilities facilitate knowledge absorption by encouraging the relationship between team members. Socialisation capabilities allow organisations to achieve a shared ideology which helps employees to reach the same interpretation of reality. Jansen et al. (2005) show that coordination capabilities increase potential AC, while socialisation capabilities enhance realised AC. One the other hand, Van den Bosch et al. (1999) point out that coordination capabilities increases AC and both systems and socialisation capabilities have negative effect on AC. The contractor results regarding the impact of combinative capabilities on AC resides in lack of adequate attention to its components. For example, Van den Bosch et al. (1999) focus on the dimensions of knowledge. It is also noticed that few studies like Jansen et al. (2005) investigated the relationship between combinative capabilities and the potential and realised components of AC. Despite of lack of adequate attention to the components of AC, combinative capabilities are important determinants of organisational AC because they enable organisations to combine new knowledge with their current knowledge bases (See combinative capabilities definition above).

2.4.3 Absorptive Capacity and Innovation

Absorptive capacity enables organisations to achieve different outcomes such as innovation, competitive advantages, and strategic flexibility (Zahra and George, 2002; Todorova and Durisin, 2007; Volberda et al., 2010). The link between AC and innovation has been studied from different theoretical approaches with different outcomes (Table 2.13). It was mentioned in Table 2.2 that innovation is one of the theoretical lenses which has been applied for studying AC. It is explored from Table 2.13 that studies which investigated the link between AC and innovation has adopted

different theoretical approaches. Moreover, some of these studies mentioned AC but they are not empirically investigated the influence of AC on innovation. For example, Vega-Jurado et al. (2008_b) included the concept of AC for understanding the effects of internal and external factors on product innovation novelty across industries. They (2008_b) did not mention explicitly to AC in their findings and they considered AC as equal to in-house R&D. This assumption may be problematic for comparing different industries because innovation does not drive by in-house R&D in traditional sectors as mentioned in section 2.4.2.

Table 2.13: Reviewing some absorptive capacity and innovation integrated studies

Study	Aim	Methods	Main findings	Theoretical lens
Cepeda-Carrion et al. (2012)	Examining organisational context and capabilities which influence the relationship between AC and innovation	Survey	- AC is an important determinant of innovation. - Unlearning context increases potential and realised AC. - Information system capabilities helps managers to enhance AC.	Dynamic capability
Spithoven et al. (2011)	Focusing on the role of collective research centres in building absorptive capacity at the inter-organisational level in small organisations and organisations in traditional sectors	Combining interview data with secondary data	- Absorptive capacity is required for open innovation. - Firms with low level of AC use alternative approach for involving in inbound open innovation.	Combining absorptive capacity with open innovation theory
Kostopoulos et al. (2011)	Examining the role of absorptive capacity as both a mechanism to identify and translate external knowledge inflows into tangible benefits, as well as a means of	Secondary data from third Community Innovation Survey	- External knowledge inflows are directly related to absorptive capacity and indirectly related to innovation. - Absorptive capacity contributes, directly and indirectly, to innovation and financial performance but in different	Absorptive capacity

	achieving superior innovation and time-lagged financial performance	(CIS-3) administered in Greece by the General Secretariat for Research and Technology (GSRT)	time spans.	
Hughes and Wareham (2010)	Examining the features of innovation strategy and formulation process in global pharmaceutical companies innovation portfolio	Case study using interviews and archival records	- Open innovation building capability depends on external information sharing and uncertain knowledge arbitrage in networks but not on value capture models and technology evaluation criteria. - Proposing a simple and bi-directional AC model which link external information sharing and uncertain knowledge arbitrage to open innovation	Combining absorptive capacity with open innovation
Zhou and	Examining the effects of	Survey	- Technological capability increases	Combining

Wu (2010)	technological capability in product innovation		exploitative innovation, while it has U-shape effects on explorative innovation. - Explorative innovation is inhibited when organisations have high level of technological capability. - Strategic flexibility increases the positive effect of technological capability in explorative learning.	absorptive capacity and organizational inertia theory
Escribano et al. (2009)	Understanding the degree of which AC influences the flow of knowledge for achieving innovation	Secondary data from the Community Innovation Surveys (CIS) for 2000 and 2002	- High level of AC increases firm's competitiveness, particularly in turbulent knowledge environment which protect with strong intellectual property regime.	Absorptive capacity
Fabrizio (2009)	Examining the link between a firm's absorptive capacity-building activities and the search process for innovation	Survey	- Firms engage in basic research profit from collaborating with university. - Collaborating with university scholars enables organisations to search quicker for high quality new inventions.	Absorptive capacity

Murovec and Prodan (2009)	Providing stronger quantitative evidence in the field of organizational absorptive capacity research by using a more direct measure of absorptive capacity and a wide range of variables in a cross-nationally tested structural model	Survey	- The existence of demand-pull and science-push AC was tested. - Both demand-pull and science-push positively related to product and process innovation. - Identified important determinants of AC	Absorptive capacity
Lichtenthaler and Lichtenthaler (2009)	Integrating AC for developing a capability-based framework for open innovation processes	Review paper	- Identified six knowledge capabilities for managing internal and external knowledge for open innovation processes - Internal knowledge capabilities include inventive, transformative and innovative capacity. - External knowledge capabilities include absorptive, connective and desorptive capacity (ability to transfer knowledge).	Integrative perspective through merging knowledge management, DC, and AC perspectives

Chen et al. (2009)	Examining the effect of relationship learning and AC on competitive advantages of companies through their innovation performances	Survey	- Both relationship learning and AC are positively associated with innovation performances. - Dividing companies into three groups ('Highly Capable Companies', 'Medially Capable Companies' and 'Lowly Capable Companies) showed that lowly capable companies should increase both relationship learning and AC in order to enhance their innovation performances.	Resource-based view
Bierly et al. (2009)	Examining organizational conditions which enable organisation to implement external knowledge for explorative and exploitative innovations	Survey	- The determinants for exploiting and exploring external knowledge are different. - Technological relatedness is negatively associated with using external knowledge for explorative innovation. - Prior experience with universities is better predictor of using external knowledge when knowledge is explicit. - Technological capability is better	Absorptive capacity

			predictor of using external knowledge when knowledge is tacit.	
Liao et al. (2008)	Investigating the relationship between knowledge sharing, absorptive capacity and innovation capability	Survey	- AC Intervenes the relationship between knowledge sharing and innovation capability. - Knowledge sharing increases AC.	The theory of knowledge inertia
Fosfuri and Tribó (2008)	Investigating the antecedents of AC	Survey	- R&D cooperation, external knowledge acquisition and experience with knowledge search are key antecedents of a firm's potential AC. - Potential AC is essential for achieving competitive advantages in innovative organisations. - Increasing potential AC facilitates internal change.	Dynamic capability
Vega-Jurado et al. (2008_b)	Investigating internal and external factors which increases product innovation and understanding the effects of these factors across industries	Secondary data from Spanish Survey of Technological Innovation	- Technological capability and R&D activities are two important determinant of product innovation. - Industrial sectors effect on the degree of product novelty as well as on the technical capabilities and R&D	Resource-based view

		2000	activities of organisations. - Non-industry agents influence technological opportunities when technological capability and R&D ability are high.	
Zahra and George (2002)	Determining the main dimensions of AC and reconceptualising AC	Review paper	- Two dimensions of AC are potential AC (including acquiring and assimilating capabilities) and realised AC (including transforming and exploiting capabilities) - Knowledge source and experience are two antecedents of potential AC which intervine by activation trigger. - Strategic flexibility, innovation, and performance are outcomes of realized AC that regime of appropriability affect this relationship. - Social integration mechanisms influence the relationship between potential and realised AC.	Dynamic capability

Cohen and Levinthal (1990)	Arguing AC is essential for innovation capabilities	Survey	- Development of AC and innovation performance is path-dependent. - Firms' investment in R&D is a main determinant of AC and proposing an investment model.	Absorptive capacity

Table 2.13 shows most of studies are mainly followed DC theory or AC perspective to research innovation. A few studies attempt to combine AC or DC theory with other theoretical approached or other field of studies within management research. For example, Hughes and Wareham (2010) combine AC with open innovation theory. Domain use of AC or DC theory leads to some problems in the existing studies.

An initial problem is diversity of findings which leads to confusion about the relationship between AC and innovation. By reviewing the existing conceptual models, the findings can be categorised into three types. First groups consider AC as an important mediator variable. For example, Fosfuri and Tribó (2008) show that AC mediate the relationship between interaction with external knowledge sources and innovation performance. The second group suggest AC as a moderating variable. Escribano et al. (2009) suggest that AC facilities managing external knowledge flow for increasing innovation outcomes. Other studies consider the direct effect and/or indirect effect of AC on innovation. For example, some scholars propose a direct effect of AC on innovation (e.g., Cohen and Levinthal, 1990; Zahra and George, 2002: Lane et al., 2006; Murovec and Prodan, 2009; Chen et al., 2009; Spithoven et al., 2011; Cepeda-Carrion et al., 2012). Similar to these studies, Kostopoulos et al. (2011) find direct and indirect effect of AC on innovation.

Some scholars propose that AC is important for innovation but there are other capabilities organisations should have. These studies mainly adopted knowledge management perspective. It is argued that AC is important for acquiring external knowledge but it is not sufficient for maintaining and implementing external knowledge (Figure 2.5). Todorova and Durisin (2007) suggest that organisations sometimes should maintain externally acquires knowledge for some periods of time before can find an application for it. In this respect, having capability to maintain the knowledge for some time is essential. However, there are two weaknesses within this argument. Firstly, the proponents of this perspective have not fully applied the definition of AC. Acquiring external knowledge is one of the dimensions of AC, while this construct also enables organisations to improve organisational knowledge through assimilation, transformation, and exploitation capabilities (e.g., Zahra and George, 2002; Todorova and Durisin, 2007). Moreover, the conceptual models

overlook the difference between the concept of learning and knowledge. It is evident that the importance of organisational learning in each stage of the knowledge management process has received little attention. It was explained in section 2.2.3 that organisational learning helps organisations to acquire and exploit external knowledge for innovation activities. It is argued that the transformative learning process as a critical part of AC definition enables organisations to reactive maintaining knowledge (Sun and Anderson, 2010). In other words, AC not only helps organisations to acquire and exploit external knowledge but also to retain knowledge. In other words, the root of the weaknesses conceptual models like Figure 2.5 is through and inadequate application of AC. This argument is supported by Lane et al. (2006) who reported that most of the studies into AC do not properly implement its definition.

Figure 2.5: A knowledge management model on innovation

	Knowledge exploration	**Knowledge retention**	**Knowledge exploitation**
Internal (Intrafirm)	Inventive capacity	Transformative capacity	Innovative capacity
External (Interfirm)	Absorptive capacity	Connective capacity	Desorptive capacity

Source: Lichtenthaler and Lichtenthaler (2009)

The second limitation is that studies on AC consider innovation as an outcome. This assumption is in line with traditional argument in the field of AC. Firms with higher AC can be more innovative and competitive (Chen et al., 2009; Zahra and George, 2002). In other words, organisations need to constantly invest in developing AC. Accordingly, it may be argued that improving AC automatically leads to competitive advantages and innovation. This does not really consider the role of individuals in AC. The role of individuals in developing AC is well acknowledged (Cohen and

Levinthal, 1990; Jones, 2006). However, only a few studies empirically focus on the role of individuals (e.g., Jones, 2006; Sun and Anderson, 2012). For example, Jones (2006) shows how new recruited middle managers act as a change agent in developing AC. Moreover, Cohen and Levinthal (1990) argues that individual AC is main part of organisational AC. Studies investigate the role of individual on building AC but not using it. There is a difference between what people can do and what they actually do in practice. For example, individuals with higher commitment work harder towards their organisational goals (Armstrong, 2006). This example clearly shows that individuals may have high level of AC but they do not allow it to translate into organisational AC. Therefore, enabling AC would help organisations to translate individual into organisational AC.

Managers play a significant role in developing AC (Zahra and George, 2002). It is suggested that particular individuals have a determinant role in organisational AC and these individuals facilitate organisational access to external environments and transfer of knowledge to subunits (Cohen and Levinthal, 1990). Managers act a point of connection between their organisations and environment. Top managers facilitate organisational accesses to environment due to their positions (Cohen and Levinthal, 1990). Middle managers enable transferring knowledge within and across their organisations because they are involve directly with operational activities (Sun and Anderson, 2012). A few exceptional researches have investigated the role of top and middle managers in building AC (Table 2.13). For example, Sun and Anderson (2012) show that the combinative leadership styles of top and middle managers influence AC. However, Sun and Anderson (2012) do not establish a relationship between top and middle managers' leadership styles and innovation.

The other limitations of AC studies are: lack of focus on the AC processes and, dominant use of quantitative methods. Table 2.13 illustrates that studies investigated the relationship between AC and innovation mainly adopted DC or AC theory. Both of these theories refer to processes (Zahra and George, 2002). However, reviewing the literature (Table 2.7) reflects that the process aspect of AC is not well researched. Easterby-Smith et al. (2008_a) encourage the researchers to focus on inner processes of AC. It is suggested that organisational processes comprise of the interaction between employees (Todorova and Durisin, 2007). It is highly important to

investigate AC processes because the lack of attention to them has also led researchers to overlook the role of individuals in developing, deploying, and maintaining AC (Lane et al., 2006). Moreover, the dominant use of quantitative study inhibit the development of AC theory as this approach is suitable for testing a theory rather than expanding it (Easterby-Smith et al., 2008_a). Table 2.13 also illustrates the dominant use of quantitative approach, although some recent works are exceptional (e.g., Sun and Anderson, 2012; Hughes and Wareham, 2010).

Table 2.13 illustrates that AC studies mainly focus on innovation performance and organisational innovation. Both of innovation performance and organisational innovation are broad constructs because they address different types of innovation. It is suggested that the mix outcomes of innovation studies drives from lack of focus on a particular type of innovative organisations (Damanpour and Wischnevsky, 2006). Innovative organisations can generate and/or adopt innovation and the process of adopting and generating innovation are different (Gopalakrishnan et al., 2010; Damanpour and Wischnevsky, 2006). The generating process of innovations comprises of five stages: idea generation, project definition, problem-solving, design and development, and marketing or commercialization and these stages do not usually follow a linear fashion (Gopalakrishnan et al., 2010). Therefore, the processes of AC may be different based on the type of organisations. Based on Damanpour and Wischnevsky (2006) argument, this thesis suggests that focusing on innovation adopting organisations which allows the researcher to compare their findings. We focus on innovation adopting organisations because they rely on external knowledge more than other types of innovative organisations (Gopalakrishnan and Bierly, 2001).

2.5 Conclusion

The aim of this chapter was to provide an understanding regarding the main theories, as well as reviewing the existing studies on AC. This understanding provided a foundation which facilitates empirical investigating the research gaps. This chapter divided into three main sections. In the first section, definitions of innovation, knowledge, and learning were reviewed. Adopting adequate definition of each of these construct helped to determine the relationship among them. In the second part, three competing theories including IO, RBV, and DC were explained. The

discussions in this section were revealed that the weaknesses of all of these theories which provided a justification for adopting AC theory in this thesis. Accordingly, the existing studies on AC were reviewed in the last part. The explanations in this part reflected the existing gaps in the literature. The main gaps were lack of focus on the AC processes, dominant use of quantitative methods, treat innovation as an outcome, not identifying any particular type of innovative organisations, and lack of attention towards the influence of agents particularly managers in AC.

Identifying the existing gaps in the literature is important because it provides a foundation for developing a conceptual model for fulfilling the gaps. The next chapter will explain the conceptual model of this thesis. The conceptual model explain the influence of AC on innovation and the way top and middle managers facilities the accomplishing the learning processes of AC.

Chapter 3: Integrating Absorptive Capacity, Innovation, and Leadership Styles

3.1 Introduction

The aim of this chapter is to present the formulation of a conceptual model based on the theoretical deficiencies identified in previous research (Chapter 2). The conceptual model determines the main constructs in relations to the phenomenon under investigation and proposes valid relationships (Miles and Huberman, 1994). Developing the conceptual model is extremely important as it helps to integrate a study to the existing related body of knowledge (Saunders et al., 2009). Therefore, the conceptual model provides a foundation to guide the empirical analysis and facilities the combination of the findings towards an original research contribution.

The rest of this chapter explains the conceptual model and the relationship between its constructs. Our research develops a conceptual model by linking AC to innovation and by explaining the influence of leadership styles of top and middle managers.

3.2 Absorptive Capacity and Innovation

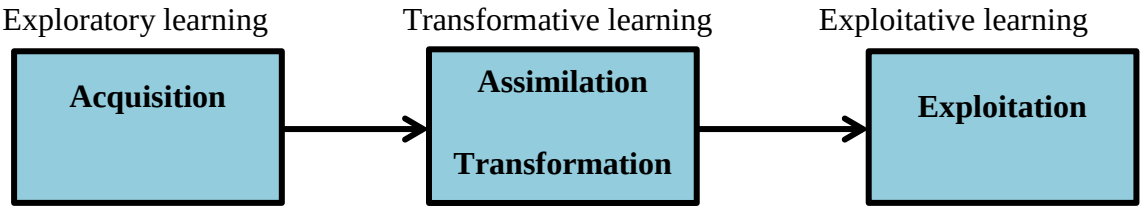
It was explained in section 2.2.3 that knowledge leads to innovation through learning organisation. Absorptive capacity enables organisations to reach new external knowledge and implement it for innovation activities. Absorptive capacity can be conceptualised as learning processes (Lane et al., 2006; Sun and Anderson, 2010; 2012). In this section of this chapter, it is explained how AC affects innovation processes.

3.2.1 Absorptive Capacity Learning Processes

Absorptive capacity refers to three sequential learning processes including, exploratory, transformative, and exploitative learning (Lane et al., 2006). The exploratory learning process enables organisations to acquire external knowledge (Lichtenthaler, 2009). For obvious reason, organisations first need to value external

knowledge before acquiring it. There is a synergy between the concept of potential AC, which developed by Zahra and George (2002), and the exploratory learning process because both of these constructs refers to valuing and acquiring knowledge, as illustrated in Figure 3.1. Prior market and technological knowledge is essential for the exploratory learning process (Lichtenthaler, 2009). Market knowledge is important because organisations search for external knowledge in order to exploit a market opportunity (Todorova and Durisin, 2007). Technological knowledge is essential because it determines the external knowledge sources and assimilates knowledge (Zahra and George, 2002). It is found that the exploratory learning process occurs at individual and group level (Sun and Anderson, 2010; 2012). At an individual level, the exploratory learning process takes place through generating initiatives and it takes place through discussing the acquired knowledge and assimilating it with colleagues (Sun and Anderson, 2012). In other words, the exploratory learning process enables organisations to transfer individual-level knowledge into group-level knowledge.

Figure 3.1: Components of AC



The transformative learning process connects exploratory to exploitative learning. The transformative learning process happens through interaction between individuals across organisations (Crossan et al., 1999; Sun and Anderson, 2010). The interaction between individuals during the transformative learning process enables organisations to combine newly acquired knowledge with organisational knowledge (Lane at al., 2006). Assimilation and transformation capabilities facilitate the transformative learning process. Assimilation capability enables organisations to combine externally acquired knowledge into organisational knowledge by slightly changing their knowledge structure, while transformative capability allows organisations to add external knowledge which cannot be easily fit with their knowledge structure (Todorova and Durisin, 2007). Distinguishing between assimilation and

transformation capabilities shows that organisations may add newly acquired knowledge to their organisational knowledge which has less or no experience about it.

The exploitative learning process enables organisations to use combined knowledge in order to create new organisational knowledge and to achieve their commercial ends particularly in the context of products and services (Lane et al., 2006). Organisations ensure the reuse of knowledge during the exploitative learning process because combined knowledge is actually implemented at this stage (Lane et al., 2006; Sun and Anderson, 2010). In this perspective, the exploitative learning process is similar to exploitation capability. Exploitation capability enables organisations to frequently implement recently acquired knowledge over certain period of time (Sun and Anderson, 2010; 2012). Reuse of knowledge means doing activities in similar pattern repeatedly which highlights the importance of organisational routines. Feldman (2000) defines organisational routines as "repeated patterns of behaviour that are bound by rules and customs and that do not change much from one iteration to another."

3.2.2 Absorptive Capacity as a Multi-Level Learning Construct

Learning in organisations takes place across three levels including individual, group, and organisational level, as illustrated in Table 3.1. Individual-level learning turns into group-level learning and group-level learning turns into organisational-level learning. Crossan et al. (1999) provided a learning model which explains how individual, group, and organisational level learning occur. This thesis argues that studying the learning processes of AC provides an in-depth understanding about these three levels learning. Understanding these learning levels and their relationship is consistence with the concept of organisational AC. It is suggested that organisational and individual AC are mutually inclusive and dependent upon each other (Cohen and Levinthal, 1990).

Table 3.1: Four processes through three levels learning

Level	Process	Input/outcomes
Individual	Intuiting	Experiences Images

		Metaphors
Group	Interpreting	Language Cognitive map Conversation/dialogue
	Integrating	Shared understandings Mutual adjustment Interactive systems
Organisation	Institutionalising	Routines Diagnostic systems Rules and procedures

Source: Crossan et al. (1999)

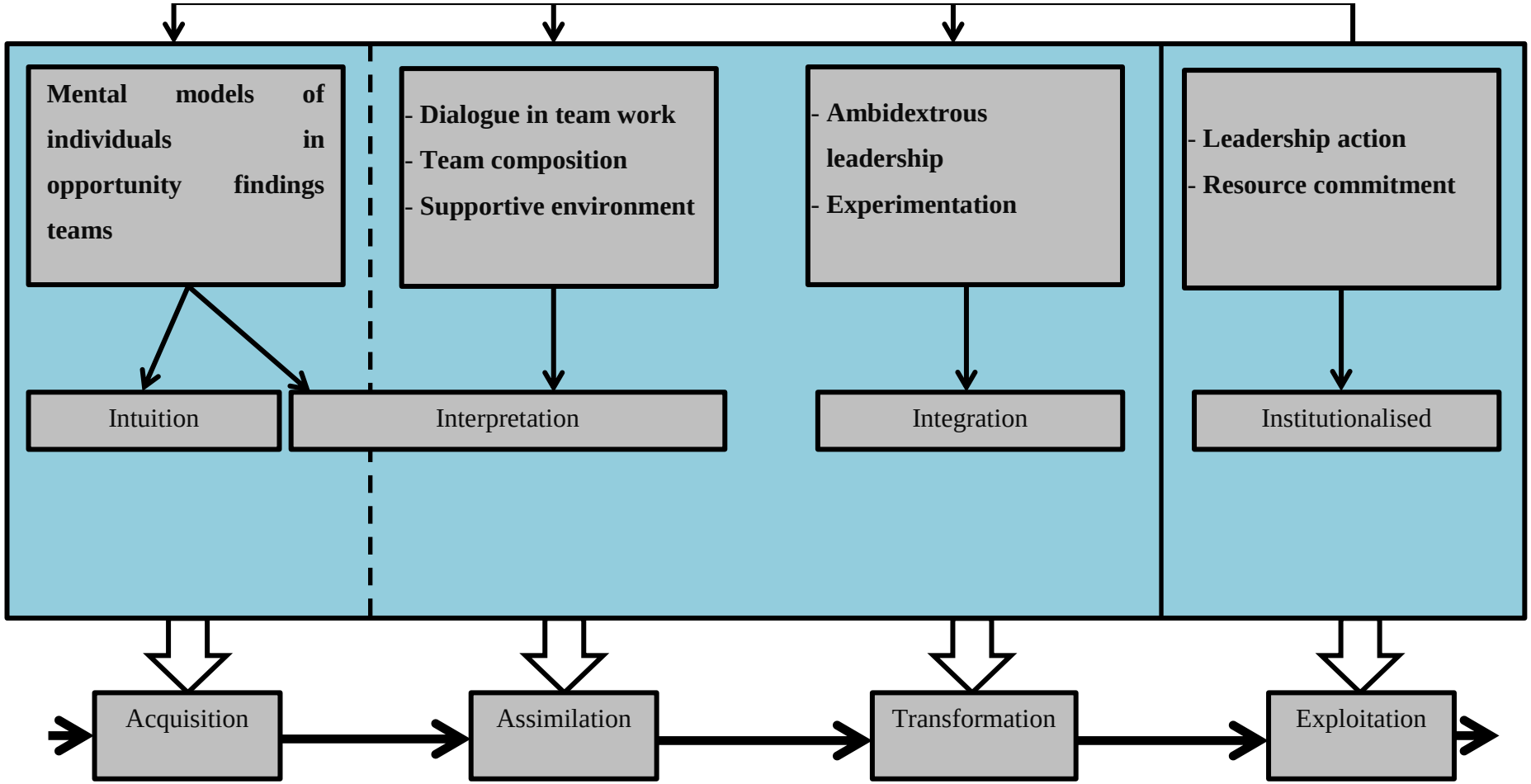
So called, intuiting process takes place at an individual level, interpreting and integrating processes occur at group level, and integrating and institutionalising happen at organisational level (Crossan et al., 1999). Accordingly, there is an overlap between different learning processes. This overlap allows organisation to expand learning from individual to group level and from group level to organisational level. Crossan et al. (1999) define intuiting, interpreting, integrating, and institutionalising as follows:

1. Intuiting. It refers to recognising patterns in preconscious way which roots in individuals' experience.
2. Interpreting. It is about developing language among individuals. Individuals explain their ideas or insights to each other.
3. Integrating. Shared understanding among individuals achieves which facilitates joint actions through mutual adjustment.
4. Institutionalising. Organisations ensure during this learning process that routinised actions are performed.

Intuiting, interpreting, integrating, and institutionalising learning processes link to AC capabilities, as illustrated in Figure 3.2. Sun and Anderson (2010) show that intuiting and interpreting facilities knowledge acquisition, interpreting facilitates

knowledge assimilation, integrating facilities knowledge transformation, and institutionalisation facilities knowledge exploitation. Figure 3.1 notes the relationship between the learning processes of AC and its capabilities. Therefore, intuition and interpretation refer to the exploratory learning process, interpretation and integrating refer to the transformative learning process, and institutionalising refers to the exploitative learning process. Accordingly, individual AC initially facilitates intuition and interpreting because these two types of learning process depend on individuals. Combining knowledge with the organisational knowledge mainly occurs at group level where team members' experience, communication structure, and support for innovation influence on the transformative learning process (Sun and Anderson, 2010). In this vein, the transformative learning process can be linked to interpreting and integrating learning processes. Moreover, as explained in section 3.2.1, the exploitative learning process enables organisations to routinise their activities in order to benefit from external knowledge over time. In this respect, institutionalisation is similar to the exploitative learning process.

Figure 3.2: Nature of relationship between dynamic capability view of AC and organisational learning



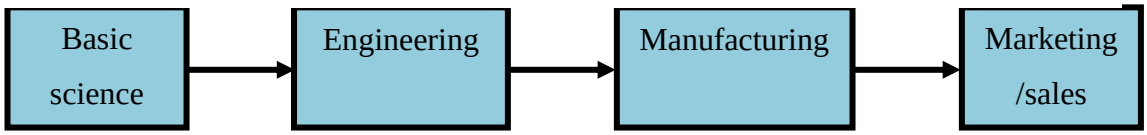
Source: Sun and Anderson (2010)

The external knowledge recognises by individual and then combines with the current organisational knowledge through intuiting, interpreting, integrating, and institutionalising. Integrating the learning processes of AC with intuiting, interpreting, integrating, and institutionalisation learning processes helps to map the process in which external knowledge flows from individual to group level and visa-versa. Moreover, this integration is significantly beneficial because it considers both cognitive and behavioural aspects of learning. For example, intuiting learning not only refers to cognitive aspect of learning but it also explain how intuiting learning occurs in organisations (behavioural aspect) (Crossan and Berdrow, 2003).

3.2.3 An Overview of Innovation Process Models

Accomplishing the AC learning processes enables organisations to reach their commercial ends such as innovation. Innovation can be generated or adopted (Gopalakrishnan et al., 2010). Innovation processes can be broadly categorised as linear and non-linear, when an organisation generate innovation. Linear models are based on stage gate approach which considers a sequence between innovation activities. On the other hand, non-linear models aim to develop a cross-functional integration within an organisation and expand such integration with the external environment (Hobday, 2005). Linear innovation model can be categorised as technology-push and market-pull approach. R&D plays a significant role in technology-push model, as illustrated in Figure 3.3, for developing new products and technologies and firms significantly invested in internal invention (Varma, 1995). Science considers as an important factor for innovating products particularly in knowledge-intensive organisations. Nemet (2009) suggests that technology-push model relies on using recent scientific development because it affects the rate and path of technological development. Scientific knowledge (basic science) turns into applied knowledge (or technology) which leads to products innovation (Balconi et al., 2010). Therefore, technology-push model relies on two types of knowledge: (1) scientific knowledge which is about discovering the reason behind a phenomena and (2) technological knowledge which refers to know-how. The problem encountered the technology-push model is that it ignores the importance of customers' needs and their desires. As a result many products that developed in R&D laboratories cannot be commercialised (Varma, 1995).

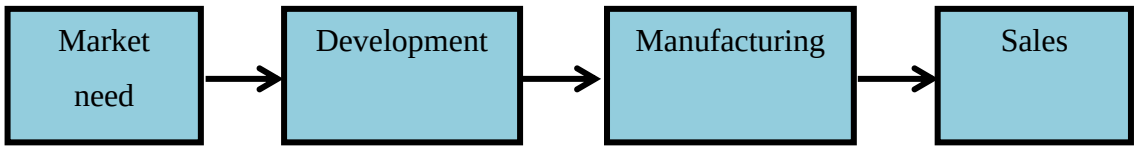
Figure 3.3: Technology-push model



Source: Rothwell (1994)

Ideas for innovation come from markets and transfer to the R&D department in market-pull model. It is reported that the most important driver of innovation is customers' needs (Murovec and Prodan, 2009). Increasing the relationship between marketing with R&D departments enables the industries to develop products which have more chance to be sold. Competition between firms therefore has been increased by focusing on customers (Rothwell, 1994). As a result of tighter competition, a firm's dependence on market knowledge has been increased. Increasing competition also puts organisations under pressure to innovate continually. This leads to the development of the market-pull approach, as illustrated in Figure 3.4.

Figure 3.4: The process of market-pull approach



Source: Rothwell (1994)

These two linear models (technology-push and market-pull) have some disadvantages. As mentioned earlier, the linear models were based on stage gate approach. The assumption behind this approach is that the innovation stages can be pre-determined and projects goals, timeline, and project plan can be initially established (Schoen et al., 2005). Uncertainty in innovation processes is high particularly when the degree of product newness increases (McDermott and

O'Connor, 2002). Therefore, achieving innovation processes within a predicted time may be in doubt. Moreover, linear models have an emphasis on internal R&D and advancement of science as major components for innovation while in low- and medium-tech industries such as wood industry have less formal R&D and more on experimenting and adopting technologies (Santamaría et al., 2009). Overemphasising on formal R&D hinders innovation studies to pay much attention to the importance of other activities such as design, training, and modernisation (Santamaría et al., 2009). Such weaknesses and changes in business environment lead to development of non-linear innovation models.

Innovation is considered as non-linear, evolutionary and interactive model which leads increasingly to interaction between a firm and its environment (Dosi et al., 1988; Malecki, 1997). Accordingly, different players influence the innovation processes. Nowadays, the success of innovation processes does not only depend on R&D employees and managers but it also relies on the experiences and feedbacks which were provided by production and marketing departments (Kaufmann and Tödtling, 2001). Furthermore, the interactivity of innovation processes is about dual relationship between different departments inside the organisations and cooperation with public sectors, universities, suppliers, customers, and competitors (Kaufmann and Tödtling, 2001).

Despite of increasing the use of non-linear approaches, linear models are still dominant in some industries such as pharmaceutical industry because the development of science and basic research still a major source of technological advancement (Balconi et al., 2010). Even recent studies within the pharmaceutical context showed that the progress from one stage of drug innovation to next stage depends on the accomplishment of the existing stage. For example, Bruni and Verona (2009) find that pharmaceutical companies are following four mandatory stages (discovery, preclinical, clinical trials and approval) and accomplishment of each stage is controlled by regularly authorities. This shows the linearity of the innovation processes within pharmaceutical industry moving from basic research (scientific progress) to applied research.

The innovation adoption process occurs through three stages: initiation, adoption decision, and implementation (Damanpour and Schneider, 2006). Initiation refers to

learning about the existing innovation and problem solving activities. Adoption decision is about assessing a new idea from different perspective such as financial and technological views, making decision, and allocating resources for knowledge acquisition and assimilation (Meyer and Goes, 1988). Top managers play a key role in this stage in order to decide to adopt an innovation or not (Damanpour and Schneider, 2006). In the final stage, organisations may modify an adopted innovation and use innovation in order to turn it into organisational routines (Rogers, 1995).

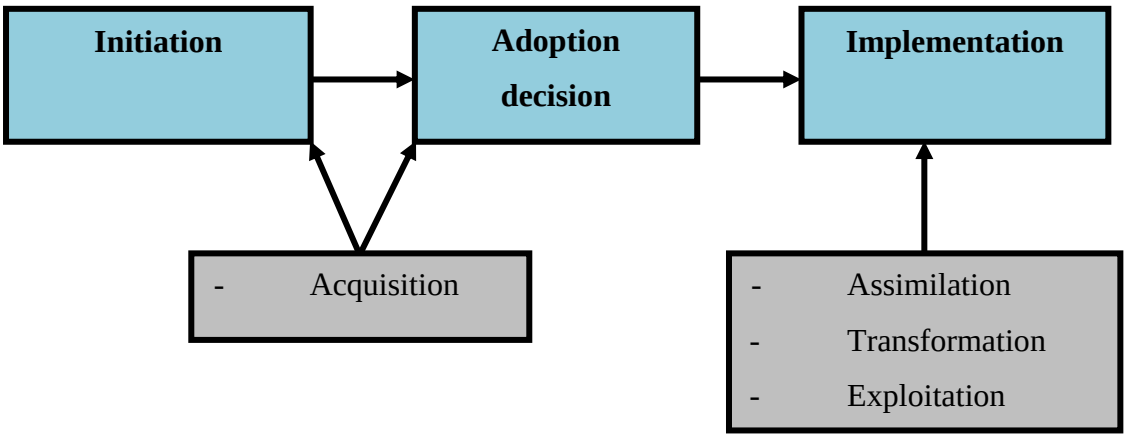
Knowing the three stages of innovation adoption highlights the importance of two issues. First, the adoption process is also linear because accomplishment of one stage enables an organisation to move to the next stage. Second, AC is also a critical determinant of this process because it enables firms to value new innovation and adopt it. It is apparent that organisations prefer to adopt innovation and to source it from an external environment when the knowledge required is explicit (Gopalakrishnan and Bierly, 2001). As noted previously, explicit knowledge is easily articulated and transferred. It is argued that fewer resources are required for acquiring external knowledge rather than developing it internally (Cassiman and Veugelers, 2006). This may be the reason why organisations may prefer to adopt innovation where external knowledge is indeed explicit. Moreover, emphasising on valuing and acquiring external knowledge in AC definition shows that developing and using AC is beneficial when there is knowledge available outside organisational boundaries. Accordingly, the AC theory and its definition are more applicable to innovation adopting organisations. In other words, those organisations successfully adopt innovation are capable of identifying and absorbing all available knowledge.

3.2.4 Integrating Absorptive Capacity with Innovation Adoption

The first two stages of innovation adoption (initiation and adoption decision) are about knowledge acquisition, as illustrated in Figure 3.5. A firm should have enough prior knowledge to value a new innovation and make decision to invest in it because searching for external knowledge is mainly a function of prior related knowledge (Cohen and Levinthal, 1990). Organisations with high level of exploratory learning are better able to acquire external knowledge and achieve higher performance and competiveness by being first movers (Leonard-Barton, 1992; Zahra and George,

2002). Accordingly, our research proposes that the exploratory learning process facilitates initiation and adoption decision.

Figure 3.5: Relationship between absorptive capacity and innovation adoption



During the implementation stage organisations need to do trial and error in order to modify innovation and to develop routines for continuous use of innovation (Roger, 1995). Therefore, the implementation stage of innovation comprises of two phases. The first phase is about modifying innovation and its second stage refers to developing routines for continual use of innovation. Modifying innovation enables organisations to match or modify their knowledge structure in order to adopt innovation. Chapter 2 noted that knowledge is assimilated when newly acquired knowledge matches the existing organisational knowledge though slight modification (Todorova and Durisin, 2007). Furthermore, knowledge is transformed when recently acquired knowledge cannot be easily integrated with the existing knowledge structure (Todorova and Durisin, 2007). Accordingly, knowledge assimilation and/or transformation enable organisations to successfully modify innovation. It was explained in section 3.2.1 that the transformative learning process comprises of external knowledge assimilation and/or transformation. Therefore, the transformative learning process facilitates implementation stage through modifying innovation.

Organisations accomplish the implementation stage of innovation adoption when they develop routines. The exploitative learning process allows organisations to

ensure about the reuse of knowledge required for product innovation. Organisations achieve the exploitative learning process through developing routines. Consequently, this learning process helps organisations to accomplish implementation stages of innovation adoption.

The above discussion demonstrates that adopting and generating innovative organisations may follow different innovation processes. Therefore, the use of AC may be different because the way they identify and value innovation may not be similar. Reviewing the AC literature shows that the existing studies do not distinguish between innovation adopting and generating within organisations (e.g., Camisón and Forés, 2010; Fosfuri and Tribó, 2008). Therefore, it is worth to focus on a particular type of innovative organisations for developing a conceptual model. Our research develops part of its conceptual mode by linking the AC learning processes to the stages of innovation adoption due to the importance of explicit knowledge.

3.3 Leadership Styles and Absorptive Capacity

Leadership style refers to attitudes and/or behavioural patterns which are continually performed by leaders (Bass, 1995_a). There are five different types of leadership style, as illustrated in Table 3.2. Transformational leadership style is a type of participative leadership style (García-Morales et al., 2008_b). Transformational leadership style increases innovation more than other leadership styles because it refers to a set of behaviours which enables organisations to be more adoptive and effective (Gardner and Avolio, 1998; Lowe et al., 1996; Howell and Avolio, 1993). Supporting this argument, several studies find that transformational leadership positively influences AC and organisational innovation (e.g., García-Morales et al., 2008_a; Gumusluoğlu and Ilsev, 2009; Sun and Anderson, 2012).

Table 3.2: Five leadership styles

Leadership style	Definition
Directive	You tell your subordinates what to do and how to do it. You initiate action. You tell subordinates what is expected of them, specifying standards of performance and setting deadlines for completing of work. You exercise firm rule and you ensure that they

	follow prescribed ways of doing things. You also ensure they are working to capacity, reassigning tasks to balance the workload.
Consultative	You tell subordinates what to do, but only after discussing matters with them first and hearing their opinions, feelings, ideas and suggestions.
participative	You discuss and analyse problems with your subordinates to reach consensus on what to do and how to do it. Decisions are made by the group as a whole and your subordinates have as much responsibility for decision as you do. They participate as equals in decision making.
Negotiative	You employ political means and bargaining to gain desired ends, making political alliances, promising subordinates rewards for meeting expectations, releasing information to suit your interests, maintaining social distance, 'bending' the rules, encouraging subordinates to compare, and 'selling' decisions to them.
Delegative	You describe the problem or need and the conditions that have to be met, and you make suggestions, but you leave it to subordinates to decide what to do and how to do it.

Source: Gill (2006)

Transformational leaders encourage and improve their followers' performance by transforming followers' personnel values and moving their needs to higher level (Bass, 1995_a; Jung, 2001). Transformational leadership performs four behaviours (Basset al., 2003): idealised influence (or charisma), inspirational motivation, intellectual stimulation, and individualised consideration. Idealised influence is about trust, respect, and admire in leaders which encourage common vision inside organisations. Inspirational motivation helps leaders to motivate their followers by

communicating an interesting vision and showing how to achieve it. Intellectual stimulation allows employees to think in a new way about the organisational problems. Through individual consideration, transformational leaders consider their followers needs for growth and achievement.

Research into transformational leadership reports the relationship between the behaviours of this leadership style and innovation. Waldman and Bass (1991) explore that intellectual stimulation and inspirational motivation are important for early stage of innovation, while idealised influence facilitates innovation at late stage of innovation. The early stage of innovation refers to creating new ideas. Late stage of innovation refers to development process of an innovation project (Elkins and Keller, 2003). Development process of the innovation is about turning new ideas into practice. It is suggested that innovation is about turning new ideas into commercial use (Amabile et al., 1996). Similar to Waldman and Bass (1991), several researchers find that transformational leadership style increases innovation through intellectual stimulation and inspirational motivation (e.g., Elkins and Keller, 2003; Jung et al., 2003). Gumusluoğlu and Ilsev (2009) suggest that managers should perform intellectual stimulation, individualised consideration, and inspirational motivation in order to enhance innovation.

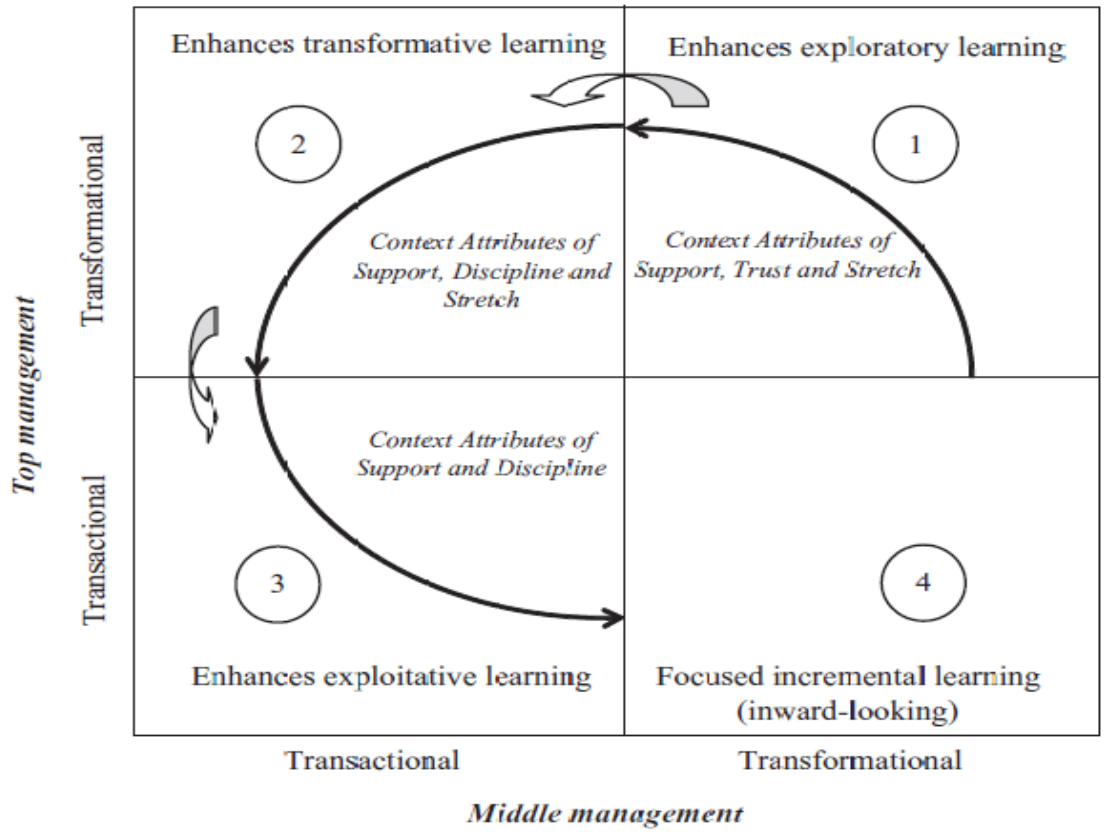
There are two fundamental issues which influence transformational leadership style on innovation. One is that they mainly adopted quantitative approach as observed. These studies do not explain why and how the particular behaviours of transformational leaders influence innovation. The second issue is that these studies have an overemphasis on transformational leadership style and most of them do not investigate the influence of other leadership styles on innovation and AC. Some researchers consider transactional leadership style as opposite to transformational leadership style. Distinguishing between transformational and transactional leadership may cause that some researchers suggest that transformational leadership style increases organisational performance more than transactional leadership style (e.g., Bass and Avolio, 2000). Transactional leadership style involves two behaviours (Sun and Anderson, 2012; Jansen et al., 2009):

1. Contingent rewards. Leaders clarify what reward their followers will receive, if they perform certain tasks in order to meet certain objectives.

2. Management by expectation. Leaders identify what punishment the employees receive if they fail to perform certain activities. They control closely their employees in order to correct mistakes quickly.

Previous studies show that transactional leadership also increases the propensity for innovation (e.g., Dayan et al., 2009). Nevertheless, some studies found a negative relationship between transactional leadership style and innovation in turbulent environment (Jansen et al., 2009). A few studies suggest that both transformational and transactional leadership styles increases learning and AC (e.g., Sun and Anderson, 2012). Investigating both transformational and transactional leadership styles is significantly important because these two leadership style are not mutually exclusive. In other words, leaders can perform both transformational and transactional leadership styles together. Some researchers show that leaders can perform both transformational and transactional leadership styles and both are increasing organisational performance (e.g., Denison et al., 1995; Judge and Piccolo, 2004). Similarly, Vera and Crossan (2004) point out that both transformational and transactional leadership styles enhance the transformative learning process. In similar line, Sun and Anderson (2012) show the influence of both transformational and transactional leadership styles on AC, as illustrated in Figure 3.6.

Figure 3.6: The influence of top and middle managers on the AC learning processes



Source: Sun and Anderson (2012)

Sun and Anderson (2012) propose four propositions about the combinative influence of both transformational and transactional leadership styles at top and middle management level:

1. Transformational leadership style of top and middle managers facilitates the exploratory learning process.
2. Performing transformational leadership style by top managers and performing transactional leadership style by middle managers facilitates the transformative learning process.
3. Transactional leadership style of top and middle managers facilitate the exploitative learning process.

4. When learning is small and organisations prefer to create knowledge in-house, top managers should perform transactional leadership style and middle managers should perform transformational leadership style.

Sun and Anderson (2012) also suggest that leadership styles of top and middle managers depend on the intention of organisation towards developing knowledge internally or acquiring it from external environment, as illustrated in Figure 3.7. There are two main limitations faced with the work of Sun and Anderson (2012). One limitation is that they used an exceptional case study research. Their research findings therefore may be limited when applied to other organisational settings. The other limitation of their study is that they did not show how the AC learning processes affects organisational innovation. It is argued that organisations develop AC for different reasons such as product innovation and strategic flexibility (Zahra and George, 2002). As different organisational outcomes may require different managerial considerations (Sirmon et al., 2011), our research suggests that the influence of leadership styles on the AC learning processes may be changed based on what organisations aim to achieve.

Investigating the influence of the AC learning processes on innovation adoption strengthens our research to investigate how top and middle managers leadership styles may be changed. The reason for investigating change in leadership styles may be due to the difference between the nature of AC constructs (Lane et al., 2006; Cepeda-Carrion et al., 2012). It is suggested that AC has different components and managing each components requires different management approach (Cepeda-Carrion et al., 2012). Accordingly, the conceptual model considers both transformational and transactional leadership styles of top and middle managers.

The conceptual model also considers the effect of both top and middle managers. Including different level of management is encouraged by the researcher in recent years because learning influence not only by a particular level of management (Berson et al., 2006). Top managers are included in the conceptual model because they enable organisations to deal with customers' needs and to increase innovation through social and task specific processes such as involving their followers in decision making and collaboration (Hambrick, 1998; Li and Zhang, 2002). The

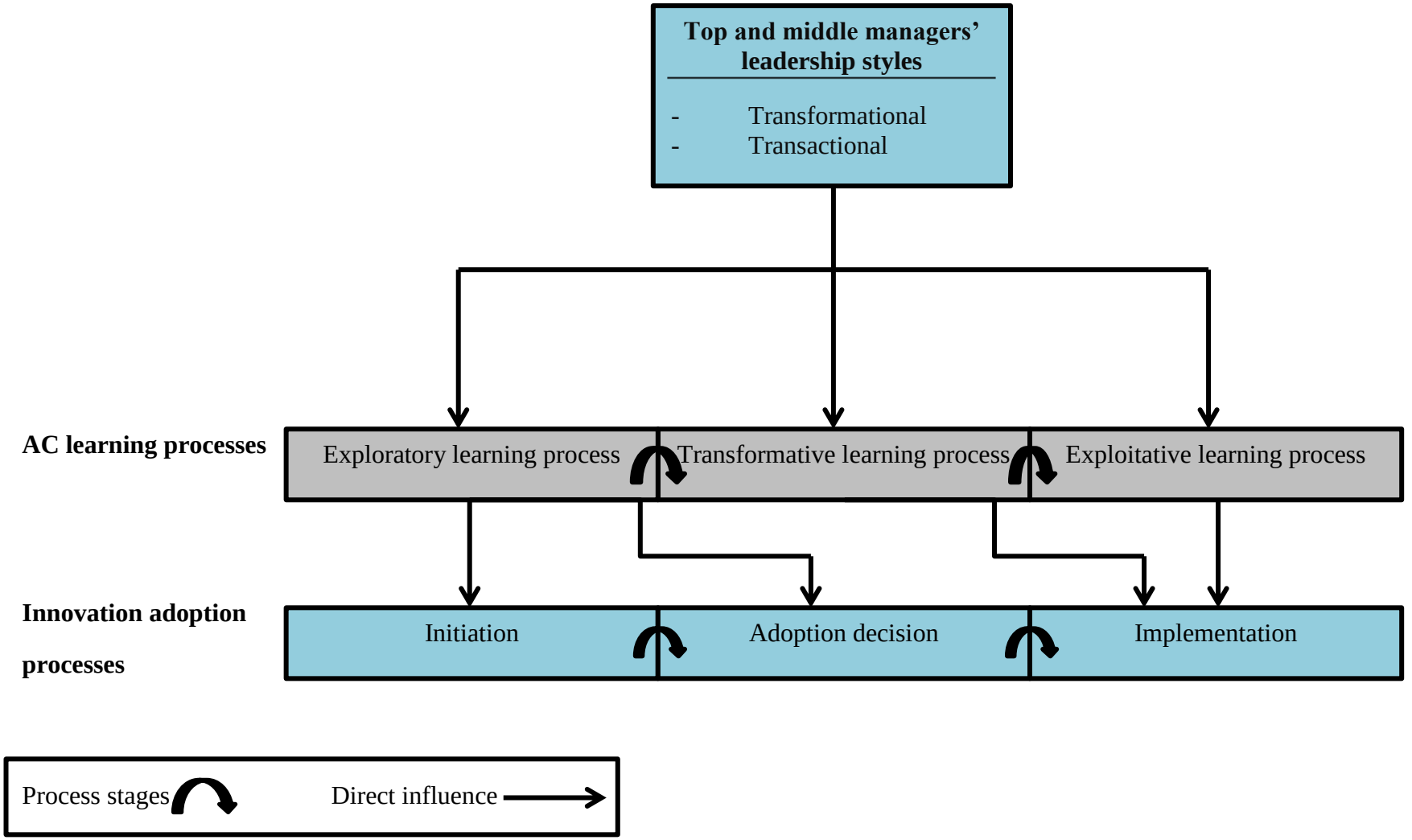
influence of top managers has a wider impact on organisations (Sun and Anderson, 2012), while the influence of middle managers is limited to certain people (Yukl, 1994). The influence of middle managers leadership style on the AC learning processes is included for two reasons. First, they influence on the flow of information between top and lower level organisational structure (Nonaka and Takeuchi, 1995). The second is that they have greater influence on their followers because they are closer to them (Sun and Anderson, 2012).

Here, it is important to clarify our research approach about management and leadership as there is a disagreement between researchers about these two terms. Boddy (2002) describes management job as "the task of planning, organising, leading, and controlling the use of resources in order to achieve some performance objectives". On the other hand, leadership explains the role of leaders and the nature of their influence (Berson et al., 2006). Researchers traditionally distinguish between managers and leaders. However, recent studies suggest that leadership is a component of organisational management because organisational performance relies on both leadership and management (e.g., Bedeian and Hunt, 2006). Similar to leadership studies, organisational learning literature considers the overlap between management and leadership (e.g., Vera and Crossan, 2004). The term leadership styles and management styles can be interchangeably used (Berson et al., 2006). For example, transactional leadership style can be considered as management approach because this leadership style emphases on control, planning, and guiding followers. Accordingly, we consider an overlap between leadership and management.

3.4 Proposing the conceptual framework

We developed our conceptual framework based on the discussions in sections 3.2.4 and 3.3 (Figure 3.7). As explained in section 3.2.3, when developing new products, organisations need to move from initiation to adoption decision and from adoption decision to the implementation stage. Similarly, the learning processes of AC follow a linear mode, as we noticed from the definition given by Lane et al. in 2006. Accomplishing the exploratory learning process allows organisations to start transformative learning and move from the transformative to exploitative learning process. To show the learning processes of AC and innovation adoption processes, we used an arc arrow () in our conceptual framework.

Figure 3.7: A model of using AC in innovation



Based on the proposed conceptual model, first the influence of AC on innovation adoption will be explored in order to understand the learning processes involved and their effects. This enables us to understand the leadership styles of the top and middle managers across the learning processes of AC. Therefore, we used blank arrows (⟶) to show the influence of leadership styles on the learning processes of AC and the effect of AC on innovation adoption.

3.5 Conclusion

The objective of Chapter 3 was to provide a conceptual model which enables this thesis to explain how top and middle managers influence the AC learning processes during innovation adoption. The conceptual model developed in two main steps. In the first step, it was explained theoretically how each stages of AC and type of learning within that stage influence the three stages of the process of innovation adoption. Then, the influence of leadership styles of top and middle managers on the AC learning processes explained. This thesis proposed to empirically investigate transformational and transactional leadership styles of top and middle managers because both of this leadership styles influencing learning and organisational performance. The recent studies mainly ignored to investigate the influence of these two leadership styles together (Sun and Anderson, 2012). Moreover, this chapter provided a solid account about the overlap between leadership and management. Explaining this overlap will be beneficial because it will help this thesis for collecting its data from appropriate respondents.

Chapter 4 reports, justifies, and explains the research methodology through the collection and analysing of the qualitative data to empirically validate the formulated conceptual model.

Chapter 4: Research Methodology

4.1 Introduction

The research methodology is explained in this chapter where adopting an appropriate research approach was important in addressing and answering the research questions. Therefore, both qualitative and quantitative methods are extensively reviewed and only those relevant aspects, which are related to this thesis, are reported. Moreover, choosing a research strategy (qualitative versus quantitative) is influenced by the researcher's philosophical perspective about the nature of the phenomena under investigation (or ontological view) and logical arguments about how knowledge can be developed (epistemology). Selecting research method for collecting data depends on the accepted philosophical paradigm of a study (Guba and Lincoln, 1994). Consequently, the research design of this thesis should be consistent with its philosophical paradigm. Yin (2009) defines research design as "a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions."

Chapter 4 is organised as follows where different philosophical paradigms are discussed. This thesis in the following part is briefly reviewed through different research designs. Adopting a case study approach helps to consider how to collect and analysis data. Three approaches are used for collecting data including semi-structured interviews, observation, and documents. Moreover, the case study protocol shows how this thesis uses its research methods. Finally, ethical issues are explained.

4.2 Philosophical Paradigms

Collis and Hussey (2009) define the research paradigm as a philosophical guideline which shows the way a study should be conducted. The research paradigm has two interrelated parts, ontology and epistemology. Saunders et al. (2009) defines ontology as the assumptions are made by a researcher about the nature of reality. The

second aspect of the research paradigm is about the nature of acceptable knowledge (Saunders et al., 2009) which is known as epistemology. As the type of a research design is influenced by philosophical assumptions, our research initially determines ontological and epistemological views.

4.2.1 The Ontological Position

Ontological aspects were categorised differently. Bryman and Bell (2007), for example, considered ontological perspectives as objectivism and constructionism. The former views social phenomena as facts that are external to a researcher and constructionism suggests that social phenomena and their meaning are constructed by social actors. In consistence with Bryman and Bell (2007), Saunders et al. (2009) classified ontological views as objectivism and subjectivism. Objectivism regards social phenomena as external to actors and subjectivism considers the social realities as the action of social actors. Easterby-Smith et al. (2008_b) divide ontological perspectives as those relate to natural science and as those use in social science. Three perspectives in social science introduced where two of them (representationalism and relativism) were similar to those in natural science. These perspectives distinguish between the realities and the processes are taken to reach them. The third view (nominalism) argues that names and labels are attached by the social actors to events and experiences shape realities.

Ontological perspectives therefore can be broadly categorised as if actors can shape social reality or not. In other words, does social reality is external to its actors and pre-given or it is internally constructed by people's interactions. The importance of knowing a study ontological perspective is that it influences the way knowledge is created (Bryman and Bell, 2007; Easterby-Smith et al, 2008_b). Therefore, it is important to identify the influence of top and middle managers on absorptive capacity (AC). The employees' AC to absorb and use external knowledge is a vital component for implementing it for innovation. Despite of the importance of the employees' capability, top and middle managers plays a key role in deploying AC and improving employees' AC as stated in the literature review. Accordingly, absorptive capacity is not a pre-given and implementing it resides in the hand of the managers. This shows that AC resides inside the firm and is therefore socially constructed.

4.2.2 The Epistemological Position

There are four major approaches that have been widely used in management studies: positivist, realist, interpretivist, and pragmatist, as illustrated in Table 4.1. Researchers have considered positivist and intepretivist as two opposite dimensions. In consistent with the distinguishing between positivism and interpretivism philosophy, it is reported that epistemological aspect of many studies in the field of business and management locates between positivist and interpretivist continuum (Collis and Hussey, 2009). Therefore, most of management studies, but not all, have contained both elements of positivist and interpretivist approaches in different extent.

Table 4.1: Comparing the four philosophies of management studies

	Positivism	**Realism**	**Interpretivism**	**Pragmatism**
Ontology	External, objective and independent of social actors	Is objective. Exist independently of human thoughts and belief or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology	Only observable phenomena can provide credible data, facts. Focus on causality and law like	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind	Either or both observable phenomena and subjective meanings can provide

	generalisation, reducing phenomena to simple elements	(direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts.	these details, subjective meanings motivation actions	accessable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology	Research is undertaken in a value-free way, the research 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	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often	Highly structured, large samples, measurement,	Method chosen must fit the subject matter, quantitative or	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs,

used	quantitative, but can use qualitative	qualitative		quantitative and qualitative

Source: Saunders et al. (2009)

The foundation of positivist view comes from the natural sciences. The followers of this view suggest that social realities can be studied in the same way as natural phenomena may be investigated (Brynman and Bell, 2007). Therefore, the acceptable knowledge is the one which is developed by adopting the scientific approach. Those studies in social science which follow positivist views aim to create universal scientific laws. For example, Johnson and Duberley (2000) note that the aim of positivist research in management studies is to generate laws that highlight the way firms operate. Followers of positivist view therefore generalise their findings to other settings. In other words, positivist proponents suggest the universal application of knowledge. On the other hand, the followers of interpretivist view claim that studying social realities cannot be investigated through positivist approach because social phenomena do not follow certain laws but they influence by meaning and human actions (Snape and Spencer, 2003). Consequently, using natural science approaches for studying social phenomena are not adequate.

One of the differences between the way knowledge produce in positivist and interpretivist perspectives refers to the role of researchers. In positivist view, researchers are independent of that phenomena being investigated (Collis and Hussey, 2009). Accordingly, the researches' values should be separated from the social entities which are studied. This shows that the positivist approach follows those ontological perspectives which consider reality as external to social actors (Bryman and Bell, 2007). Researchers that follow interpretivist perspective closely interact with those which are researched. Knowledge develops here through close interaction between the researcher and the researched (Collis and Hussey, 2009). The opponents of this perspective argue that there is a possibility that the researchers influence the outcomes of a study which is known as 'research bias' (Bryman and Bell, 2007). The supports of interpretivist view, on the other hand, suggest that a study cannot be value free.

Axiology refers to judging or studying a researcher's values (Saunders at al., 2009). Butler-Kisber (2010) suggests that the researchers' beliefs and feelings influence the research process. Because human actions drive by their values, researchers reflect axiological skills by showing how their values affect the way they conduct their research (Heron, 1996). The idea of axiology is similar to the concept of 'reflexivity'. Bryman and Bell (2007) define it as "the prior knowledge, experiences, and attitudes of the researcher will influence not only how the researcher sees things but also what he or she sees." Positivist approach therefore ignores the influence of researchers on the way their study was conducted, their interactions with the respondents is less direct and frequent compare to those ones who are doing interpretivist investigations.

Like positivist approach, realism follows scientific approach for developing knowledge. There are two types of realism which are direct and critical realism. The direct realism suggests that knowledge develops through sensing, while critical realism argues that the knowledge is sensation of reality (Saunder et al., 2009). In other words, direct realism says that direct observation of reality is achievable and it is enough for developing knowledge, while critical realism proposes that what has been seen is just a reflection of reality. Accordingly, developing knowledge by adopting critical realism requires both observing reality in first place and then mental processing the sensations in order to understand reality (Saunder et al., 2009). As acceptable knowledge resides in researchers' experiences and point of views, the findings of those studies which adopted realist philosophy are value-laden. Although knowledge developed scientifically in realist studies, the outcomes of them are not value-free.

The last type of research philosophy that used in management studies is 'pragmatism'. This view is concerned with actions, situations, and consequence of inquiry (Creswell, 2007). The followers of pragmatism do not see positivism and interpretivism as two contrasting research philosophy. Instead, they suggest that sometimes it is possible to include the elements of both positivist and inteprtivist perspectives (Tashakkori and Teddlie, 1998). Including both positivist and interpretivist philosophies together enabled those studies which were adopted pragmatist perspective to combine different research techniques together. Accordingly, the important aspect of pragmatist study is to define a research problem

and its questions rather than concerning with research methods (Cresswell, 2007). Cherryholmes (1992) and Murphy (1990) point out that underlying assumptions behind pragmatist researches are:

1. There should be no commitment to any single known research philosophy.
2. Researchers can adopt any methods, techniques, and procedures of research as long as they can meet their studies objectives.
3. The basic idea on the pragmatist study is that there is no absolute unity in the word.
4. Reality shapes by what is worked and it is independent from the relationship between the word and individual's minds.
5. The focus on pragmatist studies is on their consequences.
6. There is a common view between the follower of pragmatist view that studies takes place within social, historical, political, and other research context.
7. External word is independent from human's minds.

Our research contributes to knowledge by adopting an interpretivist perspective. As explained in Chapter Two, AC is influenced by individuals particularly top and middle managers. In spite of the importance of top and middle managers on AC, there is less research empirically investigating the combinative influence of both top and middle managers on AC for innovation. Since the nature of the business environment becomes turbulent, there is a need to investigate the influence of managers at top and middle level on AC. Investigating managers' experiences from interpretivist point of view will assist our research to reach a deeper understanding about the way they affect the exploratory, transformative, and exploitive learning processes in order to use external knowledge effectively for innovation. Moreover, following the interpretivist view enables an investigation the factors which have not been explored in prior related studies. Therefore, the scientific approach may be less useful here in order to explain the change in the leadership styles of managers.

4.3 Research Strategy

Research strategy is used to demonstrate the relationship between theory and research (Bryman and Bell, 2007). Identifying a research strategy helps to choose our research method and design. Deductive and inductive approaches are two

research strategies which are commonly used in the field of business and management studies. These two approaches are opposite to each other. Deductive approach is based on scientific principles which move from theory to data. Researches that follow deductive approach therefore adopt positivist perspective (Bryman and Bell, 2007). Studies in management use this perspective aim to explain casual relationships between variables (Johnson and Duberley, 2000). Accordingly, the operationalisation of concepts, which refers to tangible indicators use to measure constructs (Saunders et al., 2009), is a vital process to increase the validity of findings, as illustrated in Table 4.2.

Table 4.2: Comparing deductive and inductive strategy

Deductive	Inductive
-Scientific principles -Moving from theory to data -The need to explain causal relationships between variables -The collection of quantitative data -The application of controls to ensure validity of data - A highly structured approach -Less concern with the need to generalise -Researcher independence of what is being researched -The necessity to select samples of sufficient size in order to generalise conclusions	-Gaining an understanding of the meaning humans attach to events -A close understanding of the research context -The collection of qualitative data -A more flexible structure to permit changes of research emphasis as the research progress -A realisation that the researcher is part of the research process

Source: Saunders et al. (2009)

Different scales are used by analysts to measure AC where, to date, researchers have opertionalised AC mainly by applying R&D scales. Cohen and Levinthal (1990), for example, use R&D expenditures and R&D intensity (R&D expenditures divided by sales) to measure AC. Lane et al. (2006) criticise such opertionalisation because it

does not measure AC as a form of capabilities. As explained in chapter two, AC is a form of dynamic capabilities (DCs). Therefore, the opertionalisation of AC by using R&D scales has not been measured the essence of it because, as lane et al. (2006) mentioned, they were static and they were not reflected processes and routines involves in AC. Moreover, emphasising on using R&D inhibits looking at the concept of AC from other dimension. Matusik and Heeley (2005) suggest that the concept of AC should be opertionalised a multi-level in order to cope with the inconsistency in its existing literature. Consequently, there is a need to develop new indicators to measure AC.

Developing new indicators to measure AC is strongly associated with quantitative approach. This method aims to collect numerical data in order to examine the relationship between theory and research thorough deduction and following scientific approach particularly positivist perspective (Bryman and Bell, 2007). Research into AC uses mostly survey which is associated with quantitative approach. Easterby-Smith et al. (2008_b) suggest that dominate use of survey inhibits extending this theory. Therefore, to extend AC theory, this research implements qualitative approach which usually considers as an alternative to quantitative method.

Strauss and Corbin (1998) define qualitative approach as any types of research that their findings produced without using any forms of quantification or statistical procedures. One of the important differences between qualitative and quantitative research is about the relationship between research and theory (deductive and inductive strategy). Inductive approach aims to generate or improve a theory by observing and collecting data initially. On the other hand, deductive strategy seeks to collect data in order to test a theory. Table 4.3 illustrates more differences between qualitative and quantitative approach. Accordingly, not only the philosophical assumption but also the ways data collects and analyses are different in qualitative and quantitative studies.

Table 4.3: Differences between qualitative and quantitative research

	Quantitative	**Qualitative**
Relationship between theory and research	Deductive; testing of theory	Inductive; generation of theory

Epistemological aspect	Natural science model, in particular positivism	Interpretivism
Ontological view	Objectivism	Constructionism

Source: Bryman and Bell (2007)

Our research therefore applied an inductive strategy in order to extend AC theory. Inductive approach helps to provide a deeper understanding of leadership styles at top and middle level to enable innovation adoption organisations to accomplish the AC learning processes.

4.4 Research Design

Vaus (2001) identifies four types of research design: cross-sectional design (or social survey), case study, experiment, and longitudinal design, as illustrated in Table 4.4. Bryman and Bell note that longitudinal design is not commonly used in business and management studies because of time and cost involve in conducting such researches. Other research designs (survey, experiment, and cast study) are widely used for researching a real life issue (Robson, 1993; Halinen and Törnroos, 2005). However, the applications of them for studying social phenomena are different.

Table 4.4: An overview of research design

Type of research design	Explanation of research design
Cross-sectional design (or social survey)	This design collects a large number of qualitative or quantifying data at single time (Bryman and Bell, 2007).
Case study	Yin (2009) defined it as an empirical investigation into a contemporary social phenomenon where it is hard to distinguish between the phenomena and its context.
Experiment	This design seeks to determine the effects of independent variables on dependent by comparing two random groups through manipulating the variables (Vaus, 2001).

Longitudinal design	The aim here is to identify change in business and management research over time (Bryman and Bell, 2007).

Yin (2009) suggests three issues for choosing adequate research design: (1) the type of research question, (2) the influence of a researcher over the phenomena under investigation, and (3) the time horizon of an investigation. By considering these criteria, this thesis adopts a case study design, as illustrated in Table 4.5. As noted, three required criteria matches with the case study design as our research focused on how managers use AC at the present time where the researcher has no influence over the processes of acquiring and using other firms' knowledge.

Table 4.5: Criteria for adopting case study

	Research questions	**Requires control of behavioural event?**	**Focus on present or past events?**	**Sources**
Case study	How, why?	No	Present	Yin, 2009
Experiment	How, why?	Yes	Present	Yin, 2009
Survey	Who, what, where, how many, how much?	No	Present	Yin, 2009
Criteria applied to this study	How?	No	Present and past	The author

Eisenhrdt (1989) suggests different situations when conducting a case study research is acknowledged. One of the situations in which case analysis is recommended refers to when findings from theory-testing research (usually takes in form of survey) suggest searching for a new view. Easterby-Smith et al. (2008_b) suggest that the

dominant use of survey in AC studies inhibits adding new dimensions to this theory. This thesis seeks to improve AC theory by adding new dimension through considering the role of top and middle managers as explained in Chapter 1.

The other reason which supports the use of a case study refers to the research philosophy. The case study can adopt either positivist or interpretivist perspective (Myers, 2010). Accordingly, the case study can be applied in both qualitative and quantitative research. As this thesis adopted interpretivist perspective and followed qualitative research, implementing the case study is therefore possible. Adopting a case study for developing or extending a theory has some advantages. Firstly, the possibility of developing a valid theory is higher because it drives from empirical data (Eisenhrdt, 1989). Moreover, case study research is less bias as a researcher has an opportunity to explore different point of views (Eisenhardt, 1989). The other advantage of conducting case study is that the theory developed can be statistically tested by other researchers while measurement and hypothesis can be developed through the results of such research (Yin, 2009; Darke et al., 1998). Therefore, these advantages help to bring different point of views together in order to achieve better understanding about the effect of leadership style on AC, and to develop hypothesises for further investigation.

Eisenhardt (1989) suggests eight steps which need to be considered for doing a theory-building case research, as illustrated in Table 4.6. Our research therefore follows these stages for collecting and analysing data.

Table 4.6: Process of theory building from a case study

Step	Activity	Reason
Getting started	Definition of research question possibly a priori constructs	Focuses efforts Provides better grounding of construct measures

Selecting cases	Neither theory nor hypotheses Specified population Theoretical, not random, sampling	Retains theoretical flexibility Constrains extraneous variation and sharpens external validity Focuses efforts on theoretically useful cases-i.e., those that replicate or extent theory by filling conceptual categories
Crafting instruments and protocols	Multiple data collection methods Qualitative and quantitative data combined multiple investigators	Strengthens grounding of theory by triangulating of evidence Synergistic view of evidence Fosters divergent perspectives and strengthens grounding
Entering the field	Overlap data collection and analysis, including field notes Flexible and opportunistic data collection methods	Speeds analyses and reveals helpful adjustment to data collection Allows investigators to take advantage of emergent themes and unique case features
Analysing data	Within-case analysis Cross-case pattern search using divergent techniques	Gains familiarity with data and preliminary theory generation Forces investigators to look beyond initial impressions and see evidence thru multiple lenses
Shaping hypotheses	Iterative tabulation of evidence for each	Sharpens construct definition, validity, and measurability

	construct Replication, not sampling, logic across cases Search evidence for "why" behind relationships	Confirms, extends, and sharpens theory Builds internal validity
Enfolding literature	Comparison with conflicting literature Comparison with similar literature	Builds internal validity, raise theoretical level, and sharpens constructs definitions Sharpens generalizability, improves construct definition, and raises theoretical level
Researching closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small

Source: Eisenhardt (1989)

Voss et al. (2002) suggest that some decision should be made before conducting a case research including: identifying number of cases and case selection (sampling). Identifying the cases assisted to select a sample which provided rich information on how AC uses for developing new products in the context of Iranian pharmaceutical industry. Moreover, determining the number of cases is essential because there are time and cost involved in a case research (Yin, 2009; Eisenhardt, 1989).

4.4.1 Case Study Selection Criteria

It is suggested that the first step in a case research is to select right cases for building or improving a theory (Eisenhardt, 1989). Case research unlike survey studies do not select randomly but theoretically (Stake, 1995). A sample is selected in a way which allows the researcher develop a theory in theoretical sampling (Creswell, 2007), while random sampling seeks to choose one which represent a bigger population (Vaus, 2001). Representing a sample enables a researcher to measure the possibility

in which the results of an investigation statistically can be occurred to the wider population or similar research context (Vaus, 2001). Accordingly, using random sampling leads to generalising the findings of a study to other population.

Case studies are frequently criticised for lack of generalisability. Yin (2009) responds to this view and introduces two types of generalisability. Statistical generalisability (commonly use in survey design) is about testing empirically an inference made about a population or even the universe. The confidence on the accuracy of findings relies on statistical formula. A case research generalises its findings theoretically rather than statistically. To generalise theoretically, the case research applies a previously developed theory as a guideline in order to assess the findings of its study (Yin, 2009). Consistence with this argument, Firestone (1993) suggests that a researcher contribute to a theory in a case study by providing some evidence rather than proving it statistically. By distinguishing between statistical and theoretical generalisability, this thesis applies theoretical sampling in a way which its findings could contribute to AC theory.

Yin (2009) introduces two ways for theoretically sampling for doing a case research:

1. Using reasonable logic in order to predict similar results across cases.
2. Providing reasonable arguments in order to predict contrary findings.

Our research therefore takes cases from leading innovation adopting pharmaceutical firms because the aim here is to explore the way leading firms using AC for innovation. Accumulating case studies help the researchers to develop a more advance theory (Ambrosini and Bowman, 2009). Accordingly, this thesis seeks to provide explanation on how companies can increase their innovativeness by implementing AC.

The cases were selected from those organisations which are innovative. Innovative firms were identified by looking at the number of new products they introduced to the markets. First the names of pharmaceutical companies were obtained from Ministry of Health and Medical Education (MOHME). Then, the researcher searched through the pharmaceutical company's websites to gain basic information, such as number of employees, establishment years, and the vision of the companies. Moreover, some informants who were familiar with this industry were asked to assist to choose companies. Speaking with knowledgeable people about the research is also

recommended by Yin (2009) for assessing the suitability of a case. Some of the people, which were spoken to, were helped to access to the case companies. Stake (1995) suggests that it may be preferable to study cases which access to them is convenient in order to reduce time and access limitation. However, the researcher did not only rely on ease of access but also considered the theory contribution.

The other problem here was to define how many companies to select. There are two types of case study: single and multiple cases study. Yin (2009) determines five situations where conducting a single study is appropriate:

1. Critical case. When in a theory building research, a set of propositions is available. A researcher aims to challenge, confirm, test, or extent the theory by studying the proposition to reach an explanation to support them or develop an alternative discussion.
2. Extreme or unique case. This is more relevant to clinical psychology rather than business investigation, where a rare problems such as disorder or injuries report and it worth to study.
3. Representative or typical case. An investigator seeks to explore the situation and condition of an everyday or commonplace circumstance.
4. Revelatory case. When a researcher has an opportunity to investigate a social inquiry which would not available before.
5. Longitudinal case. A researcher aims to understand the changes in pre-defined conditions over time. Conducting a single case study lets to explore whether or not the predicted outcomes reveal themselves as the situation changes or not.

The decision on applying a single or a multiple case study made in this thesis by considering their advantages and disadvantages (Table 4.7). Our research followed a multi-case approach because of its focus on the processes of learning in which external knowledge acquires, assimilates, and implements for innovation, rather than on pharmaceutical companies itself. Moreover, investigating the research conceptual framework in different companies helped to overcome the research bias and compare the results together. However, the problem with doing the multi-level case research is that it achieves less in-depth understanding about each case and it requires investing more time and financial resources (Voss et al., 2002). Identifying the

number of cases was helped this thesis to use its resources effectively and achieve solid understanding about the cases.

Table 4.7: Comparing single and multi-case research

	Advantages	Disadvantages
Single case	-There is an intrest in a case (Stake, 1995). -Providing a slightly acceptable test of a complex theory where the researcher has limited access to cases (Vaus, 2001). -Single case achieves deeper understanding (Walsham, 1995).	-Finding rare, unusual, critical or revelatory case usually has more than one case (Yin, 2009). -Generalising a conclusion is less achievable compare to a multi-case research (Voss et al., 2002). -A single case study may involve biases such as misjudging the representativeness of a phenomenon (Voss et al., 2002).
Multi case	-Findings are more robust (Herriot and Firestone, 1983). -Interest is on research phenomena rather than a case itself (Stake, 1995). -It provides more insights than a single case research (Vaus, 2001).	-It requires extensive resources and time (Yin, 2009). -A multi case research achieves less deep understanding of each case compare to a single case research (Walsham, 1995).

There is no agreement between the scholars about the optimal number of cases. Eisenhardt (1998) suggests that the number of cases should be between 4 and 10. Milles and Huberman (1994) cite that the maximum number of cases should be no more than fifteen. Yin (2009) mentions that 6 to 10 cases would be enough for

replication. Because of the cost involves in a case research, the number of cases should be limited between 2 to 12 (Perry, 1998). However, selecting an ideal number of cases between 2 to 12 is up to the researcher (Romano, 1989). By considering this point, time constrain, and budget limitation, this thesis conducted three case studies. The other reason for choosing minimal number of cases is that the size of sample in qualitative research is small (Ritchie et al., 2003). Increasing the number of cases inhibits in-depth investigation of them when limited resources available (Voss et al., 2002), as it was the case in this thesis.

4.4.2 Quality of the Case Study

Using three case studies can be further justified by assessing this research quality. Yin (2009) suggests that the essential part of a research design is to determine its quality based on certain criteria. He introduces four specifications which can be applied to any case studies:

1. Construct validity. Identifying the accurate measurements of the concepts under investigation.
2. Internal validity. Determining the relationship between variables.
3. External validity. Defining the extent the findings can be generalised.
4. Reliability. Presenting that the findings of a study is repeatable.

These four specifications were considered in this thesis during the stages of research design, data collection, and analysis, as illustrated in Table 4.8.

Table 4.8: The criteria for testing the quality of this case study

Criteria	Case study tactics (Yin, 2009)	Phase of research in which tactics occurs (Yin, 2009)	Tactics used for enhancing the quality of this study
Construct validity	Use multiple sources of evidence	Data collection	Collecting data by conducting interviews, documents, and

			observation
	Establish a chain of evidence	Data collection	Conducting a pilot study
	Have key informants review draft case study report	Composition	Asking some of the research participants to read and comments on the findings Ask the study supervisor to read the final report
Internal validity	Pattern matching	Data analysis	Exploring patterns from data
	Explanation building Address rival explanations	Data analysis	Comparing and contrasting within and across the cases
	Use logic models	Data analysis	Enfolding literature
External validity	Use theory in single-case studies	Research design	Adopting a multiple embedded case study approach
Reliability	Use case study protocol	Data collection	Developing the case study protocol before data collection

The first step in ensuring case research quality is construct validity. Yin (2009) proposes three tactics for constructing validity:

1. Using multiple source of evidence. A report on a case research finding is more likely accurate and convincing if the researcher uses multiple data sources because of converging lines of inquiry. This thesis collected data from three sources which will be explained in section 4.4.3. Moreover, a pilot study was conducted prior to data collection.
2. Establishing a chain of evidence. Chain of evidence allows other persons to read and follow a research story. In this thesis, the researcher's first supervisor read and commented on the final report in order to achieve chain of evidence.
3. Having opinion of key informants on the draft of a case study research. The results of within-case analysis were emailed to some of the interviewees from each case organisation to check the accuracy of the report.

Our research ensured internal validity by checking its within- and cross-case analysis in order to discover the patterns from its data (See section 4.4.4). Following this, the findings of the cross-case analysis were compared and contrasted with the existing literature. Reaching data saturation, which refers to similar findings across cases, ensured the researcher that external validity was achieved (See Chapter 6). To ensure reliability, this thesis developed a case study protocol before collecting data from its three cases (See section 4.4.3.4).

4.4.3 Data Collection Methods

Before collecting data, six interviews were conducted in order to gain initial insight about the ways pharmaceutical companies accomplish the learning processes of AC for innovation and to validate the suitability of interview questions in answering the research questions. The pilot study interviewees were three top and three middle managers who are working in the leading innovative pharmaceutical companies in Iran. Besides, the pilot study assisted to reconsider data collection plan. Ambiguous questions were redefined based on the comments of the interviewees. Moreover, conducting the pilot study provided useful information and insight about pharmaceutical industry in Iran.

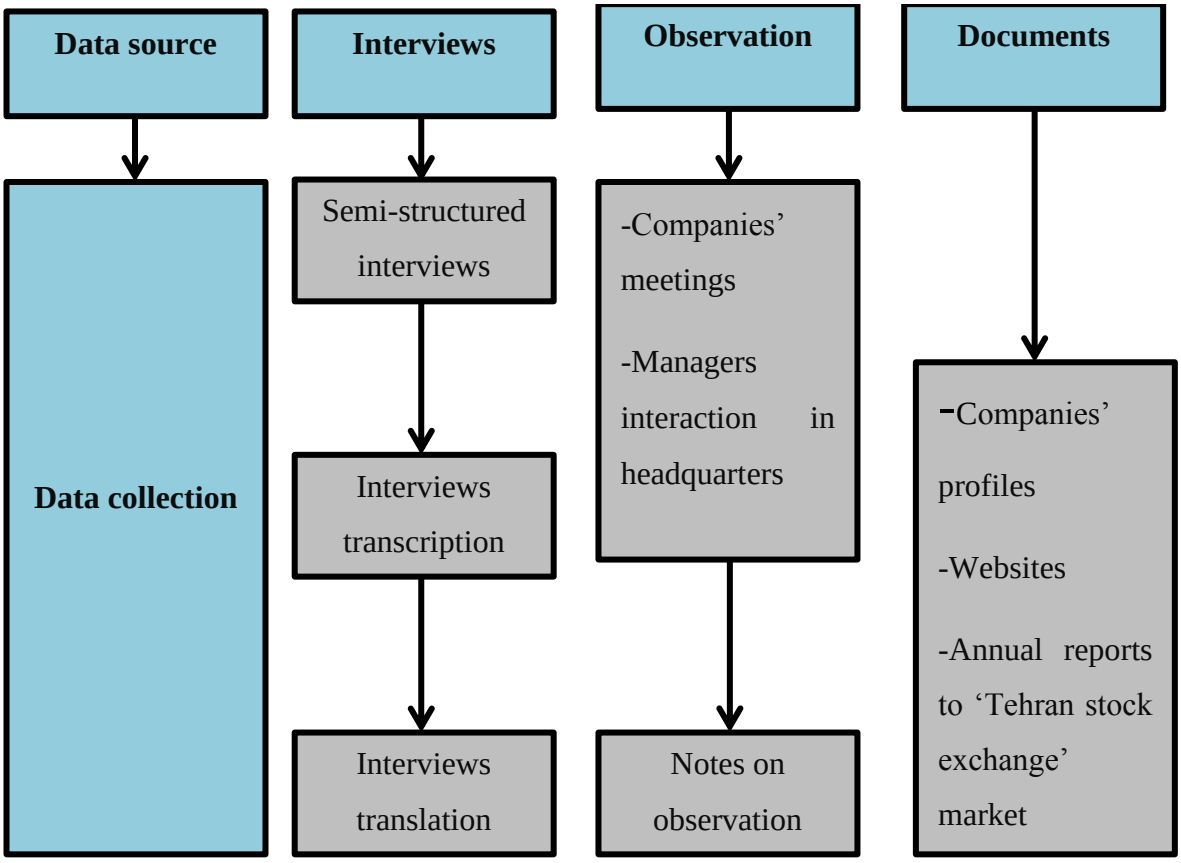
Our research involved collecting data from the pharmaceutical industry in Iran for three reasons. First, the innovation takes place in the form of adopting rather than generating because the government law makes the pharmaceutical companies

produce medicines from a generic list which is produced by MOHME (World Health Organisation, 2011). Second, the cooperation between pharmaceutical companies in Iran and international companies has increased in recent years due to the privatisation policy that was imposed by the Iranian government (World Health Organisation, 2011). Third, most of the country's medicine, around 96%, is produced inside the country (World Health Organisation, 2011). This shows that the pharmaceutical companies in Iran have high capability for adopting innovation. The capabilities of the pharmaceutical industry in Iran for producing medicine has been acknowledge by the World Health Organisation. This reflects the potential of the pharmaceutical companies in Iran to absorb and use external knowledge.

The researcher travelled to Iran in March 2011. The fieldwork almost took three months but the researcher spent four months in total in Iran. Gaining access to the first company roughly took place around one month. Apart from tense negotiations for gaining access to case Company One, the researcher collected general information about the pharmaceutical industry during the first month. This helped the researcher to know some people who have valuable knowledge about the pharmaceutical industry. Speaking to these people helped the researcher to know the most innovative pharmaceutical companies in Iran.

We selected three leading innovative organisations in Iran. The objective of sampling in a case study research is either to forecast certain outcomes through expected reasons or to achieve contradictory outcomes through expected reasons (Halinen and Törnroos, 2005). This thesis purposefully sampled three leading innovative organisations in order to show the similarities between leadership styles and the learning processes of AC for product innovation among them. It is suggested that case study research is more about comparing similarities across cases (Stake, 1995). Therefore, this thesis purposefully selected its sample from leading innovation adopting pharmaceutical companies in Iran. Taking a purposive sampling according to certain features allows researchers to investigate in-depth their research problems (Legard et al., 2003). There are different types of purposive sampling. Theoretical sampling is a type of purposive sampling which is used to develop or test a theory (Ritchie et al., 2003). Accordingly, the theoretical sampling was adopted because the outcomes of this thesis aim to improve AC theory.

Figure 4.1: Multifaceted design of case studies



We collected data from selected companies by conducting interviews, observation, and using secondary documents (Figure 4.1). The process of data collection from these three data sources is explained in section 4.4.3.1, 4.4.3.2, and 4.4.3.3.

4.4.3.1 Interview

Collis and Hussey (2009) define interviews as a research method that respondents are asked to explain what they do, think, or feel. There are three types of interviews: structured, semi-structured, and in-depth (Bryman and Bell, 2007). The advantage of in-depth and semi-structured interview is that a researcher can expand his or her discussions as an important issue raised by the interviewees (Meredith et al., 1989). Between in-depth and semi-structured interview, this thesis deployed semi-structured interview. This type of interview let a researcher to ask same questions from respondents. Because of the advantages of asking same questions and allowing to ask follow up questions, semi-structured interviewees is widely used, particularly in the field of business and management studies (Thomas, 2011; Myers, 2009). The

researcher uses an interview protocol, which is also known as interview guide, for ensuring the same questions are asked (Appendix A). Using the interview guide lets the researcher investigate certain aspects and avoid collecting too much data. It is suggested that analysing too much data is complicated and it inhibit the researcher to investigate cases in-depth (Yin, 2009).

To develop the interview guide, the theoretical framework within the thesis was considered. Barnes (2001) suggests that such concepts provide a guide line for asking questions but a researcher can still explore different topics during the interview. The interview guide considered the relationship between the proposed conceptual model of this thesis which were identified and discussed in Chapter 3. The researcher developed open questions in order to encourage the interviewees to talk in depth about their experience on innovation and managerial activities within their organisations. It is suggested that interviewers should avoid asking yes or no questions (closed questions) because these types of questions do not provide rich replies (Rubin and Rubin, 2005). Moreover, due to flexibility of semi-structured interview, other issues explored as they have been raised during the interviews.

In total, thirty one interviews were conducted (Table 4.9). Interviewees in each case company were conducted until theoretical saturation was achieved. The researcher ensured about achieving theoretical saturation, when no new information was given by the interviewees. The interviewees were mainly top and middle managers which directly engage in innovation activities like marketing, R&D, production, and quality control managers. These respondents were selected because of their crucial roles in innovation activities and making decisions. They play a significant role in AC as explained in Chapter 3. It is recommended that the researchers should include multiple informants in order to avoid ‘key informants’ bias (e.g., using a single informant) (Kumar, 1993). Conducting interviews with multiple informants enables researchers to reach superiors quality and in-depth information (Van Bruggen et al., 2002). Therefore, a few interviews were conducted with the line managers in order to capture a depth picture about the effect of top and middle managers leadership styles on the learning processes of AC and the process of innovation adoption. Conducting interviews with line managers also assisted to verify the top and middle managers’ respondents.

Table 4.9: Interviewees and their background

Company Name	Individuals interviewed	Managerial position	Work experience	Number of Interviews
1	C1	Top	N/A	1
1	M1F1	Top	19 years	2
1	M1M2	Middle	4 years	2
1	M1QA3	Middle	8 years	2
1	M2RD1	Middle	N/A	2
2	C2	Top	30 years	1
2	F2M6	Top	13 years	2
2	QA2M3	Top	20 years	1
2	M1C3	Middle	12 years	1
2	IE1M2	Middle	2 years	1
2	M1RD2	Middle	38 years	2
2	P1M2-NRF	Middle	6 years	1
2	PM4-M5	Middle	27 years	2
2	QC2M1	Middle	1 year	1
2	T2M2	Middle	8 years	2
2	SG2S2	Line	2 years	1
2	IE1S2	Line	1 year	1
3	C3	Top	N/A	1
3	C3-2	Top	N/A	2

3	M2F3	Top	15 years	2
3	M1RD3	Middle	N/A	3
3	M2S3	Middle	15 years	2
3	M3D3	Middle	9 years	2
3	M4T3	Middle	23 years	1
3	M5P3	Middle	4 years	1
3	M6QA3	Middle	6 years	2
3	MQ1C3	Middle	3 years	1
3	S1-3	Line	2 years	1
3	S2-3	Line	2 years	1
3	S1C3	Line	N/A	1
3	S2C3	Line	6 years	1

The lengths of the interviews varied from one hour and a half to three hours. Some respondents were interviewed more than once in order to resolve any confusion and/or conflict in their responses. We contacted these interviewees in person during the fieldwork. The second interview with respondent M1RD3 occurred at the conference room of Company Three but the other interviews took place in the respondents' offices. We also conducted some phone interviews with some respondents in order to clarify any unclear information. It was observed that most of the interviewees patiently answered the questions. There were some situations where the interviewees had little time; their second interviews were rescheduled. The researcher attempted to build trust with his interviewees. By building trust, researchers are able to gain the information that they need (Easterby-Smith et al., 2008_b). This thesis followed Easterby-Smith et al.'s (2008_b) suggestions for building trust which were showing the benefits of the research and having information about

the chosen companies. The researcher explained enthusiastically and professionally the benefit of this thesis to the case companies Chief Executive Officers (CEOs). Moreover, talking to the CEOs facilitated access to the three case companies. It is suggested that researchers should gain permission from the person with the highest position in case companies because it allows the researchers to access different part of organisations (Barnes, 2001).

It was planned to tape-record the interviews. The benefit of tape-recording is that all points that were made by the interviewees are collected. Since there is a possibility that tape recorder fails during the interviews, two tape recorders were used. Moreover, each of these two tape recorders is checked before conducting the interviews. The disadvantage of tape-recording is that it may inhibit the researcher to actively listen to respondents (Darke et al., 1998). To deal with this issue, some main point are recorded on a blank paper in order to recall them during the interviews and ask further questions when it is necessarily. However, a few interviewees refused tape-recording. These interviewees were written during the interviews. The best efforts were made during the interviews to record interviewees' points correctly. Recording interviewees correctly is important as it is suggested that wording interview questions and style is not useful, if a researcher does not capture the interviewees' comments properly (Patton, 2002).

After conducting interviews, they were transcribed. As a result of transcribing, around seven hundred pages were produced. Transcribing interviewees was a time consuming activity as one hour interview requires six to ten hours transcribing (Ticehurst and Veal, 2000). All names or points which may enable a third party to identify an interviewee and/or his or her organisations were replaced by a pre-determined code during transcribing. For example, there were several interviewees who are mentioned their companies' name during their interviews. The name of their companies was replaced with an English alphabet. Then, the transcribed interviews were translated from Persian (Farsi) to English. To avoid bias and check the accuracy of the interviews, the researcher asked several people to randomly select some interviewees and check the accuracy of his translation.

4.4.3.2 Observation

Observation was chosen to collect data in order to directly record what managers do in the firms to manage and use externally acquired knowledge for innovation.

Marshall and Rossman (2011) define observation as "recording of events, behaviours and artefacts (objects) in the social setting." It is suggested that observation provides case researchers with deeper understanding and better insight (Stake, 1995). To understand innovation activities and related managerial practices, the following factors (Collis and Hussey, 2009), were considered:

1. Research aim
2. Research budget
3. Extent to which limitations are imposed on observation
4. Time limitation
5. Extent to which the Researcher is comfortable in conducting observation

There are two forms of observation: (1) participatory observation which a researcher engages in organisational activities, (2) direct observation (non-participant) that the researcher just observe what people do and say. Mason (2002) suggests that direct observation is preferable technique when a researcher wants to explore knowledge from naturally occurring data rather than participating in generating it. This type of observation enabled the researcher to understand the social situation within each organisation through observing the interaction between people (Thomas, 2011).
The researcher participated in some of the companies' meetings, including training sessions and daily organisational activities. It was initially planned to visit production sites, R&D, and marketing departments before conducting interviews with the respondents because it would have helped the researcher to gain better knowledge about the managers' behaviours and attitudes by observing the interaction between the managers and their followers. Unfortunately, such permission was not granted because the pharmaceutical companies strictly protect their product information as well as tightly consider health issues. Therefore, the observation was limited to attending daily production meetings and attending some training sessions. The researcher also had the chance to observe the informal interaction between managers during lunchtime. Attending the meetings and training sessions as well as observing the interaction between managers provided further understanding about the atmosphere of the case companies and flow of information at the managerial level. As explained, the AC learning processes start at the individual and group level,

where managers have a significant role. Therefore, observing the interaction between managers was also valuable because it provided an insight regarding the learning processes and knowledge transfer. Moreover, roaming around the organisations allows the researcher to observe informal interaction between managers and their followers at the company's offices.

There are different approaches that data derived from observation can be recorded such as audio or video recording, photographs, maps, diagrams, and field-notes. The most used observation recording method is field-notes (Mason, 2002) which assisted for reflection on what has been observed. That is why we used field-notes technique to record our observation.

4.4.3.3 Documents

The final source of data was documents. Documents are one of the main sources of data collection in qualitative studies in general (Saunders et al., 2009) and case studies in particular (Blumberg et al., 2011). It is very common to collect data along with interviews and observation in case study researches (Gibson and Brown 2009). We used documents in order to record activities that the researcher cannot observe directly (Stake, 1995), including the case companies' innovativeness. For example, using documents enabled this thesis to observe the increasing number of new products, which reflects innovativeness and organisational AC (Daghfous, 2004).

Yin (2009) introduces different types of documents which may use in a case study research. Between these types of documents, this thesis planned to use administrative documents such as product proposals, market reports, progress reports, internal letters, and organisational websites. Case companies refused to share most of the administrative documents which the researcher asked for. The reason for not sharing administrative documents with the researcher was that secret information such as drug formula hold in these types of documents, as the researcher was informed. Therefore, we browsed the case companies' websites and profiles in order to become familiar with the companies background and to know what is important for the case companies. Website information is important because they reflect what issues are currently important for organisations (Easterby-Smith et al., 2008_b). We also used public domain documents and companies' annual reports in recent years which were provided for the Tehran Stock Exchange market. Comparing each company' annual reviews over years enabled the researcher to evaluate the organisational path towards

product innovation and to gain further information regarding the case companies. Around 600 pages of documents were reviewed in total. Although accessing to most of internal documents was not granted, we still achieved a solid understanding about the aspects of innovation and managerial activities in the case companies, which cannot be obtained from interview and observation alone.

4.4.3.4 Case Study Protocol

After identifying source of data, a case study protocol was developed. As shown in Table 4.5, developing a case study protocol increases the reliability of the research. The benefit of using the case study protocol is that it provides guidelines for a researcher to conduct his or her data collection procedures from a single case, even when that case is a part of multiple case study research (Yin, 2009). Such procedures reflect the significant role of research questions and set the research boundaries (Yin, 2009). The case study protocol comprises the following sections as Yin (2009) suggests: overview of the case study project, field procedures, case study questions, and guide for the case study report. Firs part includes the general information about the study and let the participants to know the study, its purpose, and the researcher(s). Such information in this thesis was not only provided in the case study protocol but also explain to the participants before conducting the interviews.

The second part of the case study protocol (field procedures) deals with main tasks in collecting data, as illustrated in Table 4.10. The first task was to gain access to the three companies. This task was achieved through three stages. It was important to identify which companies to include in the study. The way this task is fulfilled was previously explained in this chapter. Then, to facilitate the access to the gatekeepers (which defines as those who provide access to companies), this thesis established a relationships with the CEOs through friends and their partners in order to establish trust with the top managers. The benefit of asking the CEOs for gaining access was that they provided better access to data which requires for doing the study. The last stage here is to negotiate with them and explain the data the study needs. The second part is having enough resources while the researcher is in the field. This is important because the lack of resources inhibits the data collection. For example, having a laptop helps the researcher to copy the recorded interviews and delete them from the recorders in order to have more space on the tape recorders to save the following interviews.

Table 4.10: The field procedures adopted

Major tasks in collecting data	Strategies applied
Gaining access	- Identifying adequate organisations - Introducing to the firms through friends or their partners - Making appointment and negotiating with the (CEOs)
Having resources	- Having equipment such as papers, pen, laptops, tape recorders, and batteries - Considering financial and time limitation
Developing a plan for help (if needed)	- Asking for help from knowledgeable people about this research
Planning data collection activities	- Identifying participants and documentations - Developing interview questions - Being flexible for data collection in a way which not harm the validity of data - Considering ethical issues
Preparing for unexpected events	- Seeking for other types of data sources - Backing up the interview files - Copying interview transcripts

Before conducting the fieldwork we identified proposed interviewees, types of document, and observation. Interview questions were also developed prior to collecting data. Since managerial and processes might be different to some extent across case companies, it was planned to asked follow up questions which were not

in the interview guide. Yin (2009) suggests that the main part of a case study protocol is the different level of questions which shows the line of inquiry, as illustrated in Table 4.11. Since the data in a case study research is collected from real-life setting, there is possibility that the researcher cannot access to interviewees or documents required. Therefore, we developed an action plan before collecting data. For example, time negotiated with the interviewees and required documents were requested before entering to each case company. Nevertheless, having the action plan in real-setting has not been completely guaranteed in a fieldwork. A contingency plan developed beforehand in order to ensure that the required data collection was achieved. For instance, part of the contingency plan was to protect the loss of interview content from damage by providing an extra copy of interviews. This strategy also applied for the interview transcripts.

Table 4.11: Question levels in this case study

Question level	Research questions	Question
Level 1	Questions asked of specific interviewees.	The interview guide (Appendix A)
Level 2	Questions asked in an individual case study.	Section 4.3.3.4
Level 3	Questions asked across multiple case studies.	Section 4.3.3.4
Level 4	Questions asked about the entire study.	Section 1.4
Level 5	Questions about the recommendations and conclusions beyond the scope of the study	Sections 8.2, 8.4

Source: Yin (2009)

We also planned some questions which helped the researcher for collecting appropriate data. These questions did not ask directly from the interviewees but instead they reminded the researcher about main topics to follow up during the interviewees. For example, there were questions which asked from the interviewees

as interesting issues raised. The researcher used these reminder questions in order to help him to decide which issues to follow, as illustrated in Table 4.12. Moreover, having the reminder questions enabled the researcher to ensure that he received more likely useful information regarding the innovation and AC learning processes at the end of each interview.

Table 4.12: Question reminder for further investigation

Research issues	Description
Innovation adopting processes	- How does product innovation conduct?
AC learning processes	- How does external knowledge value, acquired, assimilated, and implement in the context of product innovation?
Managerial aspects	- How do managers increase organisational innovativeness and influence AC learning processes from product innovation perspective?

The last part of the case study protocol refers to how to report the case study findings. Therefore, the report should particularly highlight theoretical orientation and methodological issues (Yin, 2009). To be better familiar with the style of writing in a case study report, some thesis and journal articles that adopted case study method were also reviewed.

Yin (2009) considers four ways in which a case study can be reported. The first type can be applied to a single case study and therefore it is not suitable for this thesis. The format of writing in this type is to develop narrative which can be used for describing and analysing the single case by using tabular, graphical, and pictorial display. The second type relies on the traditional single case report (applied in the first format). This type usually develops multiple narratives and describes single cases in different chapter or sections from the cross-case analysis. The third format does not follow the classical narrative such as the first two formats. Instead, the style of writing here is to ask questions and answering them. The forth one is to only deploy multiple case studies and considers both within- and cross-case analysis in

the same chapter. The focus here is mainly on cross-case analysis and information about each case can be found throughout the discussion. For our research we used the second format (the multiple-case version of the classic single case) to report its findings. Similarly, it is suggested that the case study researchers emphasis should be on separating the description of individual case from cross-case analysis (e.g., Eisenhardt, 1989; Voss et al., 2002). Therefore, the following two chapters consider patterns within and between cases respectively. Applying visual formats to reports the case study findings helps the reader to validate conclusions due to the systematic presentation of information (Voss et al., 2002). Doing this assists to improve the quality of the study.

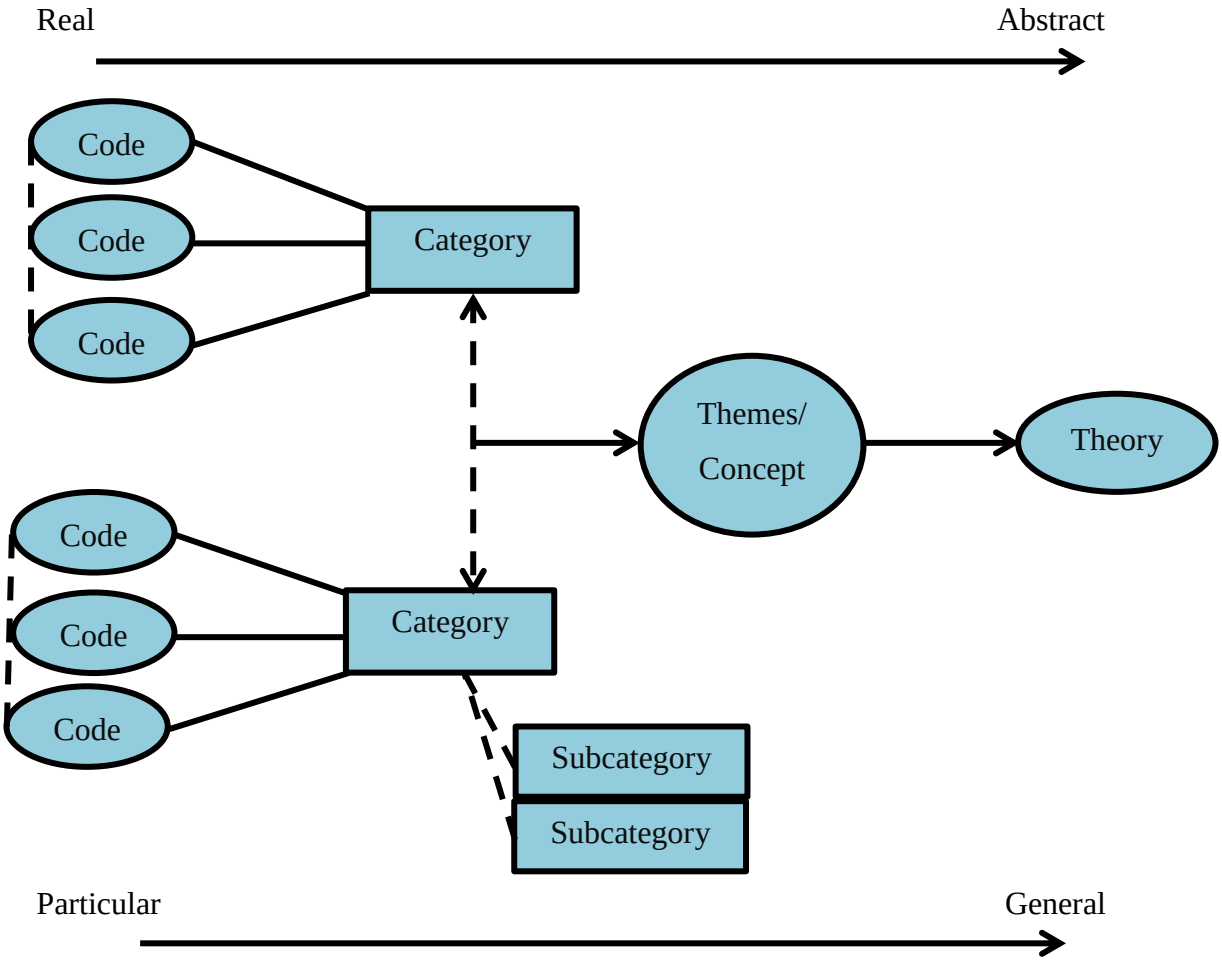
4.4.4 Data Analysing Method

Qualitative data analysis is about turning data into something meaningful (Myers, 2009). Analysing data adequately also increases the quality of a case study and its internal validity as explained in section 4.4.2. The difficulty in qualitative study is that data analysing methods are not adequately formulated (Miles and Huberman, 1994), particularly in case study researches (Yin, 2009). We therefore extensively reviewed the most important qualitative data analysis methods in general, and case study analysing techniques in particular, in order to choose adequate data analysing methods. Through reviewing these methods, it was noticed that theory-building case study research refers to pattern invention. For example, Bogdan and Biklen (2006) consider searching for pattern as part of qualitative data analysis.

Eisenhardt (1989) developed a widely respected data analysing method for theory-building case study. A theory-building research from case study involves two stages: within case-analysis and cross case-analysis in order to explore new insights which may resides in data (Eisenhardt, 1989; Miles and Huberman, 1994). Detailed description of each case is provided during within case analysis stage and there is no particular format for writing up within case analysis report (Eisenhardt, 1989). Some respondents were agreed to check our report on their companies and we contacted them by email. Receiving approval from them ensured us about the accuracy of our account on each case company. Within case-analysis provided in-depth understanding about similarities and differences across cases. Accordingly, understanding the relationship between innovation adoption process and the AC learning processes in each company and exploring how top and middle managers

affect the AC learning processes enabled this thesis to determine the commonalities and differences across cases. In the second stage, cross-case analysis performs in order to look for patterns (Eisenhardt, 1989). To identify patterns in data, we followed thematic analysis, as illustrated in Figure 4.2. Boyatzis (1998) defines it as "a pattern found in the information that at minimum describes and organizes the possible observations and at maximum interprets aspects of the phenomenon." Thematic analysis allows researchers to classify or encode the pattern (Boyatzis, 1998).

Figure 4.2: A streamlined codes-to-theory model for qualitative inquiry



Source: Saldaña (2009)

As Figure 4.2 also illustrates, the first step in developing theme is to code data. Saldaña (2009) defines code as "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." Coding in qualitative study can be categorised into

top-down and bottom-up (Auerbach and Silverstein, 2003). Top-down coding derives by theoretical constructs from literature, while bottom-up coding refers to selecting appropriate text without relying on theoretical constructs (Auerbach and Silverstein, 2003).

Consistence with interpretive and inductive theory-building case studies, we adopted both top-down (Table 4.13) and bottom-up coding approaches to identify themes in the data. It is suggested that using top-down coding leads to a moderate theory, while the bottom-up approach leads to a good theory (Eisenhardt, 1989). Top-down coding helped to benefiting from the existing literature on AC theory. However, relying purely only on top-down coding may inhibit adding new insights to a theory (Perry, 1998). This thesis used top-down coding because the existing literature on leadership styles, innovation, and AC learning processes is rich and codes regarding these concepts are available in the literature. However, to explore further themes and build a better theory, bottom-up coding was also applied. As a result of applying bottom-up coding, this thesis explored the themes for the exploratory and transformative learning processes. Determining the themes enabled this thesis to identify a pattern in the data in regards to integrating innovation, the AC learning processes, and leadership styles. To develop the pattern, this thesis initially analysed each case and then compared the cases together, as suggested by Eisenhardt (1989). Since the data analysis showed similar themes across the three cases, the researcher got confident on the theoretical saturation and consequently on the emergent pattern. Theoretical saturation was achieved as it was observed that similar theme emerged across three cases. Achieving theoretical saturation enables the researcher to generalise a pattern across three case companies. Developing this pattern ensured the research achieved internal validity, as illustrated in Table 4.8. It is suggested that internal validity in a case study research is achieved if similar findings across cases is observed (Yin, 2009).

Table 4.13: The illustration of code-to-theme model (deductive coding)

Codes	Categories	Themes (concepts)
Encouraging pride, trust, and respect in leaders, organization and themselves (García-Morales et al., 2012), Admiring and respecting in managers (Bass et al., 2003), Sharing risk with followers (Bass et al., 2003), Motivating employees mainly through communication of high expectations (García-Morales et al., 2012; Sarros et al., 2002)	Idealised influence	Transformational leadership style
Proving coaching and teaching (Bass 1985), Treating each follower as a respected individual (Bass 1985), Creating new learning opportunities along with a supportive climate (Bass et al., 2003), Considering individual differences (Bass et al., 2003), Considering followers' needs over his or her interest (Bass et al., 2003), Building one-to-one relationships with his or her employees (Gumusluoğlu and Ilsev, 2009)	Individualised consideration	
Creating a common vision (García-Morales et al., 2008_a), Paying attention to effective communication and sharing values (Adair, 1990), Encouraging followers to envision an attractive future (Bass et al., 2003), Motivating followers by providing meaning and challenges to their work (Bass et al.,	Inspirational motivation	

2003) Supporting the collective process of organisational learning (Manz et al., 1989), Promoting employees' intelligence, knowledge and learning for being innovative (García-Morales et al., 2012), Allowing experimentation (Bundy, 2002; Henry, 2001), Encouraging followers to think in a new way (Bass 1985), The use of reasoning before taking action (Bass 1985), Avoiding public criticism of individual members' mistakes (Bass et al., 2003), Soliciting new ideas and creative solutions to problems from followers (Bass et al., 2003)	Intellectual stimulation	
Providing incentives for development of new products (Yukl, 2009), Clarifying expectations and offering recognition as the goals are achieved (Bass et al., 2003) Tracking progress in development of new products (Yukl, 2009), Analysing and refining the traditional work processes (Yukl, 2009), Taking corrective action as quickly as possible when mistakes occurred (Bass et al., 2003), Specifying the standards for compliance (Bass et al., 2003); often-punish non-compliance (Bass and Avolio, 1993)	Contingent rewards Management by expectation	Transactional leadership style

Participatory decision making (Jansen et al., 2005), Clear strategic focus (Lane et al., 2006; Zahra and George, 2002; Zheng et al., 2010), Investment in R&D (Cohen and Levinthal, 1990; Cohen and Levinthal, 1989), Prior knowledge (technological and product-related knowledge) of individuals involved in acquisition (Cohen and Levinthal, 1990; Crossan et al., 1999; Lichtenthaler, 2009; Sun and Anderson, 2010; Zahra and George, 2002), Openness towards external knowledge sources (Gebauer et al., 2012), Identification of new knowledge in external sources (Gebauer et al., 2012), Motivation to use external knowledge sources (Gebauer et al., 2012), Acquisition of knowledge through various sources (Gebauer et al., 2012)	Exploratory learning process	Absorptive capacity learning processes
Team interaction and dialogue (Crossan et al., 1999; Gebauer et al., 2012; Jansen et al., 2005; Nonaka, 1994), Social relationship within the organisation (within and between functions) (Gebauer et al., 2012; Cohen and Levinthal, 1990; Jansen et al., 2005), Using tools for spreading knowledge throughout the firm (Gebauer et al., 2012), Maintaining and reactivating knowledge (Gebauer et al., 2012; Lichtenthaler, 2009), Adding new knowledge to the acquired knowledge (Gebauer et al., 2012), Achieving a collective understanding of the acquired knowledge (Gebauer	Transformative learning process	

et al., 2012), experimentation (Sun and Anderson, 2010), Decentralised structure – interactions and communication amongst members (Zheng et al., 2010)		
Launching innovation to the market (Gebauer et al., 2012), Engaging in product innovation (Gebauer et al., 2012), Converting innovative ideas into commercial application (Gebauer et al., 2012), Formalisation of systems and processes (Crossan et al., 1999; Jansen et al., 2005; Zheng et al., 2010)	Exploitative learning process	

All collected data were entered into NVivo 9.2 because the volume of data was massive. Qualitative software packages such as NVivo 9.2 are suitable when the volume of data is high, approximately more than 20 interviewees (Easterby-Smith et al., 2008_b). Flick (2007) mentions to other advantages of using computer software, like NVivo 9.2, such as increasing speed and enhancing quality of research. Using NVivo 9.2 helped the researcher to manage and search data quicker and easier. Moreover, NVivo 9.2 enabled the researcher to follow similar analytical procedures which ensured the accuracy of the findings.

4.4.5 Ethical Issues

There are ethical issues which need to be considered by the researcher in order to respect individuals and to present the research honesty. Ticehurst and Veal (2000) suggest that the ethical issues are universal. Reviewing the ethical issues revealed that the different principles need to be considered by the researcher. These issues are: protecting the respondents and the researcher from harm, gaining contest, and giving the respondent an option to the respondents to participate (Ticehurst and Veal, 2000; Legard et al., 2003).

To protect the respondents from harm, it was planned to keep the informants' information and the name of companies confidential. Furthermore, a coding system developed in order to inhibit other people to identify who participated in the interviews. The interview files also deleted from the researcher's laptop and from his tape-recorder. The researcher also planned to protect himself from particular risks such as accident and the respondents' anger. Legard et al. (2003) suggest that the researcher need to arrange his or her way to interview venue in advance by asking participants or using a map in order to reduce the risk of accident. Therefore, the direction to the interview venues has been asked from the respondents. The other issues that considered for protecting the researcher from harm referred to the respondents' anger which rose during one of the interview. In such situation, the researcher moved to other topics.

Access was granted to companies after extensive negotiation with CEOs. This process was time consuming since they wanted to check the information provided by the researcher. After access granted, the respondents were informed about the aim of the study. It gave a right to informants to deliberately accept to participate. It was asked from each respondent to sign a 'participatory information sheet' in order to

show that they understood why they were participating in this research (Appendix B).

4.5 Conclusion

Chapter 4 explained the methodological aspect of this thesis. We discussed the philosophical aspects of this thesis. Explaining the philosophical aspects is important because it shows the way a research claims for knowledge. We followed an interpretive stance which allows achieving a comprehensive view on integrating the AC learning processes, innovation and leadership styles. In the light of adopting the interpretive stance, using qualitative or quantitative strategy was explained. Implementing qualitative research strategy was justified. Accordingly, this thesis adopted a case study research design. Adopting case study design was justified by considering type of research questions, the research focus on the current organisational practices and the influence of the researcher on the researched issues.

Designing a case study research has some requirements such as identifying the number of cases. This forms part of achieving a good quality case study. One of the important parts of achieving a high quality case analysis is to use a multiple source of data. We applied three sources of data including interviews, non-participant observation, and documents. There were some difficulties in collecting data from these sources. It was explained how the researcher dealt with these difficulties. We developed a case study protocol following the identification of sources of data in order to ensure the consistency in data collection. The other important issue which increase the quality of a case study is data analysis. In this respect we adopted within- and cross-case analysis in order to analysis its data. Finally, ethical issues were explained.

Justifying philosophical points, research strategy, research design, and ethical issues enabled this thesis to collect its required data. Analysing data revealed the key findings. Chapters 5 and 6 consider and explain within- and cross-case analysis respectively.

Chapter 5: Within-Case Findings

5.1 Main Fieldwork

This chapter aims to understand innovation, the absorptive capacity (AC) learning processes, and leadership styles of the top and middle managers in each selected company. Within-case descriptions were found to provide enough information in order to justify the research, which was presented in this thesis. The data collected were used to explore the suggested theoretical framework: (a) the stages of innovation adoption; (b) the AC learning processes that take place during the innovation processes within the case companies; and (c) the combinative influence of the top and middle managers on the AC learning processes. Nevertheless, the analysis of the empirical data should not be seen as a comparison between the cases. Instead, this chapter offers an empirical analysis of different case-study perspectives that describe the learning processes and the combinative influence of top and middle managers in order to adopt innovations effectively.

The chapter is divided into three parts. At the beginning of each section, a brief background about each company is given in order to make others familiar with the three cases. Then, an in-depth account about the influence of AC learning processes on innovation is discussed. Finally, the influence of the leadership styles of top and middle managers is explained.

5.2 Case Company One

5.2.1 Background to Company One

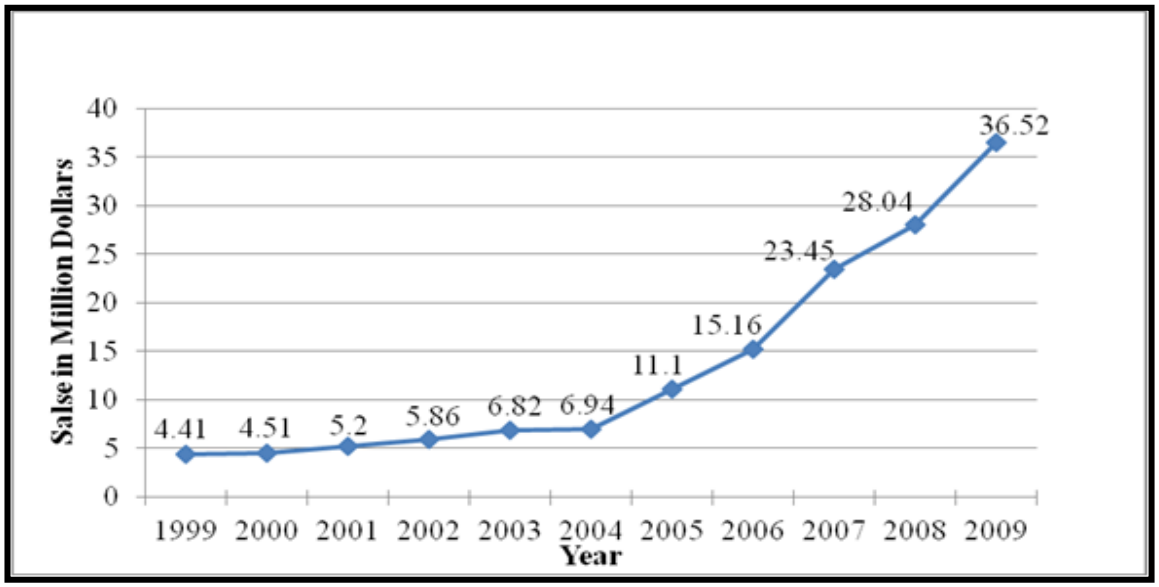
Company One was established as a joint venture more than 40 years ago. At the present time, this company is partly privatised. The main objective of the company is to produce high-quality medicines and penetrate the domestic and foreign markets by enhancing the company's revenue in order to increase its innovativeness. Innovation, quality, and continual learning are considered as some of the company's values. This company has different production lines, which allow innovation of different forms of

medicine such as tablets, injections, and syrups. The diversity of its production lines helps this company to enter different markets at the same time. Company One aims to export its medicines to six new countries into Asia, South America, and Africa.

The company moves towards producing high-tech medicines which require more complex knowledge and advanced technologies. The company not only relies on its own R&D departments but also closely cooperates with other international pharmaceutical companies, universities, and research centres for developing new drugs and establishing several pipeline production products. Following this strategy has enabled this organisation to develop 55 new medicines in the last five years. The company's R&D department is currently working on 30 new medicines, aiming to release 22 of them to its markets by next year.

Company One has been developing a five-year strategic plan since 2007. Every year the company provides a report on their success in its strategic plan and establishes the objectives for the oncoming year. For example, the production department, with the help of the R&D department, added 13 medicines to its drug list. As Figure 5.1 illustrates, following the strategic plan has helped this company to grow dramatically. Such development has enabled this company to meet its sales objective (24.4 percent annual sales growth). Such progress shows the sustainable growth of this firm through constant product innovation, which turns this firm into one of the ten leading pharmaceutical companies in Iran in terms of growth and revenue.

Figure 5.1: Company One sales growth



Source: Company's profile

Company One has continually progressed. Such development has been made due to this company focusing on continual improvement and on harmonising the cooperation between its departments. This company is moving towards more changes such as expanding its R&D and production space and facility in order to enhance production outputs and to introduce new medicines. Such achievement is in line with the company's vision. One of the key values in this company is quality, which supports its vision, because the Ministry of Health and Medical Education (MOHME) does not allow any company to launch new medicines in to the market that have no quality approval. Company One obtain different 'quality standard qualifications' such as ISO 900 in order to reach its vision and satisfy its customers in domestic and foreign markets.

5.2.2 An Overview of the Innovation and the AC Learning Processes

It was explained in Chapter 2 that the process of innovation takes place in the form of generation and adoption and both of these innovations follow a linear fashion in the pharmaceutical industry. The three stages of learning include exploratory, transformative, and exploitative, which occur as processes when a firm seeks to adopt an innovation from the external environment and acquire the underlying knowledge which is required for developing it. Therefore, the way the leading

Iranian pharmaceutical companies like Company One manage the process of innovation adoption and the learning underlying it is explained in two parts. In the first part, it is explained how these firms initiate new products, where valuing them resides in their exploratory learning process. Then, in the same part, the way the adoption decision is reached is discussed. After that, an explanation is given regarding the knowledge implementation, which highlights the way transformative and exploitative learning processes are achieved. These two latent learning processes, as mentioned in Chapter 3, show the way organisations modify and disseminate external knowledge in order to exploit it for innovation.

5.2.2.1 The Influence of the Exploratory Learning Process on Initiation and Adoption Decisions

One of the factors which has helped Company One to grow and maintain their competitiveness refers to the high speed at which it develops a new medicine compared to their competitors. Being first in the market helps this company to increase its revenue before its competitors penetrate its market niche and their new drugs reduce its profit. Being the first to market requires this organisation to enhance its knowledge and its capability constantly. Company One monitors pharmaceutical companies across the global market to determine the type of knowledge and products that have been developed recently.

> "*Innovation does not mean that I start to produce a medicine which is being produced by five other companies. Rather, it means that it should be number one and is being produced in Iran for the first time. Therefore, many products in the pipeline have been produced that were not being produced in the country. It is possible that a medicine is produced by Company One but since the process is lengthy, it takes two or three years in order to produce generic products so that the process will be started by five other companies after us, but we would start sooner and I can ignore them. I believe that if I produce medicine produced by other companies, it will not be innovation. I think it is just market expansion.*" (Respondent M1F1)

> "*We try to be on the same level as famous pharmaceutical companies. I am not saying to be the same as US or big European companies. I mean,*

> *we want to reach those companies that we acquire knowledge from. The medicines we are producing here are mainly high-tech, and doing trial and error to create knowledge imposes much cost.*" (Respondent M1F1)

One of the reasons why this firm searches for external knowledge is cost reduction. Moreover, having little knowledge of high-tech medicines increases the time required for developing new medicines because the innovation processes involve trial and error. As the entry time in the market is important, using external knowledge helps Company One to speed up the introduction of new medicines to its markets. Time and cost reduction lead not only to enhancing its profitability but also to benefiting from the uniqueness of the products for a longer time before a new rival launches the same or similar medicine in the market. Therefore, to benefit from its new medicines for a longer time, Company One should protect its knowledge.

> "*It is really important, especially those medicines which are introduced to us from foreign companies. Such medicines first need to solve one of the problems in the health area within our country and then it should be lucrative. This reduces the production time.*" (Respondent M1F1)

> "*The extent to which you have disseminated information about a new drug helps you to protect your knowledge. We reduce the possibility of leaking information regarding our new medicines by sharing it with only a few people*." (Respondent M1F1)

Preventing other firms from gaining the knowledge underlying new medicines does not inhibit other companies from imitating Company One's new medicines. Therefore, this firm needs to search for new medicines extensively. This company relies on its human capital for innovating medicines. One of the main supporting aspects of the human capital is to develop new ideas for product innovation. As Company One aims to be the first to market, the employees' ideas should be new, not only to the firm but also to the country. This company has a systematic approach in order to choose appropriate ideas.

> "*We should consider the principles of business plans. We should have a general idea; we are not allowed to consider a project which does not have a complete idea and has negative and positive assumptions. The*

> *first principle in a business plan is that your idea should be complete and comprehensive. Second, the idea should be market-orientated. We cannot ignore orientations of the market due to it being a production company; third, it should be implemented. For example, a person can go to Mars with safe equipment but if they are not safe enough when facing meteors, they won't work. And finally, it should make added value for the company.*" (Respondent C1)

The first step when initiating new medicines is to have practical ideas. Good ideas for this company are those which introduce new medicines that increase its revenue as well as being new to the country. The main source of initiating such drugs is the existing international markets.

> "*The first step is to identify a medicine in the global market which has high market sales*." (Respondent M1M2)

> "*We have a unit called market evaluation and the pharmaceutical market of the world is controlled there by the internet, and it seeks medicines to be accepted in European and American markets, then they are brought into a committee in order to search, test, and produce. The general director is present in the committee, where they decide to discuss this issue and whether or not we can produce this medicine, and whether it coincides with our production lines; then we choose that medicine*." (Respondent M1F1)

Another source of ideas is its personnel. Employees suggest new products through a suggestion box, which is highly valued in Company One. Respondent M1M2 noted that "*One of the most important tools for initiating new medicines is the suggestion box. The top managers give rewards to those who share their creativity and opinion with others*". Apart from these two ways, its CEO suggests searching for new products for a particular disease which may have the potential to increase profitability. It was pointed out by respondent M1QA3 that, "*however, since our CEO is a pharmacologist and teaches in the university, sometimes he will ask us to work on a particular medicine. This has rarely happened*". Therefore, initiating new medicines inside Company One occurs mainly in formal ways through a suggestion box and a systematic market analysis, which is conducted by the marketing manager;

and occasionally in an informal way through managers, particularly the R&D manager. The last approach for initiating new medicines comes from foreign companies. Respondent M1F1 said that "*sometimes foreign companies contact us for developing new medicines through their representatives in Iran*". When Company One receives such suggestions, they evaluate the new medicines proposed for production, as commented by the interviewees, in order to assess the advantages of such drugs. Accordingly, Company One initiates the development of new medicines through internal and external sources, specifically through a market evaluation committee.

Market knowledge has enabled Company One to search for new products because identification of opportunities depends on the firm's prior market knowledge. Having market knowledge not only enables the recognition of new products but also helps to evaluate them before making adoption decisions.

> "*There is a committee in the company that evaluates the market, considering customers' needs (the customers are Iranian and sometimes we have registered customers in some countries). The information is available in the pharmaceutical industry. For example, ten products are available in Iran. You can estimate the amount of sales in every therapeutic group, then it will be predicted according to future diseases. It is the committee that works on this subject*". (Respondent C1)

Initiating medicines and evaluating them refer to the way Company One conducts its exploratory learning process. The exploratory learning process enables organisations to value and acquire external knowledge, as explained in Chapter 2. After this stage, Company One needs to decide which medicines to develop. Three factors are considered for making decisions in this company. This company evaluates these factors in order. Firstly, they look at their technological capability. Respondent C1 mentioned that, "*obviously, any innovative company firstly achieves in developing new products through its existing capabilities. I mean if I do not have a production line for developing a new product, I move initially towards establishing its production line*". In the next step, this firm looks at its own human resources and their capability to innovate products. The last factor is product market size.

> "*We develop a business plan initially to see if transferring the technology for developing a new medicine is economically justified. Moreover, I should say here that we do not accept combining our existing production facilities to develop the new drug because it does not bring any economic advantage and it does not generate profits for our company. However, managers and people within their departments use all their talent and creativity based on our company's existing platforms in order to accomplish the process of product innovation. What are our company's existing platforms? The first one is our production lines. The second platform is our human capital. The third one is the market size of the new product, which reflects for how much this new product can sell right now and how well this medicine can sell in the future.*" (Respondent C1)

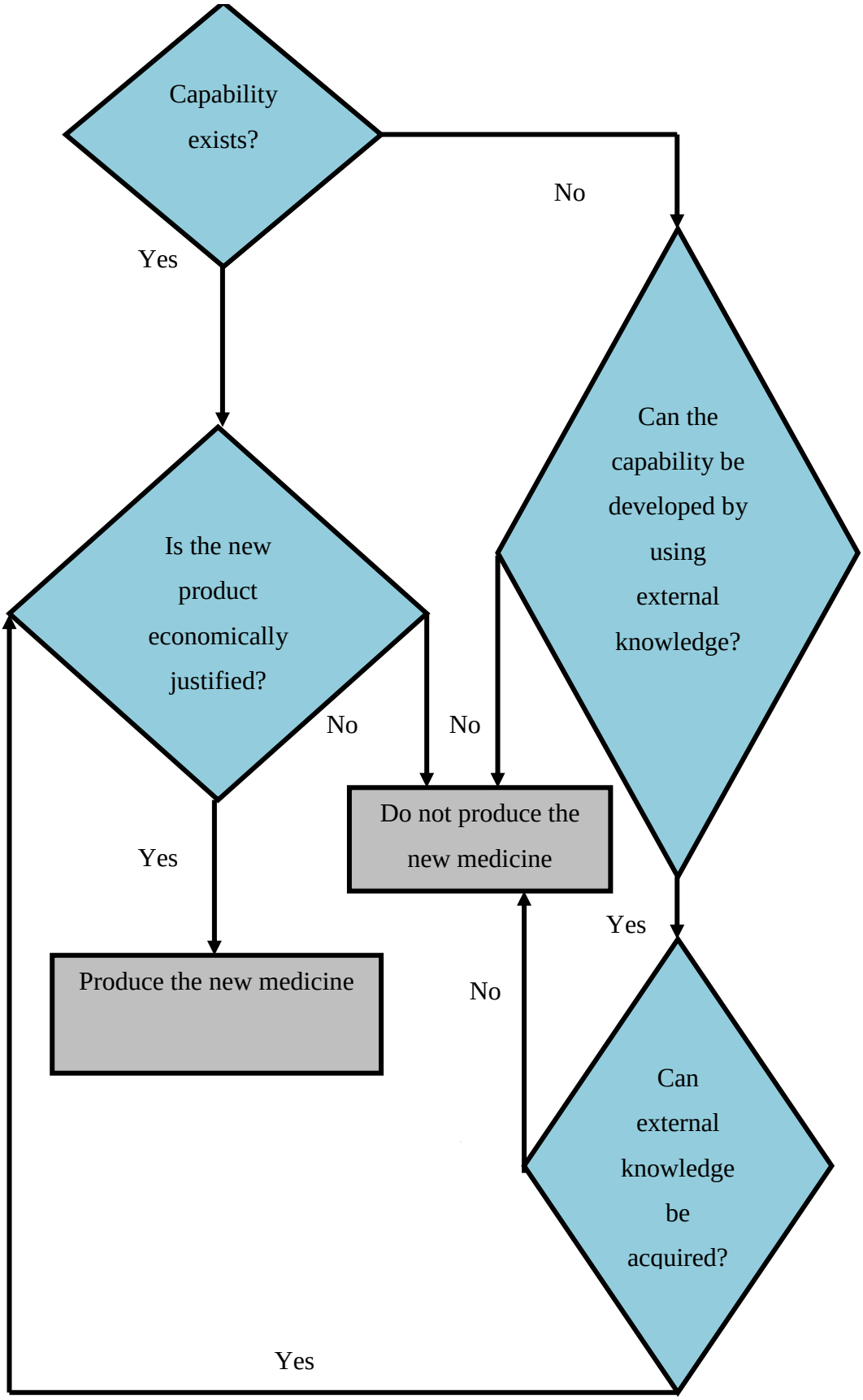
The decision is not driven only by its top managers. There is a 'research committee' which is in charge of deciding whether to develop the new medicine. This committee comprises Company One's CEO and his middle managers. This committee critically evaluate the existing company's platforms to decide whether to produce a new drug (Figure 5.2). If the required platforms such as the technology are available and producing the medicine is economical, then the firm starts developing the drug. However, when such platforms are missing, Company One searches the external environment to see if it can acquire them. As Figure 5.2 illustrates, valuing and identifying sources of external knowledge take place during the decision stage of the innovation adoption process. Company One decision making process is illustrated in Figure 5.2.

> "*In the committee, there is a financial manager, R&D manager, commercial manager, factory manager; each is responsible for reporting on their field. The financial manager identifies the amount of money we need to run the project so he is responsible for supplying, in a certain time, the financial resources. The factory manager should determine the production capacity.*" (Respondent M1F1)

> "*There is a committee which suggests that there is a molecule and it is being sold in the international market at a certain cost. Then we check to see if it is possible to produce it technically, or if it is cost-effective to*

produce it. This cost-effectiveness is specified by checking the domestic market, obtaining the opinions of doctors, checking similar medicines for sale, comparing its effectiveness with the products present in the market, finalising the cost of the product or whether it is economical to produce a product with a 10% increase of effectiveness and at a 200% higher price. Can we encourage the doctors to make their patients pay two or three times more money due to a 10% increase in drug effectiveness? If we conclude that we are able to do it, we will obtain the technology and product." (Respondent M1M2)

Figure 5.2: Company One decision process



Having market knowledge also plays a significant role in making decisions on adopting a new medicine. However, the firm's capability and technological knowledge are really important in Company's One's decisions. Lack of capability and technological knowledge to develop a new medicine are the main reasons why this firm searches for external knowledge. Company One has different production lines, a long history, a strong R&D department, and experience in developing different types of drugs. Company One has a large stock of knowledge in order to develop knowledge to innovate new medicines in-house.

> "*We formulate most of the medicines inside the factory. A few medicines require us to acquire technology or know-how from outside. We prefer to produce the medicines internally because we have enough capabilities inside the factory to reach the required level of knowledge for innovating new medicines.*" (Respondent M2RD1)

However, Company One moves towards developing high-tech medicines which use different types of knowledge and technologies compared to its traditional products due to their profitability and their market size. Company One does not have enough capability and knowledge to develop such medicines. Consequently, developing such knowledge requires trial and error, which increases production costs. To benefit from developing such products, the firm uses external knowledge.

> "*We want to reach those companies that we acquire knowledge from. The medicines that we are producing here are mainly high-tech and doing trial and error to create knowledge imposes much cost.*" (Respondent M1F1)

Using external knowledge is highly important to innovate medicines in Company One, despite its preference for developing them internally.

> "*We are able to produce and formulate most of the medicines. There are a few medicines where we get their technology and know-how from foreign countries. We try to produce medicines by ourselves and we develop the knowledge inside our company.*" (Respondent M1M2)

Having the high capability to develop traditional medicines encourages Company One to prefer internal medicine production. However, aiming to launch high-tech

medicines in the market encourages Company One to consider using external knowledge. The orientation of Company One towards developing medicines internally can also be seen in high-tech medicines. Company One even aims to produce such medicines internally afterwards because its goal is to enhance its capability to the same level of its partners. This company initially considers the existence of the required technology because without the technology, development of new medicines is not achievable.

> "*Experts from different companies always visit the technical and formulation sections. We purchase the processes of producing the medicine or DMF of the medicine, and this DMF is an A-to-Z for the product. So at first we purchase know-how, then transfer the technology. It is routine that they come and train us and stay with us for the first batches, then they return to their countries, then we follow the process*." (Respondent M1F1)

The knowledge to innovate a new medicine does not reside only in the technology itself. However, transferring the technology is part of the adaption process. There are two components here for external knowledge acquisition that this organisation considers. The first part resides in the existence of the technology. The second part refers to having the product knowledge because it determines how the medicine is developed. Therefore, the production capability does not purely rely on having the technology, because it is also about knowing how to produce the new medicine. Knowing these two components fosters the transformative and exploitative learning processes, which facilitate external knowledge assimilation and exploitation.

5.2.2.2 The Influence of the Transformative and Exploitative Learning Processes on Implementation

Learning is obviously critical when developing a new medicine as it enables an organisation to acquire and use external knowledge. As explained in Chapter 3, the transformative learning process enables organisations to combine external knowledge with their knowledge, and the exploitative learning process allows organisations to reuse knowledge. To foster these two learning processes, Company One works closely with their partners. They come to Company One's production site and, through three production batches, the knowledge providers transfer their

knowledge. These first three production batches facilitate knowledge assimilation and transformation. Moreover, any possible changes, concerns and problems are resolved and answered through these three batches.

> "*When we want to choose a company, we consider its reputation. We check if this company is exporting products to Europe or America. We do not have technical know-how. So when we want to get know-how, we focus on the company's abilities. For example, if we found a company in India and there were ten famous biotech companies in India, we would visit them, not unknown companies. We are sure that their knowledge is valid and there is a procedure in pharmacology in which three batches are presented by the company having know-how*." (Respondent M1F1)

Company One therefore chooses a company for knowledge acquisition through its reputation and its past working experience with them. However, allowing three production batches through cooperation with the external knowledge providers facilitates the assimilation, transformation, and exploitation of the knowledge in order to accomplish the implementation stage. The implementation stage is about doing trial and error in order to develop routines to ensure the reuse of knowledge. Moreover, external knowledge can be quickly adopted and used because the employees have no ownership over it. This may cause the employees to share their knowledge and play a more active role in the innovation processes.

> "*We have got know-how from a foreign company, nobody is its owner. I think that since the know-how is from a foreign company, nobody can claim it and is not on their property. I am used to sharing whatever I have learned with other personnel. So I think as the know-how is coming from a foreign company, it makes people challenge each other and, in other words, their knowledge will increase*." (Respondent M1F1)

Applying the external knowledge to innovate medicines is more beneficial for this company as it encourages the employees not to keep their information for themselves. This leads to communication between and inside those departments that are engaged in the innovation processes. Increasing the communication lets the employees across this organisation recognise the value of the new information, which facilitates a collective understanding of the newly acquired knowledge.

Collective understanding of knowledge enables accomplishment of the innovation processes. The R&D department plays a significant role in disseminating and sharing knowledge across the organisation. A new product is developed in the R&D department and then its knowledge flows to other departments. The flow of knowledge from R&D to other departments reflects the linearity of the innovation processes in the pharmaceutical industry. Accordingly, the transformative learning process begins in the R&D department.

> "*R&D has to scale up in the pharmaceutical industry and teach staff on the production line. All other operations are technical. In fact, by innovation in R&D, the knowledge and skills of staff in production, marketing, and so on increase. Recently, we produced a product to control rejection of liver transplants so it caused the knowledge of the marketing and quality assurance staff to increase. For example, the production manager teaches our medical representative how to produce the medicine. The representative visits the doctor and explains how the drug will be produced. A chain of technical knowledge transference will be made*." (Respondent C1)

The transformative learning process increases the transfer of knowledge between departments. The way Company One does this learning is by following a specific mechanism. As mentioned, the first three production batches allow new knowledge to be added to the company's knowledge base. Considering the development of the three production batches enables the R&D employees to understand the senders' knowledge. It also facilitates quicker dissemination of external knowledge to other departments due to close interactions between the R&D and production departments.

> "*Three batches are done in the presence of our personnel including production, packaging, and quality control. If there are any questions, our personnel will be answered and if there are any problems during the three batches, the process may take up to four or five batches in order to know that it is fixed*." (Respondent M1F1)

The acquired external knowledge sometimes needs to be revised before turning into a product due to the firm's resource limitations. For example, lack of financial resources and land availability for making new production sites in order to purchase

and install a new technology make Company One mostly prefer to use their existing platforms. Although financial resources can be provided by banks, there is less space available for technological expansion in Company One. This may be the reason why this firm considers its existing capabilities and technologies to develop a new medicine. Moreover, having different production lines enables Company One to be more flexible in developing products with its existing technologies, except for high-tech medicines, which require a different type of technology. Respondent M1F1 explained that "*At the moment we focus on high-tech products, controlling, and their technologies are different from our traditional products*". Therefore, when external knowledge is modified, new knowledge is created. Such modification takes place inside R&D.

> "*I think it is very effective because the present technology coincides with the features of our company. Sometimes a product that is produced in a European company is not compatible with our facilities. The R&D sector wants to make the technology native. I think it is very important to adopt ourselves with their conditions but with our own facilities*." (Respondent M1F1)

> "*Assume a technology in another company; they are using expensive equipment but we cannot pay the same price. It is important to know how to produce the product but with another system and method. It is the duty of the research sector*." (Respondent M2RD1)

The transformative learning process influences the exploitative learning process by developing routines for reusing acquired knowledge. In the pharmaceutical industry, such routines are developed by creating 'standard operation procedures' (SOPs), which comprise two parts: (1) explaining the drug's production process from the beginning to the end; and (2) determining critical points within the process which should be controlled. When a pharmaceutical company wants to be sure that it has gained the knowledge to develop a new medicine, it should produce an SOP. After the firm innovates a new medicine, some experimental tests need to be conducted. Positive results of these tests reveal the appropriateness of the external knowledge. Moreover, after these successful results, the firm can apply for a certificate to launch the medicine into the market from the MOHME. When the results of these

experiments are passed and the MOHME permits the launch of this product into the markets, the SOP for the product is developed by R&D.

> "*In every industry, we use some methods; we call them SOP. In order to produce the product, we start from A to reach B after repeating this stage two or three times. It is necessary to evaluate validity or credit. We have to use the same method to be sure that it will lead us to the correct result. We should always follow the same method. Every change in the main method, designing and producing should be controlled. The best thing that assures us of following the correct method is result iteration*." (M1QA3)

The innovation of a product is successful if the firm can develop routines for its production process. Creating SOPs for new medicines requires doing some pre-determined tests, which take time to accomplish. The outcomes of such basic tests are also important to show that externally acquired knowledge is adequately used. The proper use of knowledge is reflected in the quality of the newly developed medicine, which these pilot tests aim to ascertain. This pilot use of innovation highlights a further step that every pharmaceutical company should follow after creating a new drug.

> "*When three batches are implemented, we will be sure about the process. There is a short- and long-term study for these batches. When we produce the products, we place them under severe conditions, meaning high temperature, high humidity, and we evaluate them during 3-6 months. If the product is intact in the given temperature, we will be sure that we have got the know-how*." (Respondent M1F1)

Developing SOPs requires documentation of its production process and all control points. This shows that pharmaceutical firms make their knowledge explicit in order to develop production routines for a new medicine. The use of SOPs is essential and inevitable in the pharmaceutical industry, which highlights two points. Firstly, the nature of the industry influences the way the pharmaceutical industry develops routines for exploiting external knowledge to develop a new drug. It also shows that, unlike the exploratory and transformative learning processes, the exploitative learning process is formal and documented.

5.2.3 The Influence of Leadership Styles on the AC Learning Processes

5.2.3.1 The Influence of Leadership Styles on the Exploratory Learning Process

The interview findings showed that the leadership styles of the top and middle managers influence the exploratory, transformative, and exploitative learning processes in Company One. As explained in Chapter 3, transformational leadership is based on four behaviours, including intellectual stimulation (encouraging a new problem-solving approach), inspirational motivation (conveying an interesting future), individualised consideration (building one-to-one relationships), and idealised influence (gaining the followers' respect and admiration). The transactional leadership style refers to identifying and controlling the daily activities and rewarding those employees who perform their tasks correctly.

Achieving product innovation requires the involvement of the employees. The participation of the employees is successful if they cooperate together. Respondent C1 noted that "*We won't claim an innovation if there is no participation and cooperation*". Accordingly, the first step is to create common goals in order to involve the employees in the innovation activities. A review of Company One's annual report showed that its vision is to be excellent at producing an efficient portfolio of innovative medicines with quality standards. To communicate this vision across the company, some panels were installed in different parts of this company, which was observed by the researcher, and even one of the top managers (respondent M1F1) mentioned it during his interview. To achieve this, the middle managers were encouraged to develop their own plan (or what this company called an 'action plan') in line with the company's objectives.

The top managers, particularly the company's CEO, provide an opportunity for their middle managers to engage in a critical discussion about other departments' action plans and evaluate the progress of the existing ones. Each middle manager defends his or her action plans in a meeting, which is held every three months by the company's CEO. Through this critical discussion, the top managers achieved fostering the awareness of each part of the company within other departments and also motivate the middle managers to play significant roles in organisational planning towards the company's vision. Moreover, encouraging critical discussions

has enhanced the introduction of new ideas by trusting and giving responsibility to their middle managers.

> "*All the departments are required to move in the direction of quantitative and qualitative production innovatively and creatively in the company consistent with the strategic planning. According to the strategic planning, apart from your qualitative objectives, you would have some action plans, which complement your goals. Every three months, all the action plans are reviewed by a strategic council and each action plan will be publicly read out in front of all the middle managers. For example, the manager of financial affairs indicates his action plans in order to reach objectives. Other managers also defend their action plans. It is possible for one manager to suggest some changes or ask to delete some parts of their colleague's action plans*." (Respondent C1)

The CEO is open to new ideas in order to enhance innovation. However, through the discussion, it was explored that articulating a brighter future and valuing employees as a source of new ideas lead to the development of a dynamic environment. Creating such an atmosphere inside this firm facilitates the product initiation stage of the innovation processes at all levels of the organisation.

Generating and sharing new ideas for innovating medicines (the initiation stage of innovation adoption) are encouraged at all levels of Company One and in all the departments. The top managers encourage idea generation for product innovation in two ways. There are some suggestion boxes installed across the factory which let anybody, specifically line personnel, to give their comments, suggestions, and criticisms, particularly those which are given for developing new medicines. The other way is for the ideas to come from a market research group. The members of this group are responsible for monitoring the global markets closely and report good-selling medicine to the market evaluation committee, specifically the marketing manager. Company One, therefore, has followed informal (suggestion box) and formal (continually monitoring global markets) mechanisms to enhance the exploratory learning process.

> "*We have faced it in the suggestion system and we try to have relationships with those who have key ideas by market research and get*

> *their opinions. Furthermore, much information is received through the suggestion box of the company*." (Respondent M1F1)

It is also sometimes possible for Company One's CEO to ask his market research employees to evaluate the future direction of a particular disease. Accordingly, the market research personnel's knowledge about new products in particular areas will be increased. Since working in groups has been encouraged in Company One, each employee's knowledge is transferred faster to other people within his or her group.

> "*I give the responsibility to some employees, like those who are working in the R&D department, to study a particular illness. Then, they should report all the product innovations related to it. In other words, I give assignments to the employees who are in market research. For example, at the moment I ask some of my colleagues to investigate the future direction of medicine regarding a disease. Therefore, right now there is a research group working on it. They constantly report their findings. At the end, if we decide to investigate into this field, we will have something to say*." (Respondent C1)

The technical knowledge of the CEO (the company's CEO is an academic person and he is also engaged in research at a university) created a dynamic and supportive environment within Company One by considering people's needs and their differences. Consequently, searching for new knowledge is not limited to the middle and top managers. All the employees actively know about the importance of it and they value the importance of external knowledge.

> "*By his [CEO] thought, he wants to move all the sectors of the company towards this direction to obtain new information. I cannot work with information that I gained five years ago. I mean that we should update our information. The view of the top manager in this company is very important.*" (Respondent M1QA3)

> "*The co-workers are very interested in creating new ideas and the manager [CEO] supports them.*" (Respondent M1QA3)

In Company One, the technical knowledge of its CEO enhances the respect for and trust in him. Because the CEO also engages in academic activity as a

pharmacologist, his knowledge is up-to-date. The CEO, by using his knowledge when searching for new products, inspires his followers to engage actively in looking for new medicines.

> "*Sometimes he will do some work, even searching on the internet. Then in an ME [market evaluation] meeting, the top manager presents an article to the personnel and when the personnel see that the manager is very interested in this field, they are motivated to create new things*." (Respondent M1F1)

> "*Our CEO is a university professor and he is knowledgeable and a leading person in pharmacology. So he leads others towards this direction in order to produce new medicines or go into new fields. For example, we did not have prefilled syringes. When this manager came here, he proposed to add a new line for it. In other organisations, R&D and QA managers persuade the head to produce the new medicines. The R&D and QA managers also directly search for new products in this company but there is a mutual relationship between them and our CEO. By a mutual relationship, I mean that sometimes the head proposes something and sometimes we propose it*." (Respondent M1QA3)

Company One's CEO motivated the middle managers to engage in innovation activities and to search for new external knowledge. Like the CEO, the middle managers communicate the organisational vision with their employees. The CEO compares the organisational achievement with what has been achieved. Then, he reminds his colleagues of the organisational vision and what other goals need to be accomplished which would facilitate the search for new external knowledge.

> "*Our CEO communicates the future direction of our company to those who engage in innovation activities, like the middle managers. He explains to us where we want to be in two years' time by considering our company's strategic plan. We know how much our company should grow and we communicate our objective with my employees in order to look for new external knowledge and medicines*." (Respondent M2RD1)

The middle managers firstly accepted their responsibilities, which were allocated to them by the CEO in order to search for new medicines. Then, they developed a learning environment among their employees, particularly when the middle managers valued their employees' knowledge.

> "*When you do not use your followers' knowledge, you send them a message that we do not need your knowledge. This inhibits employees from increasing their knowledge*." (Respondent M1M2)

The middle managers also encouraged their employees to search for new medicines and knowledge. They intellectually stimulate their employees through avoiding public criticism, supporting the collective process of learning, and allowing experimentation.

> "*In my unit, I always tell others that I do not know anything. We are all working in a group and we know everything together. I think it is very helpful. I try to explain the conditions for those who are working with each other*." (Respondent M1QA3)

> "*Sometimes when there is a problem, the personnel try to solve the problem without asking me to help them; but if we want to order them, it will not work.*" (Respondent M1QA3)

> "*Everybody makes mistakes and if I know that it was accidental, I try to speak with that person and maybe I do not talk directly about the mistake with him.*" (Respondent M1QA3)

In the following section, the leadership styles of the top and middle managers for facilitating the transformative learning process will be explained.

5.2.3.2 The Influence of Leadership Styles on the Transformative Learning Process

As explained in Chapter 3, the innovation processes in the pharmaceutical industry are linear and they start in the R&D department. As highlighted in section 5.2.2.2, implementing external knowledge in the same way as the sender's firm is not usually achievable due to limitations in the recipient's infrastructure. After the knowledge is determined and acquired, the R&D department starts working on it to make it native.

This reflects the role of R&D in modifying external knowledge in order to enable this company to implement external information successfully in product innovation.

> "*It seems to me that R&D plays a key role because it adapts a transferred technology to the characteristics of our organisation. There is the possibility for a product to be developed in a European factory, but we do not have the same conditions and characteristics as the European country. In such cases, R&D comes and localises the technology*." (Respondent M1F1)

R&D is also responsible for scaling up new medicines. R&D implements external knowledge to achieve a good understanding of it. R&D managers play a key role here in the success of adopting a product, as they are in charge of monitoring and guiding their followers to scale up the new drug. Then, the acquired knowledge is transferred to other departments. Company One has used training to transfer knowledge across its organisations.

> "*Look, R&D in the pharmaceutical industry is mainly responsible for scaling up a new medicine and train other people and production lines to use knowledge. All the technical work is carried out inside this department. In other words, R&D, through innovating new products, suddenly increases the knowledge and skills of the production and marketing personnel in particular and other employees in other departments in general*." (Respondent C1)

The R&D manager has an effective role during the transformational learning process and in transferring knowledge to other departments. However, without the support of other managers, the work of the R&D department is not effective.

> "*The other middle managers have a critical role here. They should cooperate closely with the R&D department in order to understand and learn the know-how which was developed in R&D and transfer it to their departments. They should also explain to the subordinates where we are heading and encourage their followers to coordinate with the R&D department and the top managers*." (Respondent M2RD1)

The engagement of the middle managers relies on the extent to which the top managers have developed a cooperative environment between the departments. It was revealed that the role of the company's CEO was more critical in creating an environment which facilitates knowledge transfer across the departments in Company One. Emphasis on a learning-and-teaching culture was also observed by reviewing the company's recent annual report. The CEO, by being transformational and trusting his middle managers, encouraged knowledge transfer. The CEO, through individual consideration, encouraged their middle managers to increase their own knowledge and that of their followers.

> "*I think giving responsibility is more effective than giving tasks.*" (Respondent M1QA3)

> "*One of the important things in our strategic plan is learning; we have a slogan in our company – 'you must learn and you must teach'. It means that we should not be learners, we have to teach what we have learned to others who do not know it and we try to develop this culture among staff.*" (Respondent C1)

Company One's CEO gave responsibilities to their middle managers. Giving responsibility allows their middle managers to plan their activities. Because the middle managers started to think in different ways regarding the use of external knowledge, the top managers allowed their middle managers to participate freely in the transformational stage of product innovation. For example, one way in which the middle managers could contribute to innovation activities is to think about producing a different medicine for particular patient groups.

> "*I think that the best thing is to trust skillful people and give them authority. This causes middle managers from all sectors to think innovatively, but using innovation is made by the R&D council, by which newly acquired knowledge is modified and transferred.*" (Respondent C1)

Accordingly, having skilful middle managers fostered the transformative learning process. However, having skilful managers at the middle level did not facilitate transformative learning itself. The CEO motivated their middle-layer managers to

cooperate and transfer newly acquired external knowledge together. In this respect, he considered the differences among those people who were involved in innovation.

> "*Sometimes people want to get respect, authority, financial resources, or knowledge promotion. So we tried to use the abilities and interests of the people, meaning that we provide everything for our employees.*" (Respondent C1)

The CEO, therefore, should know each of his employee's needs and desires in order to encourage them. As developing a new medicine is a knowledge-intensive activity and the CEO is involved in the external knowledge exploration, he knows his middle managers and those employees who are engaged in innovation. Moreover, the regular meetings with the middle managers provide an opportunity for the CEO to get to know his employees better.

> "*Normally, the middle managers ask the CEO to consider a reward for those who played a role in the success of innovation projects. But in a recent event, which I have seen, employees cooperated closely together in a friendly environment. Sometimes they even worked till midnight. Sometimes they worked during weekends. This was an event in which the CEO directly, without anyone even telling him to give incentives to them, paid them some money in order to appreciate them*." (Respondent M1QA3)

Although the CEO was not engaged directly in knowledge transformation in Company One, his awareness about the current situation of innovation activity revealed that he monitors the progress of new medicines' development. Imposing control enabled the CEO to know his employees' skills better. Moreover, awareness of the progress of innovation projects enabled the CEO to coordinate departments together by knowing their needs and allocating the knowledge the employees within a department require. Coordinating departments together is essential for developing new products and the transformative learning process. A successful transformative learning process relies on the ability of the CEO to coordinate the speed of learning across his organisation. Being too fast or too slow in terms of learning external knowledge deters innovation. Obviously, having knowledge about individuals aided the CEO to allocate his employees to the most suitable departments.

> "*The top managers act as coordinators here. They should allocate knowledge to each department based on their needs. Some knowledge is financial, market, and technical, which should be controlled by the top managers in order to make sure the activities related to such knowledge are going on. We do this through meeting with the middle managers and they should report what they have done so far*." (Respondent M1QA3)
>
> "*We have to employ efficient human resources to apply knowledge. The top manager has a difficult duty and sometimes we feel that a section is not being moved proportional to other sections. Coordination in the company is a very important but a difficult task*." (Respondent M1M2)

The term cooperation reflects mutual relationships between the top and middle managers. All the interviewees mentioned the importance of one-to-one relationships between the top and middle managers. This helped Company One to benefit from its medicines' innovation by launching them quicker. Because those pharmaceutical companies which adopt innovations implement explicit knowledge, their competitors may have access to the same knowledge. In such situations, the competitive advantage relies on introducing new products quicker to the market continually.

> "*In order to implement know-how, teamwork is needed in pharmacology and if duties and responsibilities in one sector are implemented undesirably, the project will fail or be completed without profitability. We will lose time and profit, too, compared to our competitors*." (Respondent M1F1)

> "*The middle manager is in fact a mediator. The knowledge is not introduced in the organisation by the CEO but he can provide the equipment. He does not engage in distributing knowledge. He is the leader of the middle managers. However, a mutual relationship between him and the middle managers has facilitated the transfer of knowledge*". (Respondent M1QA3)

Moreover, knowing the future direction of the company lets the middle managers put their efforts in consistency with the organisational objectives such as innovation and transferring knowledge.

> "*If the employees are not aware of the company's goals, they cannot compare whether or not they are moving in the direction of the organisational interests. It is possible for people's interest to be in contradiction with the organisational aims. Both the people and the organisational interests should be on the same line. The employees are aware of their interest; they should also be aware of the organisational interest and vision and they should not move against each other. The top managers, particularly the CEO, have to inform the personnel about the vision and encourage them to move towards it. So it is greatly the role of the top manager in the organisation to step forward by choosing good people. The second step is to know those people and move them towards the company's vision*." (Respondent M1M2)

However, there were some occasions that middle managers did not transfer knowledge correctly. In such situations, the CEO punished those middle managers who failed to absorb the transferred knowledge. Therefore, the CEO sometimes performed the transactional leadership style in order to facilitate the transformative learning process.

> "*We want to have a new product and the operative managers need to deliver the know-how from R&D in three first production batches and they will be punished if they do not do this based on three batches*". (Respondent C1)

Like the top managers, the middle managers facilitated the transformative learning process in Company One. They increased the employees' willingness to think critically about their responsibilities by trusting their employees. This led the followers to feel that they are valued by the company. As a result of feeling valuable, they put more effort into the transformative learning process. Nevertheless, some of the interviewees mentioned that the production department is less engaged in such activities as their employees are less educated and they are engaged more in routine work. This reflected that the leadership styles of the middle managers should be different across the departments based on the job that they are doing. However, since innovation activities are intellectual work, require the involvement of educated

people and are not routine work, the middle managers should use similar leadership styles in order to promote the transformative learning process.

> "*Yes, the employees should feel that they have to do the work. They feel valuable because of the responsibility. So I give them responsibility according to their abilities. I think responsibility is more suitable than tasks and duties, and people are encouraged to do work more accurately.*" (Respondent M1QA3)

> "*I think most of the parameters are managerial ones. When you do not use the knowledge of your co-workers, unintentionally you are telling them that you do not need their knowledge. When you do not need their knowledge of today, naturally you do not need their knowledge development. So the behaviour of the managers and the view of the middle managers and top managers can be very effective. For example, as an expert, I feel that I have an opportunity to improve. If the knowledge of this group adds to my knowledge, it can be helpful. The most important element is that I feel increasing my knowledge helps the progression of the system*." (Respondent M1M2)

The middle managers explained Company One's vision to their followers. Sharing the organisational vision helped the middle managers in Company One to create a supportive environment in order to move towards the organisational goals, including medicine innovation. Creating a supportive environment enabled the middle managers, particularly the R&D manager, to improve other employees' knowledge.

> "*As a middle manager, I have some responsibility. It is my responsibility to communicate our company's vision to my followers. Sharing the vision among me and my followers helped us to support each other better and move towards our company's goals*." (Respondent M1QA3)

Therefore, the middle managers not only have a great role to play in developing a learning environment to increase the transformative learning process, but also encourage this environment. In the following section, the leadership styles of the top and middle managers in Company One during the exploitative learning process will be explained.

5.2.3.3 The Influence of Leadership Styles on the Exploitative Learning Process

The pharmaceutical companies use SOPs for knowing how to produce a newly developed medicine to launch it in the markets and commercially benefit from them. It was explained in section 5.2.2.2 that the exploitation of new external knowledge is reflected in a recently developed SOP. The SOP development is highly structured and formal.

The middle managers were involved in developing an SOP for a newly developed medicine because they were directly engaged in the transformative learning process. After the transformative learning process is accomplished, the firm has the knowledge to develop a new drug. However, making sure that the SOP is implemented requires control to be imposed in order to reach the same quality as the company proposed to the MOHME. If the company does not reach the same quality as they announced to the higher authority, they will be banned from launching the medicine in the market. To launch drugs continually in the market, they should follow the same process.

> "*There are some products that we consider some specifications for. Keeping the quality is important. In the quality control sector, we just control the end product, raw materials, and some of the process. But in order to be sure about keeping quality control, we should use methods of quality guarantee.*" (Respondent M1QA3)

In this stage, the production, quality control (QC), and quality assurance (QA) managers play a more critical role than other middle managers. The production managers control the production line. The production managers assess their employees' performance and report it to the top managers in Company One. The top managers allocate rewards to those employees on the production lines which follow the instructions of the production managers.

> "*We have an evaluation form which is completed by the middle managers for each of their employees. This form is filled out four times a year for each employee. We assess the performance of each employee. We set different criteria for the employees. For example, we expect the people in R&D to be creative, while the employees on the production lines should do their routine tasks correctly. To encourage the employees on the*

> *production line to perform their tasks, we reward them financially*." (Respondent C1)

The quality control manager is in charge of checking the raw materials, critical points, and the quality of the end products. The work of the QC manager only highlights the use of external knowledge based on a written SOP in the recent production batch. The quality assurance manager is in charge of keeping the quality of the medicine at an acceptable level over time. Respondent M1F1 pointed out that "*All the processes are dependent on the SOPs. If there are no SOPs, there will be no quality control, no production, and no QA because all of them need the SOPs*". Modifications in the process of using external knowledge for developing new medicines were highly restricted at this stage. In other words, creating new ideas to improve the existing medicines was limited but not prohibited; respondent C1 mentioned that "*Every change in the main method, designing, and producing should be controlled. The best thing that assures us to follow the correct method is result iteration*". This was because of the existence of SOPs, which reflect the quality of products and adequacy of the process of external knowledge exploitation.

> "*Certainly, they have to be controlled because medicinal knowledge needs control. In most of our activities, we are not allowed to do them alone. Although there are two producers, they are not allowed to do them individually. In order to reduce errors and mistakes, all medicinal activities will be done by two people: one will do the work and the other controls it. There is also a system in which the laboratory will do quality control during the process, then we control the finished product. There is another system called quality assurance, which is superior to all the other controls. The goal is to produce a safe product with the expected potency. All of them exist while producing a medicine in order to cure the patient, not cause problems for her/him. The quality guarantee has a greater role than control. All the stages should be controlled to prevent mistakes and errors made by people.*" (Respondent M1F1)

The top managers, particularly the CEO, also, by imposing control, assured that the external knowledge was commercially exploited. However, he imposed control

indirectly. He was aware of the re-implementation of external knowledge through the feedback and reports that he received from his middle managers.

> "*I think by outputs. When our goal is to produce a new product and we get a product with the desired quality, we will be sure that we have been running correctly. In many outputs, we return and check the direction. We control the process and report to our CEO.*" (Respondent M1M2)

The emphasis on control during the exploitative learning process revealed that the leadership styles of both the top and middle managers were overturned. Therefore, the leadership styles of both the top and middle managers become transactional. They impose tighter control and they do not allow much change in the approved processes.

5.2.4 Discussion

The results indicated that the learning processes of AC influence the innovation adoption process (Appendix C). The exploratory learning process influenced the initiation and adoption decision stages of the innovation adoption process through clear strategic focus, motivation to use external knowledge sources, prior knowledge of individuals (particularly Company One's CEO), openness towards external knowledge sources, identification of new knowledge in external sources, acquisition of knowledge through various sources, and participatory decision making. The transformative learning process facilitated the implementation stage of innovation adoption through team interaction and dialogue, adding new knowledge to the acquired knowledge, experimentation, social relationships within the organisation, and achieving a collective understanding of the acquired knowledge. Finally, the influence of the exploitative learning process came from converting innovative ideas into commercial applications, launching innovations in the market, and formalisation of the systems and processes.

Valuing external knowledge and acquiring it occurred during the initiation stage of innovation adaptation in Company One. Company One has different approaches for acquiring knowledge. All the employees were valued for valuing external knowledge and it was explored that the top managers, particularly the CEO, played a critical role in the exploratory learning process. Moreover, the R&D and marketing managers had a significant role in the exploratory learning process. The role of the middle

managers became more dominant during the transformative learning process, particularly the R&D manager. Transformation and assimilation of external knowledge occurred mainly inside the R&D department and then it was transferred to other departments. Cooperation and integration between the middle managers facilitate the transfer of the external knowledge for adopting a new drug. In the last stage of learning (exploitative learning process), the organisation aimed to develop an SOP for its new drug in order to establish routines for production. In this stage, the role of the QA, QC, and production managers was more important than other middle managers due to the importance of control in the exploitative learning process. Accordingly, the role of the top managers reduced as the organisation moved from the exploratory to the exploitative learning process. Moreover, the engagement of people across the organisation became limited as the innovation processes moved from the initiation to the implementation stage because of the increase in the formality of the process.

Table 5.1: Determining the influence of the transformational and transactional leadership styles on the AC learning processes

Themes	Categories	Exploratory learning process	Transformative learning process	Exploitative learning process
Transformational leadership style	Intellectual stimulation	• Supporting the collective process of organisational learning (■)	• Supporting the collective process of organisational learning (♦, ■)	×
		• Encouraging followers to think in a new way (♦)	• Encouraging followers to think in a new way (♦)	×
		• Promoting employees' intelligence, knowledge and learning for being innovative (♦)	• Promoting employees' intelligence, knowledge and learning for being innovative (♦, ■)	×
		• Soliciting new ideas and creative solutions to problems from followers (♦)	×	×
		• The use of reasoning before taking action (♦)	×	×
		• Allowing experimentation (■)	×	×

		• Avoiding public criticism of individual members' mistakes (■)	×	×
	Inspirational motivation	• Creating a common vision (♦, ■)	• Creating a common vision (♦, ■)	×
		• Encouraging followers to envision an attractive future (♦)	×	×
	Individualised consideration	• Creating new learning opportunities along with a supportive climate (♦, ■)	• Creating new learning opportunities along with a supportive climate (■)	×
		×	• Considering individual differences (♦)	×
		×	• Providing teaching and coaching (■)	×
		×	• Building one-to-one relationships with his or her employees (♦)	×

		×	• Treating each follower as a respected individual (♦)	×
	Idealised influence	• Admiring and respecting in managers (♦)	×	×
Transactional leadership style	Management by expectation	×	×	• Tracking progress in development of new products (♦, ■)
		×	×	• Specifying the standards for compliance (■)
		×	×	• Analysing and refining the traditional work processes (■)
		×	• Often-punish non-compliance (◈)	×
	Contingent rewards	×	×	• Clarifying expectations and offering recognition as the goals are achieved (♦)

♦ Behaviours constantly performed by top managers ■ Behaviours constantly performed by middle managers

◈ Behaviours occasionally performed by top managers × No evidence

The top and middle managers' leadership styles also changed together as the AC learning processes moved from exploratory to transformative and from transformative to exploitative learning (Table 5.1). However, the top and middle managers played different roles throughout the AC learning processes (Appendix D). It was revealed that the CEO was more influential in the learning processes than the other top managers. The transformational leadership style of the CEO encouraged the entire organisation to search for external knowledge by knowing the future direction of their company, specifically the middle-level management. Moreover, his technical knowledge inspired his followers as he was actively searching for new knowledge which resides outside the firm. The inspirational characteristics of the CEO motivated the middle managers to be more involved in searching for external knowledge and increase the exploratory learning process. Individual consideration of both the top and middle managers is essential for increasing the exploratory and transformative learning processes. Like the top managers, the middle managers' intellectual stimulation and inspirational motivation encouraged their employees to increase the exploratory and transformative learning processes. Moreover, the engagement of the middle managers in developing their own action plans for their department inspirationally motivated them to consider the importance of the exploratory learning process. Furthermore, the intellectual stimulation and inspirational motivation of the transformational leadership of the CEO were also reported during transformative learning process. Nevertheless, he performed transactional leadership style when the middle managers failed to absorb the transferred knowledge. As the success of the transformative learning process depends on the participation of the middle managers, the CEO can establish this through knowing their followers' needs and desires. At this stage, the middle managers gradually started to play a more important role than the CEO, particularly in the R&D department, where its manager should intellectually stimulate their followers in order to transform and assimilate external knowledge to others. After this stage of learning, the top managers, specifically the CEO, and the middle managers impose more control but in different ways over the external knowledge exploitation in order to produce high-quality medicines.

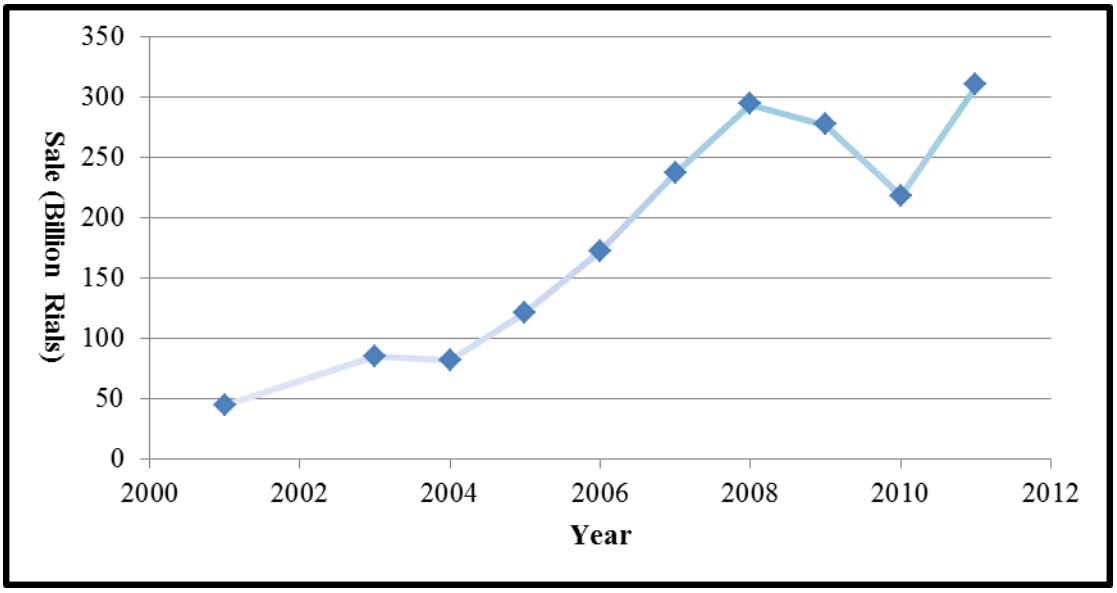
5.3 Case Company Two

5.3.1 Background to Company Two

Company Two was established more than 50 years ago by a Western pharmaceutical company. This company was bought by the Iranian government and it was partly privatised 20 years ago. This company has different production lines, which enable this company to produce different forms of medicine. In the last 10 years, more investment has been made in the R&D and training departments. Both of these departments were moved to new buildings. The number of projects in its R&D department has increased in recent years under new strategic planning. Moreover, this company has increased its cooperation with universities and some international companies in recent years in order to develop new medicines.

Company Two aims to achieve three objectives: enhance its reputation, promote its employees' intelligent and entrepreneurial behaviours, and increase the knowledge of its scientists and entrepreneurs. The marketing and QA departments are responsible for working on the first two objectives. The management approach is to invest heavily to achieve the first two objectives, as part of the company's strategic planning is to enhance its product quality and to increase its market search to identify its customers' needs and know what its competitors are doing in order to enhance its profitability. The third angle of the company's strategy was about continual improvement of its employees, particularly those who were engaging in innovation activities. One of Company Two's strategic directions is to develop new medicines in order to achieve these three objectives. A review of its annual review of 2011 showed that one of the important strategies of Company Two is continual progress by developing new products, expanding internal markets, exporting its medicines, and investing in other domestic pharmaceutical companies. Innovating medicines as a central part of the organisational strategy has aided this company to increase its revenue in the last 10 years, as illustrated in Figure 5.3.

Figure 5.3: The profit of Company Two before tax



Source: Company Two's annual review (2008) and its balance sheet (2009; 2011)

The company not only aims to serve the domestic market but also plans to export its products to some countries in the Middle East and Africa, according to its annual report of 2008. Exporting medicine helped this company to increase its revenue by 20 percent in 2011 compared to the year before. This showed that this company was successful in penetrating foreign markets. A review of the company's annual report of 2010 revealed that its revenue from exporting medicine was six-fold compared to 2009.

5.3.2 An Overview of Innovation and the AC Learning Processes

5.3.2.1 The Influence of the Exploratory Learning Process on Initiation and Adoption Decision

The increasing competition made Company Two enhance the development of new products. Reviewing the company's annual report of 2011, it also supports the importance of product innovation. One of the core objectives of this firm is to increase its revenue, which made this company revise its strategy. This company aims to be first into the market in order to benefit more from its new products. Under the new plan, this company actively engages in searching for external knowledge in order to launch new medicines of high quality in its domestic and international

markets. Therefore, this company had no other choice other than to expand its production and R&D activities. The importance of producing high-quality medicine is observed in the organisational annual report of 2011.

> "*I mentioned before that generally we are alive with the attraction of knowledge. Meaning, whatever old medicine we have, its long life is shortened, or if not, we lose the market share rapidly due to the competitive market. Inevitably, we need to have a progressive strategy. For having a progressive strategy must always be a part of top companies, which have updated technical knowledge, formulate new medicines, expand our production sections towards production of medicines which are progressive in the world. Company Two is a progressive company in principle. Meaning that, other pharmaceutical companies in Iran are after Company Two. Every new medicine produced here therefore has added value for us. Therefore, we do not have any choice; for our existence we must continually innovate.*" (Respondent C2)

Company Two had different approaches to initiating new products. Its main approach was to initiate new products by monitoring the global market. The aim of this company is to develop medicines which have been launched recently mainly in the Western market. Respondent F2M6 noted that "*We define projects at the company which were discovered in recent years and desire to enter them into the market*". Although such medicines might not be in the MOHME generic drug list, developing such drugs was not prohibited as the MOHME examined them from the medical point of view in order to add them to its drug list. Its managers and highly educated employees were more involved in monitoring the global market. Attending technical seminars and using recent publications in the field of pharmacology helped Company Two's managers and employees to value new technical knowledge. Moreover, this company also monitors its internal market to collect information regarding new medicines which have been imported from foreign companies. Company Two also acquired information regarding new medicine from the MOHME website. To be first to the market, Company Two actively searches for new external information.

> "*We have a marketing section and since the marketing section has a wide outlook for the market, it continually assesses the competitors. It checks the market, lists, and identifies imported medicines. Myself, committee members, and board of directors of the company participate in international seminars in the world. We have a minimum of three CPhIs annually, where we are supplied with raw materials: one in India, one in China, and one in Europe. We participate in all of them and are informed of current information. The company have educated individuals in the section of research, where their job is searching for and attracting new information…. Other sections get their information from the Ministry of Health website*." (Respondent C2)

Another way was to maintain its relationship with university scholars. Since academics also engage in scientific research, they have recent knowledge about their field of study. Respondent PM2M5 cited that "*Some technologies are being implemented in Iran, like nanotechnology, that we heard about from university scholars for the first time*". The last way was a suggestion box for identifying new external knowledge. Although Company Two highly valued its suggestion box, it was observed that the employees were not really keen to use it to share their ideas. This made the company disseminate a survey among its middle managers and experts in order to understand why the employees were not eager to communicate their ideas through it.

> "*One of the most important and good things we have available here is the discipline of recommendations. Here, each member of personnel of any rank could express his recommendations in his line of work. They collect all the recommendations and review them. Those logical points of view are put into effect*." (Respondent F2M6)

What drove the search for and acquisition of external knowledge for an initiated medicine was the lack of experience in the area of producing a medicine that this company had not produced before.

> *"But when we want to do a new thing on the production line or laboratory and we do not have any experience in it, we ask consultants in this field to help us."* (Respondent QA2M3)

Company Two acquired external knowledge in different ways from international companies, which can be categorised into two broad groups. One approach is to acquire knowledge from its raw material suppliers. The other way is to engage in some type of cooperative contract such as licensing or purchasing the knowledge.

> "*We usually take the technical knowledge from foreign companies. One of the ways to get the technical knowledge from various companies is to purchase the raw material, and they might give us the technical knowledge in exchange. Second, we have the readiness to produce medicine under licensee, meaning, requesting the company to provide us the method of its production (brand), and we produce this medicine under its licence. There is another method: we purchase the technical knowledge. ... We apply different methods until we attain the technical knowledge and make use of it*." (Respondent C1)

Company Two also considered product patents when identifying and acquiring external knowledge. One of the middle managers mentioned:

> "*We usually search the patents in Europe and America to see whether or not the product is registered*." (Respondent F2M6)

The decision to innovate medicines is made through three main steps. The first step, obviously, is to identify medicines. The medicine should be scientifically proven, as respondent F2M6 explained: "*The first factor is that we select the medicine that is proven scientifically to be the best. Meaning, both to be more effective and to have less side effects*". Then, it is anticipated what would be the market share of the medicine. Some information in this stage needs to be extracted from scientific sources such as books and scientific journals in order to estimate the production cost of the medicine. If the price of the medicine is predicted to be at an acceptable level for customers and for the national insurance company in particular, the company progresses to the last stage of making the decision.

> "*Once we identify a medicine, we look at the world sales of that medicine. We consider, in respect of the population of Iran, that if this medicine is produced, what sort of income could it have for the company*." (Respondent C2)
>
> "*We take its information from the world market and benchmark it, take it from books and text. Then, some tests will be conducted in order to*

> *develop a formula and supply it to the market. What type of place would it have in the market? Is it going to be expensive or cheap medicine for insurance approval? All these questions need to be answered to see what size of the market share it could have*." (Respondent C2)

A part of determining the process of developing a new medicine is about determining the cost of its production. Doing this requires Company Two to consider its own facilities, human resources, and financial assets in order to assess whether it can develop new products economically. It was observed that this company has high production capabilities because of three factors: long history, R&D capability, and having different production lines. These three factors enabled this company to be able to produce different types of medicine and to improve its knowledge bases continually. As a result of having high production capabilities, this company preferred to develop medicines internally and use existing production facilities, as observed.

> "*When I want to select something, first I make a review to see if the factory conditions are set up for it or essentially based on the scientific, expertise, facilities, financial conditions that we have available, whether we could perform it or not*." (Respondent C2)
>
> "*They evaluate new knowledge to see whether or not it can be implemented. They also estimate the costs and benefits of implementing new knowledge. If our firm can implement new knowledge economically, then the managers operationalise such knowledge*." (Respondent F2M6)

Company Two, therefore, considered two sets of factors in making the adoption decision. The first type of factor was external, which referred to the market situation. The other factor refers to the internal facilities and resources which drive the cost of products.

5.3.2.2 The Influence of the Transformative and Exploitative Learning Processes on Implementation

The transformative learning process facilitates the organisational ability to exploit external knowledge, as explained in Chapter 3. Company Two considered three factors in implementing external knowledge effectively: time, cost, and quality. One of the strategies in Company Two is to innovate with less trial and error, based on

the company's annual report of 2011. Trial and error imposes costs. Moreover, the time lag between initiating new medicines and launching it in the market may also increase due to trial and error. Increasing the time lag of new products in the market may prohibit Company Two from being first to market, which may be the cause of it not being a leading firm. Quality was also important for this company for two reasons. The first is that the MOHME does not permit the launch of low-quality medicines into the market. Moreover, producing high-quality medicines was considered as one of the organisational values which caused this firm to become a well-known company. A review of the company's annual report of 2011 showed that increasing the company's reputation was considered as one of the directions of the organisational strategies. Enhancing the company's reputation is important because it allows this firm to benefit from its new medicines more, even when its competitors start producing the same medicines.

> "*If we face competition for our products, since our company is famous, the customers prefer using our medicine*." (Respondent M1RD2)

The prior experience and knowledge helped Company Two to be innovative and to develop new products quicker. Reviewing the prior experience led to avoiding mistakes as well as knowing the positive and negative aspects of implementing knowledge. Therefore, reviewing the lessons that were learned from past innovation activities helped this company to reduce its trial and error. In other words, the time and cost of medicine innovation might have been decreased and its new products have been launched quicker into the market.

> "*Well, this happens automatically. When you have the experience which led to success, certainly you will follow and use the same experience to create new successes. The issue that I think is important and helps a lot is that, to register the successful experiences, study, review them and make use of the experiences in the following activities. Sometimes this leads to identifying weaknesses and advantages and avoiding repeating work and errors and improving the quality of the work. Let me add something here: when we talk about activities, there are three indicators involved: cost, quality, and time. This triangle perhaps brings us closer to the optimum conditions. Therefore, in any project activities, if these three conditions are not being considered, then there is something lacking somewhere. If*

> *the experience and knowledge are being used and directed correctly, then you could control and lower your costs, increase the quality and reduce time. When the company goes in this direction, then they have more effective results*." (Respondent F2M6)

Implementing the knowledge for producing high-quality medicine quickly and with less cost required combining the knowledge of different experts. A new medicine would be developed in the R&D department, where different experts from different fields of study such as pharmacology, microbiology, chemistry, and the like work together. The high capability of the R&D manager and their employees helped Company Two to implement external knowledge and increase their organisational knowledge bases successfully. The R&D department, therefore, might have had a significant role in fostering the transformative learning process.

> "*R&D is the basis of the company's output. If we have a powerful R&D in order to work on new products and their optimisation, certainly we won't have any problems either in selling or in production. So if we have a powerful R&D, it will give us a formulation which matches with our facilities and systems. I think the product is based on a powerful R&D for bulk production in the future, so it plays a great role*." (Respondent C2)

R&D did three types of work to implement external knowledge, as illustrated in Table 5.2. The first type of work referred to developing medicine formulas through evaluating external knowledge by conducting some experimental tests. Doing such tests was an essential part of gaining approval from the higher authority in order to launch a product into the market. Conducting these tests was also essential for producing a medicine in large volumes. Any changes might be vital during the scale-up in order to eliminate faults and to reach acceptable formulas. After that, externally acquired knowledge was disseminated from the R&D department to other parts of the organisation.

Table 5.2: The role of R&D in the transformative learning process

Transforming knowledge	Empirical evidence
Developing a formula	"*The process of formulating a medicine is a special and rather long process. To formulate*

	the medicine, we must purchase its raw materials from a country, take a sample, test and approve it. Once approved, a machine runs it and then formulates it. Then, R&D conducts some tests and prepares the required documents for DMF [Drug Master File] to present it to the Ministry of Health. If approved by the Ministry of Health, then our company will start producing the medicine." (Respondent C2)
Scaling up	"*In the product development, a new product goes to R&D; therefore, they do most of the research and the team defines the responsibilities among many related experts and the work is divided, and in the process the laboratory has an important duty to analyse the new formulation. Therefore, the final results will be available for production. In the production, special changes for scaling up are performed with the supervision of R&D. What I am trying to say is that the collected data in the R&D section gets finalised in the analysis and processes, which leads to new methods and standards.*" (Respondent F2M6)
Making knowledge native	"*It happened many times that we purchased the technical knowledge from valid companies and after purchasing, we made it native through doing some tests until we figured out whether or not the made formula was appropriate for Iran's climate. We apply different methods until we attain the technical knowledge and make use of it*." (Respondent C2)

It was observed that Company Two has high R&D capability. Follow-up interviews were therefore conducted to investigate the types of problems this company faced in implementing external knowledge. It was found that Company Two was facing problems in testing new products. Company Two, to solve such problems, deployed the knowledge of particular experts in universities.

> "*We have formulations in the company which are performing very well. But sometimes we have problems with the taste of new products; then we get external help. So the problem will be solved through a particular channel either through expert knowledge at universities or through the experience of individuals either internally in the company or externally*." (Respondent PM2M5)

After solving all the problems in the external knowledge transformation and getting approval from the MOHME, Company Two fostered the exploitative learning process through identifying some standards. Such standards and specifications should match the global requirements, mainly those which were established by the Food and Drug Administration (FDA) organisation. Following certain global standards showed that the exploitative learning process within pharmaceutical companies is highly structured. Since developing high-quality medicines promotes good health in any country, following medicine standards is important to ensure the quality of the drugs in production.

> "*When we want to produce a medicine, we need to define some specifications and standards; we search for the availability of those specifications and standards in the FDA or other reference points*." (Respondent M1RD2)

> "*The goal is: when the conditions are set up and studies are performed, then we try to reach the desired result; we keep the same conditions to be sure that moving from point A to point Z always gets the same result*." (Respondent F2M6)

Once the process of drug development was determined, no changes were allowed. At this stage, the production processes and controlling points for producing the adopted medicine were documented. As explained in section 5.2.2.2, the documents

developed in this stage are called SOPs. The exploitative learning process starts as Company Two develops routines through encouraging their employees to follow SOPs. This is to ensure the same outcomes are reached all the time. However, there were some occasions on which Company Two had to modify the production processes. Modifications to the production process may be essential when the raw materials are provided by a new supplier. Changing suppliers may require doing different experimental tests for production, as was informally explained by one of the middle managers. Altering the production control therefore requires different forms of SOPs in order to specify the production process and to have good-quality drugs.

> "*But once the setup is changed to an operation procedure, in fact it is registered, approved and signed, then from that point neither the laboratory nor the production interferes in the process. Meaning, we always go from A to Z under one specified direction and make no changes. Unless for some special case such as purchasing raw materials from other sources; then these changes are defined in the changed control and gets subjected to an assessment, and announcements are made and a replacement is performed*." (Respondent F2M6)

The process in which Company Two conducts its innovation adoption activities was explained in detail in sections 5.3.2.1 and 5.3.2.2. In the following sections, the influence of the top and middle managers' leadership styles on the learning processes of AC will be discussed.

5.3.3 The Influence of Leadership Styles on the AC Learning Processes

5.3.3.1 The Influence of Leadership Styles on the Exploratory Learning Process

It was explored that the company's CEO had a significant role in enhancing the exploratory learning process. He played two roles in fostering the exploratory learning process. One was that he directly engaged in suggesting which new production lines should be purchased, which new technologies and which new medicines should be produced. During the fieldwork, it was observed that a new building and new facilities had been established and more construction was being undertaken.

> "*Personally, I participated in the new phenomena of Company Two. I was its initial designer. For example, I made the foundation of section A in Company Two, since I had work experience in factory F and familiarity with this type of production*." (Respondent C2)

The prior technical knowledge of the CEO helped him to introduce new products. It was noticed that the idea of developing two production sites in this company was developed by its CEO. It was observed that the CEO was actively looking for new external knowledge. Changes in this company started ten years ago when the CEO started his job. Therefore, the direct involvement of the CEO in searching for new external knowledge has influenced the exploratory learning process in Company Two.

> "*When I make a visit to a foreign factory, I always wish we had their system implemented in Iran. Now under the management of Dr X, I feel with the principle of GMP [Good Manufacturing Practice], the best equipment and best expertise, I no longer have this wish. Dr X has now prepared more than 20 formulas, all types of spray-type medicine, and research is working on them with the help of the production section*." (Respondent PM2M5)

The technical knowledge of the CEO also encouraged his employees to search for and acquire external knowledge. The technical knowledge of the CEO and his direct involvement in the exploratory learning process encouraged his middle managers to participate in searching for and acquiring external knowledge. Moreover, the technical knowledge of the CEO increased their trust and respect for him, as observed.

> "*As he is an educated person, he pays more attention to training and education and we have to work more to attract know-how and use it for innovation*." (Respondent QC2S1)

The primary goal is that the company's capability reaches the level of big international companies. To achieve this, the CEO aims to establish a platform for organisational growth. He developed and encouraged a collaborative working culture among his employees. It was observed that the organisational culture was promoted by the CEO. He keeps reminding his employees about the organisational values in any social-gathering events. Moreover, the organisational values were installed on

some boards across the organisation. Reminding the employees about the organisational values leads to them sharing a common culture. Developing a common culture also enabled this company to cope with any resistance towards acquiring new knowledge.

> "*I think, if you asked me 7-8 years ago, I would have said that there may be resistance to development. But now our organisational culture accepts changes*." (Respondent F2M6)

Developing the common culture across the organisation helped this firm to move towards its objectives. One of the organisational objectives was continual progress and growth, according to the company's annual report of 2011. This company aimed to grow continually by developing new medicines, expanding its domestic and international markets, and investing in other pharmaceutical companies. Conveying an interesting future motivated the employees to stay in this company and work hard.

> "*We first talked about strategy; I like to know what our company's strategy is. Well, if it is specified for us what our goals are, then we could plan a direction to achieve those goals.*" (Respondent F2M6)

Company Two relied more on the abilities of particular employees like its CEO, marketing, R&D, and deputy R&D managers when initiating new products, as observed. The marketing manager provided market information about the market for new medicines, which enabled Company Two to initiate new medicines. The R&D manager not only searched for new medicines but also increased the employees' capability to look for new medicines. The R&D manager increased his employees' capability in two ways. One was to train his employees and increase their knowledge. Building his employees' knowledge enabled his employees to search for new medicines and external knowledge. The other way was that the R&D manager gave his employees tasks to accomplish.

> "*For our personnel, sometimes I do the training, sometimes we are allowed to use special training courses at the company's expense. We also give them a subject based on their type of work to research on and transfer that knowledge to colleagues*." (Respondent M1RD2)
>
> "*The middle managers are experts and have experience in order to guide their subordinates*." (Respondent M1C2)

The middle managers' relationships also contributed to facilitating the exploratory learning process within the R&D department. The relationship between Company Two's middle managers and the managers in the R&D department was mutual. Close relationships between the middle managers were observed, although there was a conflict between two middle managers that was noted on one occasion (the company's CEO interfered to solve the conflict).

> "*One of the reasons for the success of Company Two's R&D department refers to the cooperation between its middle managers. Close relationships between the middle managers help our R&D department to use other managers' experience for identifying new external knowledge. I think the relationship between other departments' managers and the R&D managers should be mutual in order to lead an organisation to success*." (Respondent F2M6)

The middle managers influenced the exploratory learning process by training and motivating their employees. Moreover, they gave freedom to their followers in their responsibilities.

> "*The middle managers enable searching for and acquiring external knowledge by motivating their employees and training. ... The most important issue is training and providing motivation. They also give freedom to their employees in their responsibilities to search for knowledge*." (Respondent PM2M5)

The CEO conducted some training courses. It was observed that he attended the training courses and gave a speech at the end of each session. He reminded the trainees about the organisational vision as well as provided feedback and suggestions about the use of that training session in Company Two. He provided coaching and guidance about the use of training by the employees. Moreover, by reminding them about the organisational vision, he tried to encourage his employees to work harder towards the organisational vision. It was observed that the middle managers highly acknowledged their organisational vision.

> "*He [the CEO] makes the most speeches in the training sessions to remind personnel how important this subject [searching for knowledge] is.*" (Respondent F2M6)

> "*I would say, the working personnel are comfortably performing their tasks here; they tell everyone to come to work for this company. There are three generations of employees who have worked for this company. So this shows that the vision of the company must have been realistic and feasible*." (Respondent T2M2)

The openness of the managing director was critical for the success of Company Two in external knowledge acquisition due to his position. Empirical evidence for his openness towards external knowledge was obtained from the interviewees, observations, and the company's several annual reports. For example, Company Two planned to expand its production and R&D facilities ten years ago when the CEO started his job. A new building was constructed with new facilities for both the R&D and training departments. Before the new CEO came, the activities of R&D were limited to product troubleshooting rather than developing new products. The CEO established a unified R&D department, as observed.

> "*He [the CEO] is an educated person; he pays more attention to training and education and we have to work more to attract know-how and use it for innovation*." (Respondent T2M2)

The CEO also has an important role in developing the organisational network knowledge, which facilitates external knowledge acquisition. To support the claim regarding the expansion of Company Two's knowledge networks, for example, it was noticed that some of the employees work or study in the university part-time. These people facilitate the cooperation between Company Two and universities. Therefore, the CEO improved the exploratory learning process, first by developing the technical facilities through developing a knowledge network and second by establishing a shared culture.

> "*The managing director is the point of contact between inside and outside the organisation. He acts as an entrance door to the organisation. If he opens the door, then the knowledge and information flows in*." (Respondent IE1M2)

> "*After investments were made in the company, its line of production expanded up until ten years ago. Ten years ago, when I started working for the company, their strategy was adapted, which was based on a*

> *strategy where this factory gets modernised and new lines are prepared in it, and currently is busy with operating activities*." (Respondent C2)

The CEO supported the R&D employees and managers in order to increase their capability to innovate medicines. The CEO provided more recent reference books, within one month of their publication in the global market, as he explained. It was also observed that he improved the IT facilities and provided internet access. The middle managers considered providing facilities as an important role of the top managers in assessing the R&D department on accessing new knowledge.

> "*The top managers enhance the ability of the R&D employees to learn new knowledge by providing internet access and providing the required scientific books*." (Respondent F2M6)

> "*We have an IT system connected to the internet. We set up these facilities to search for new medicine continually. We purchase all the related publications a month after they're published and make them accessible to our colleagues*." (Respondent C2)

The company's CEO also played a determinant role in the adoption decision. However, people at different levels were directly or indirectly involved in helping the CEO to make the adoption decision. As a new product was initiated, other top and middle managers assessed the internal resources and capabilities. The top and middle managers assessed the feasibility of an innovation project using their own skills. They allocated tasks to their followers to participate in assessing the feasibility of the innovation project. Based on the employees' assessment, each top manager generally expressed his/her opinions about the acceptance or rejection of the innovation project. The CEO then, by reviewing the comments of the top managers, made the adoption decision.

> "*There is a process defined for this. Well, naturally the organisation has various colleagues who might recommend and give opinions. They become familiar with the new product via the internet, publications, universities, training, etc.; then a recommendation is stated, or even by R&D, for a new product, then all the information about the product is collected and the related forms are completed and sent to the top manager for the needs assessment. Therefore, all the information*

arranged as a questionnaire is sent to the managers to review the subject. The laboratory supervisor makes an assessment as to what the requirements are for the process and gives a recommendation; the same goes with R&D; all the collected information is sent to the managing director and, based on the available budgeting, the decision will be made." (Respondent F2M6)

In the next section, it will be explained how Company Two assimilate and transform externally acquired knowledge (transformative learning process) to develop new products.

5.3.3.2 The Influence of Leadership Styles on the Transformative Learning Process

The importance of the R&D department in the transformative learning process was observed. Transferring knowledge from the R&D department to other parts of the organisation depended on its manager and deputy of research and development. These two managers trained their employees properly, which enabled them to transfer the knowledge developed in R&D more effectively to other departments.

"*Well, our knowledge is dependent on the individuals who work there [R&D department]. There are university scholars who are working in our R&D department and are very knowledgeable and train the personnel to perform their tasks as experts*." (Respondent T2M2)

Another role of the middle managers is to consider individual differences for transferring knowledge. Moreover, it was observed that the middle managers paid more attention to their employees' training needs. They evaluated their employees' skills and identified which training course was appropriate for them.

"*The other one is that the middle managers can see training and transfer their knowledge according to the employees' characteristics. They have more knowledge and experience; and these help them to transfer the knowledge that they gained through training more effectively because of the wisdom they have*." (Respondent T2M2)

During the interviews, it was revealed that they not only transferred external knowledge but also explained the importance of it to their followers. Explaining the importance of external knowledge helped the middle managers to cope with their

followers' resistance towards external knowledge. Engaging in routine work might have inhibited the employees from understanding the importance of external knowledge.

> "*Maybe the personnel do not understand the importance of new knowledge because they are busy with daily routines. Because the managers are familiar with the work, they can explain to their employees what problems this knowledge can solve. This motivates the employees to value the knowledge quicker*." (Respondent F2M6)

The cooperation between the middle managers also fostered the flow of knowledge from one department to others. It was observed that the middle managers actively communicated together, particularly the R&D and production managers. It was explained in section 5.3.2.2 that the absorbed knowledge flowed from R&D to the production sites. However, dual communication between the production and R&D departments facilitated external knowledge implementation and the transformative learning process. This means that the R&D and production departments mutually communicated together when scaling up new medicines, as the conditions in the R&D laboratory were different from the conditions on the production sites.

> "*Next is the communicational training for the flow of information from R&D to production and vice versa for the process to progress and be finalised. In fact, this communication is critical for the success of a project. There is much going back and forth for the most detailed issues, either qualitatively or quantitatively, to commission the production successfully*." (Respondent F2M6)

The role of Company Two's CEO was critical in enhancing cooperation and establishing harmony between the departments. Creating harmony aided in reducing the cost of new medicines, as it reduced trial and error. Company Two's CEO used two mechanisms to create harmony between the departments. One was to develop an organisational culture between his middle managers, which encouraged cooperation and friendship. The importance of such a culture was reminded by the CEO on different occasions, as was observed. Fostering a cooperative culture is rooted in the intention of the CEO to use all of his middle managers' knowledge rather than relying on the knowledge of particular ones. This intention helped this company to increase its knowledge continually.

> "*After all, one of the ways to progress in the world is to develop conditions of cooperation between parties. This is not a world of individuals, no matter how knowledgeable one is; it is only a small part of a big picture. Once you start a production process, from the first step of purchasing the raw material to the last step of getting a licence, there are numerous steps that must be taken and all require cooperation. If these factors are not performed harmoniously, then a bottleneck would be created, which has a high level of energy and cost. Therefore, our capabilities depend on how much we can cooperate with each other. We tried to make a good culture in Company Two, a culture along with love, interest and cooperation, and in my belief, I see the company as one of the most successful companies in the country.*" (Respondent C2)

Another mechanism was to facilitate communication between and among organisational departments. He removed obstacles which inhibited communication. To achieve this, he changed the organisational structure. It was observed that reducing the formality fostered the communication between the departments.

> "*Today, management has become linear, no longer is it stepwise. Since the birth of the internet, it has helped you to be connected easily. As a managing director, when I open Facebook at night, a simple worker would also be able to leave a message, meaning to make this relationship with me. The process of contacts and connection becomes faster and faster. Previously, there was a series of managerial layers for doing something in our organisation; with new technology, this process is changing rapidly and we have to think about how to manage it. A person sending a simple SMS anytime of the day or night could inform us about a new success or new phenomena.*" (Respondent C2)

Facilitating communication led to an increase in the two-way communication between the top and middle managers and even between the employees and their managers. The trust and honesty of the top managers, specifically the CEO, in the first place enhanced the two-way communication. The CEO closely communicated with other middle managers, as observed. Having such a close relationship increased the cooperation between him and his middle managers.

> "*Meeting with different middle managers can be really helpful. Moreover, I think if they can improve empathy in their relationship, this will increase cooperation between them*." (Respondent P1M2-NRF)

The achievement of the middle managers in increasing the cooperation reflected the success of the CEO's approaches in this regard. Enhancing the cooperation at each level facilitated the flow of knowledge. It also helped to foster the transformative learning process in order to reach common knowledge. The middle manager was directly engaged in the transformative learning process and external knowledge implementation. Newly acquired knowledge may be changed, modified, or even discarded by middle managers. Therefore, the middle managers' intention to share external knowledge influenced the transformative learning process.

> "*This issue isn't much related to position. In fact, it is like a chain. When you filter through the chain, then finally the top manager might see it advisable not to allow some knowledge to enter. But the middle managers are usually enforcing managers and supervise most of the operation; sometimes they do not want to use newly acquired knowledge. What I mean is: the role of the middle manager sometimes is much more important than the top manager*." (Respondent IE1M2)

When the middle managers did not want to implement external knowledge for product innovation, the CEO ordered them to use the knowledge. Therefore, the CEO, or maybe other top managers, might have performed a transactional role in order to cope with the resistance of the middle managers against enhancing the transformative learning process. The top managers interfered directly in the transformative learning process when there was resistance from some middle managers against implementing external knowledge.

> "*Sometimes some units cannot or do not want to cooperate; then they are assigned to perform them*." (Respondent T2M2)

Company Two's CEO was observed to pay special attention to his younger managers, although the importance of their knowledge in most of the companies in Iran is ignored. The combination of both experienced and young managers showed the intention of Company Two to facilitate the transformative learning process. The CEO valued middle managers' views and encouraged them to learn. He developed a

supportive environment in order to combine younger middle managers' knowledge with the experience of older managers.

> "*Unfortunately, in our country, in some parts managers do not pay attention to young managers. Now it is getting better, and young managers may have more knowledge than me, with 3-4 years' experience. So I think their [top managers] view is very important so that they should trust me, give opportunities and equipment to me to see whether or not I can cope with it. I also try to attract their views because they allocate a budget to the work I want to do, so I have to get the desirable result*." (Respondent PM2M5)

The experience and knowledge of the middle managers should support the organisational goals for increasing the collective understanding of newly acquired knowledge. Supporting the organisational goals enables them to transfer external knowledge to their followers effectively. Respondent M1C2 noted that "*the experience and knowledge of the middle managers should be in the direction of training and educating their employees in order to reach the company's goal*". To increase the support and awareness of the organisational goals, the company's CEO asked his middle managers to develop a strategic plan for their departments. Then, the middle managers' plans were reviewed by the CEO and he imposed some changes where they were deemed important. The new plan for each department was sent back to the middle managers. Participating in strategic planning promoted the organisational objective to the middle managers.

> "*At the end of last year, by the request of the managing director, a number of meetings were held where all the units came together and compiled their own strategy, and if they could, define the general strategy for the company. We as well as other units presented our opinions. All the information was propagated throughout the company and the company's strategy was specified*." (Respondent IE1M2)
>
> "*I mean that I translate for subordinates the information the top manager gives me. In general, they are doing the main work and are in direct contact with the systems.*" (Respondent SG4S2)

Then, the middle managers communicate the organisational objective and vision to their employees. Increasing the awareness of the employees about the future direction

of their company helped the middle managers to enhance cooperation inside their departments.

> "*Middle managers communicate our company's vision to their employees. … Our work is teamwork. Therefore, each of us plays a role in order to get from A to Z. If the employees do not know the vision, the cooperation between them cannot be easily developed*." (Respondent F4M6)

The awareness of the importance of external knowledge therefore facilitated the transformative learning process. The middle managers played a significant role in explaining the importance of external knowledge to their followers and in prompting changes in order to reach a collective understanding of it. Achieving a collective understanding of external knowledge facilitated its exploitation.

5.3.3.3 The Influence of Leadership Styles on the Exploitative Learning Process

The exploitative learning process refers to using external knowledge continually, as explained in Chapter 3. Following routines assured Company Two that external knowledge was being implemented continually to produce and launch new products into its markets. Implementing knowledge during the exploitative learning process requires imposing a formal structure in order to detect and eliminate errors. Therefore, all the information related to production batches was recorded. The top managers should be aware of all the information about the use of newly acquired external knowledge through the middle managers' reports in order to increase the responsiveness of its company towards any errors in its production.

> "*Obviously, everything is performed based on the documentation. Every process from purchasing to manufacturing and lab testing is performed based on certain documents, which are a major part of the operation. Every batch has a code and in that code all the information related to it is documented. These documents are important for the tractability of products or safety issues, and the top managers get involved in all the processes because in times of trouble, the company refers to the top managers to solve the problems*." (Respondent PM2M5)

The top managers encourage reuse of knowledge mainly by providing financial rewards. This shows that the top managers perform the transactional leadership style.

> "*Monetary rewards are one method that top managers use here to motivate employees to reuse knowledge. I think it is the most effective approach*". (Respondent P1M4-NRF)

The use of external knowledge was reflected by controlling the process and outcomes of the related production activities.

> "*Well, naturally, it shows itself in their work. Meaning the results of the work would show*." (Respondent T2M2)

It was the QA and QC's responsibility to monitor the outcomes of the production department. Moreover, the QC department was also responsible for doing some tests on medicines that were developed during the production stage. Controlling the process and outcomes of the medicine production processes was important because this enabled Company Two to assess the quality of its products. In other words, the QA and QC departments were directly monitoring the continual application of external knowledge. Apart from the direct control of the QC and QA departments, it was observed that the managers of each production site also closely monitored the production lines through cameras. This shows that this company tightly controls the application of newly acquired knowledge in order to ensure its proper application.

> "*These things are related to the quality sections [QA and QC]. In fact, they are under the control of our quality assistants. They hold some meetings and some evaluations will be done by this section in order to see to what extent these standards are considered in the organisation*." (Respondent QC2M1)

The top managers, particularly this company's CEO, indirectly control the exploitative learning process.

> "*He [the CEO] controls all the departments indirectly and checks them and asks for results*." (Respondent M1C2)

The middle managers also controlled their employees and they assessed their performance in the application of external knowledge. A review of the company's annual report of 2011 showed that this company aimed to assess its employees' performance. However, one of Company Two's problems was that there was not an efficient method for assessing the employees' performance, according to the company's annual report of 2011.

> "*Like the top managers, they [the middle managers] should control their employees. They should compare their employees to see who has got results from knowledge application. Moreover, this helps to compare personnel's abilities before and after knowledge transfer*." (Respondent IE1M2)

Consequently, both the top and middle managers imposed control over activities either directly or indirectly in order to facilitate the exploitative learning process.

5.3.4 Discussion

We found that the learning processes of AC influence the innovation adoption process in Company Two (Appendix E). The exploratory learning process influenced the initiation and adoption decision stages of the innovation adoption process through clear strategic focus, motivation to use external knowledge sources, prior knowledge of individuals (particularly Company One's CEO), openness towards external knowledge sources, identification of new knowledge in external sources, acquisition of knowledge through various sources, and participatory decision making. The transformative learning process facilitated the implementation stage of innovation adoption through experimentation, maintaining and reactivating knowledge, team interaction and dialogue, the social relationships within the organisation, and a decentralised structure. Finally, the influence of the exploitative learning process came from launching innovations in the market and formalisation of systems and processes.

The process of innovation adoption in Company Two follows a linear mode. In the first step of innovation adoption, the new medicines were mainly initiated by the company's CEO, R&D deputy, and R&D and marketing managers. This reflected the importance of particular managers in initiating new drugs and valuing external knowledge (exploratory learning process), although the company's CEO was very open and keen to engage all the employees in searching for new products. The CEO's technical knowledge and experience gave him the vision to invest in training, R&D, and production facilities. Acquisition of external knowledge mainly depended on the R&D department. Then, the knowledge flowed from R&D to other parts of the organisation. As the innovation processes and its underlying learning processes progressed, the influence of the CEO was reduced. On the other hand, the influence of the middle managers increased as the learning processes moved on because of

their direct influence, as illustrated in Table 5.3. The top and middle managers' leadership styles also changed throughout the AC learning processes (Appendix F).

Table 5.3: Determining the influence of the transformational and transactional leadership styles on the AC learning processes

Themes	Categories	Exploratory learning process	Transformative learning process	Exploitative learning process
Transformational leadership style	Intellectual stimulation	• Supporting the collective process of organisational learning (♦, ■)	• Supporting the collective process of organisational learning (♦, ■)	×
		• Promoting employees' intelligence, knowledge and learning for being innovative (♦)	• Promoting employees' intelligence, knowledge and learning for being innovative (■)	×
		• The use of reasoning before taking action (♦)	×	×
	Inspirational motivation	• Creating a common vision (♦) • Encouraging followers to envision an attractive future (♦) • Paying attention to effective communication and sharing values (♦) • Motivating followers by providing meaning and challenges to their work (■)	• Creating a common vision (♦, ■) • Paying attention to effective communication and sharing values (♦) • Encouraging followers to envision an attractive future (♦)	×

	Individualised consideration	• Creating new learning opportunities along with a supportive climate (♦) • Proving coaching and teaching (■) • Creating new learning opportunities along with a supportive climate (■)	• Building one-to-one relationships with his or her employees (♦) • Proving coaching and teaching (■) • Considering individual differences (■)	✖
	Idealised influence	• Admiring and respecting in managers (♦)	✖	✖
Transactional leadership style	Management by expectation	✖	• Specifying the standards for compliance (◈)	• Tracking progress in development of new products (♦, ■) • Specifying the standards for compliance (■) • Analysing and refining the traditional work processes (■)
	Contingent rewards	✖	✖	• Clarifying expectations and offering recognition as the goals are achieved (♦)


♦ Behaviours constantly performed by top managers
■ Behaviours constantly performed by middle managers
◊ Behaviours occasionally performed by top managers
✗ No evidence

The CEO intellectually stimulated his employees, specifically his middle managers, to become involved in initiating new drugs and valuing new external knowledge by investing in R&D and training and being open towards new ideas. He also had close relationships with his middle managers. Having such close relationships reflects that he established one-to-one relationships with them. Moreover, his idealised influence increased their trust and respect for him, which facilitated building close relationships with the middle managers. He also conveyed a bright future, which motivated particularly his middle managers to engage in the exploratory learning process.

The close relationships between the middle managers positively influenced the exploratory learning process. The R&D manager encouraged his employees to search for and acquire new external knowledge by performing the transformational leadership style. His individualised consideration and intellectual stimulation behaviours facilitated the exploratory learning process. Moreover, the middle managers in general, through training and motivating their employees, supported the exploratory learning process. These behaviours of the middle managers reflected the inspirational motivation of the transformational leaders.

The CEO performed the transformational leadership style during the transformative learning process. The CEO facilitated the relationships between different departments in order to increase the transformative learning process. Cooperation between different departments was essential for transferring knowledge across the organisation to achieve a collective understanding of the knowledge. He also supported the collective process of learning, which reflects intellectual stimulation behaviour. Moreover, allowing the middle managers to develop their own strategic plans in consistence with the organisational goals enabled the middle managers to aggregate the middle managers' personal interests with the organisational goals. Therefore, the middle managers put more effort into cooperating together in order to reach the organisational goals. Engaging each middle manager in planning their department's goals addressed the inspirational motivation behaviour of the CEO.

The CEO, in the case of resistance towards implementing external knowledge, might have changed their behaviour from transformational to transactional. The middle managers played a more critical role in the transformative learning process because they transferred external knowledge within and between departments. Like the CEO,

they increased their followers' learning by transferring their knowledge because they were committed to their organisation to perform better. They also played a key role in transferring knowledge to their followers. It was found that transferring knowledge required knowing their employees' needs in order to fulfil them. Providing teaching and coaching and considering individual differences for transferring knowledge reflected the individualised consideration behaviour of the transformational leadership style. Moreover, they supported the collective process of learning among their employees in order to facilitate the transformative learning process. This reflects intellectual stimulation behaviour. They also performed inspirational motivation through creating a common vision, which allowed their employees to put more efforts into the organisational objective towards innovation.

Both the top and middle managers change their leadership style from transformational to transactional. The task performed is based on the documents that were developed during the transformative learning process. Performing tasks based on these documents enabled this company to be sure about the quality of their products. At this stage, the production, QC, and QA managers played a more important role as they were directly in charge of monitoring products. Moreover, the top managers indirectly controlled the application of external knowledge through the outcomes of their products in the market and the reports provided by their middle managers. The top managers gave monetary rewards in order to encourage their employees to reuse knowledge.

5.4 Case Company Three

5.4.1 Background to Company Three

Company Three was established in 2003 and it has two CEOs. This company started by only having one medicine in the market for two years. Then, new shareholders invested in Company Three and more experts were recruited. As a result of recruiting these experts, this company progressed faster. One year later, the number of new medicines made by this company increased by 10. This company started to distribute its medicines directly to the drugstores across Iran in 2007. One year later, this company managed to increase its number of medicines to 25 and it produced 35 medicines in 2009. This company started renewing its factory in 2009. New technologies based on the latest 'Good Manufacturing Practice' (GMP) standards

were installed. Three new production lines were installed, which let this company produce different types of medicine in the form of powder and syrup. Further investments were made in the R&D department. Using the latest technology and improving its R&D enabled this company to launch 50 medicines into the market. More land was purchased in order to develop Company Three's production technology. The company invested in R&D and improved its production technologies, which aided this company to increase its revenue dramatically, which turned this company into one of the biggest and successful pharmaceutical firms in Iran.

5.4.2 An Overview of the Innovation and the AC Learning Processes

5.4.2.1 The Influence of the Exploratory Learning Process on Initiation and Adoption Decision

Company Three valued developing new medicines. The company recognised the dynamic nature of its market, where the advantages of new products quickly erode. Under such a dynamic market, companies should develop new medicines continually. Otherwise, they would lose their market share.

> "*Most of the companies are not interested in paying money for formulation and they are satisfied with what they have at present. This attitude is wrong because during that time, the present medicines overshadow new ones and they lose their market share. A number of companies have closed due to this attitude. For example, company X was producing different kinds of antibiotics four years ago and it had 23 items in its basket. But it continued with this traditional view such that its sales were so low that it went into bankruptcy, even though it was very famous in Iran*." (Respondent M1C3)

Company Three has improved its competitiveness by increasing its number of medicines and by distinguishing itself from its competitors. As a result of increasing its number of medicines, it started to develop different types of medicine. This company, therefore, was able to serve different markets. To benefit more from its new products, this company was required to increase its speed in innovating medicines. Moreover, distinguishing its products allowed this company to benefit from its innovations by achieving a quicker return on its investment.

> "*A complete basket of medicines is very important in the market; we had just a few items in the medicinal basket so we tried to produce marketable items which were being produced by a few producers. Fortunately, we have been very successful for nine months, while other companies have added a few medicines to their baskets.*" (Respondent M1C3)

> "*Our goal is to have distinction in our products. With respect to this distinction, our company has achieved a faster return on investment in the market*." (Respondent M2F3)

Three factors helped Company Three to increase its speed in recognising the importance of new medicines, which were: its R&D capabilities, its openness towards external knowledge, and its R&D capability. Knowledge in the pharmaceutical industry constantly progresses. Company Three recognised the importance of new external knowledge. The exploratory learning process enables companies to value and understand new external knowledge. Company Three followed different approaches to value and acquire new external knowledge, which helped this company to grow quickly and to initiate new products.

> "*New knowledge, which is very important, since it is an industry in which one should be updated constantly; every day something new is added*." (Respondent M5P3)

One of the approaches was to use its R&D capability to search for new external knowledge. Its R&D department actively searched for new products. It was observed that the R&D manager was actively searching for new external knowledge. Another observation during the visit to Company Three was that the R&D manager provided some of the important scientific materials such as books and scientific journal publications. Providing such scientific materials aided Company Three to search for new external knowledge.

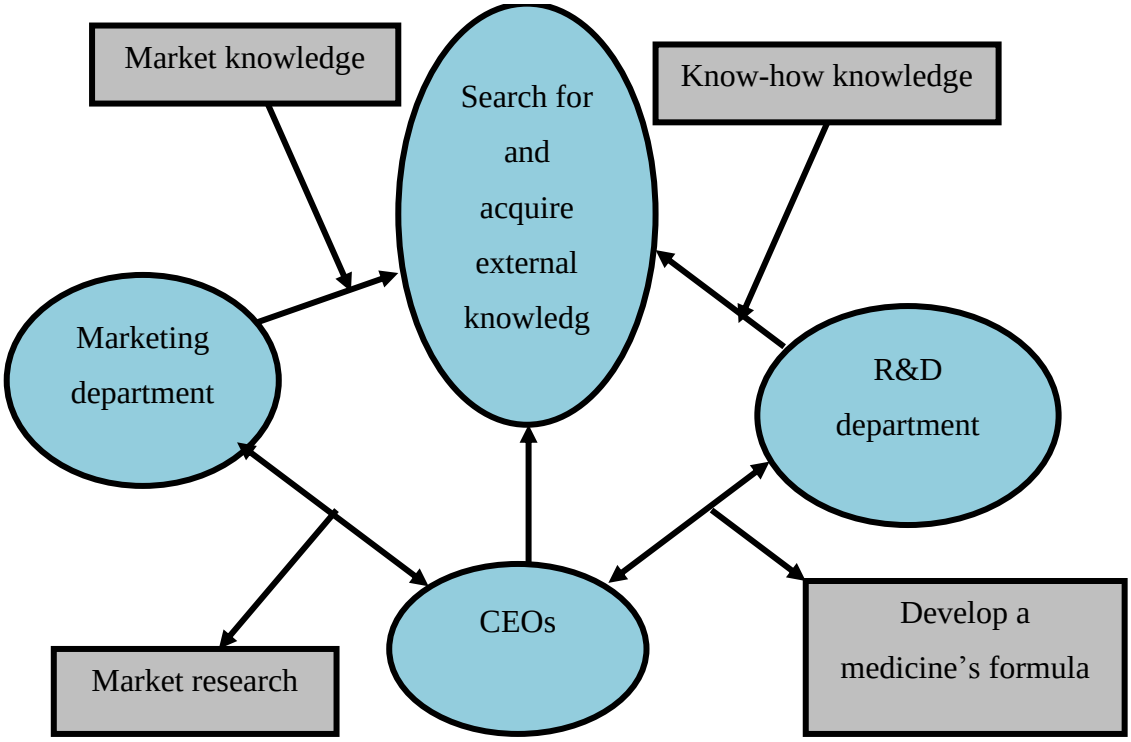
> "*The R&D of our company spends most of its time on the formulation of medicines. In this regard, we consider three sections in the company: R&D, the market, and top management. These sections have bilateral relationships with each other. In general, the CEO [Respondent C3]*

> *performs a knowledge search with the aforesaid network and after that, with respect to the information gained from the market section, decides what knowledge to enter into the system. But in the case of R&D, I must say that, in addition to formulation of new medicines, the personnel of this section also do studies, where if they feel there is new knowledge which the company could make use of, transfer it to the top managers. Therefore, this relationship is bilateral among these aforesaid three sections*." (Respondent M2F3)

To value new external knowledge, close relationships were required between the CEOs, marketing, and R&D manager. During the interview with respondent M2F3, he drew a figure in order to explain the relationship between the CEOs, R&D, and marketing managers in Company Three, as illustrated in Figure 5.4. As was observed and even noted by most of the interviewees, one of the CEOs (respondent C3) was actively engaged in searching for new external knowledge. The marketing manager used his market knowledge to search for new market opportunities for developing new products. They reported their findings to both CEOs after their market research. On the other side, the R&D manager searched for new knowledge based on his own past knowledge and he determined the adequate knowledge. The marketing manager was then consulted on the importance of the external knowledge for developing new products. It was mentioned by respondent M3D3 that ideas for developing or imitating new medicines sometimes come from the existence of market opportunities, which are determined by the marketing department. Then, the decision would be made on the external knowledge acquisition. After that, R&D and one of the CEOs (respondent C3) would be actively engaged in the acquisition of external knowledge and they would try to develop an adequate formula.

> "*We gathered information from the market. Sometimes there is a problem in the market and the customer will see it and it also becomes an opportunity to work on new knowledge*." (Respondent M3D3)

Figure 5.4: A model of the search for and acquisition of external knowledge within Company Three



Source: Respondent M3F3

Another way to identify new external knowledge is to attend domestic and foreign seminars and exhibitions. Participating in the seminars and exhibitions had two advantages for Company Three. The first advantage of attending such seminars and exhibitions is that they can acquire knowledge about their domestic rivals. The other advantage of attending such seminars and exhibitions is that they can learn about new medicines and technology. Knowledge regarding the new medicines and technology in the global market may facilitate the initiation of new medicines and the exploratory learning process. Moreover, the knowledge acquired from the seminars and exhibitions enabled this company to perform its adoption decision due to its familiarisation with the new medicines and their technology.

> "*We have representatives in most of the domestic and foreign seminars because we have to be aware of today's science in order to make true decisions about the innovation and production of our products. Familiarising ourselves with new products is useful for new ideas. We*

> *have to have enough insight about the products of competitors in the domestic and foreign markets and also about formulation in foreign exhibitions held in developed countries in which new technologies are introduced that are helpful to us. So in our company, we believe that in order to produce a new product, it is necessary to recognise our competitors, identify the technologies that can be used and the related sources, then a decision is made on its implementation*." (Respondent M3D3)

Another way to value and acquire knowledge is to purchase it from other companies, particularly for transferring new technology. Transferring knowledge was common in Company Three. The intention of Company Three to buy technology maybe resides in its age. Company Three is a young organisation which aims to expand its production capabilities, as was observed. During the fieldwork, there were some experts from a foreign company that were there to install new machines on one of Company Three's production sites.

> "*The experience of other companies shows its positive effect. For example, our injection systems are under a licence from an European Company. Our company has to consider the standards of Company E due to being under the licence of a famous company. So the organisational knowledge has increased*." (Respondent M4T3)

Company Three aims not to rely too much on foreign companies when developing new medicines, although it highly valued the external knowledge. Having a strong R&D department helped this company to develop new medicines by itself. This company wanted to improve its production capabilities rather than only considering making a profit, as was noted during the fieldwork.

> "*For example, you may produce a product with low profitability. We choose injection products, although they have lower profitability compared to our other products. But, everything is not about the profit. The reputation of the company is also important*." (Respondent C3)

One of the middle managers supported his CEO's comments further.

> "*We have a strong R&D so that we do not need foreigners. As I told you, we are a company that determines the formulations first, and we have not copied the formulations of other companies so we do not need to cooperate with foreign companies and have licences. We may get licences to transfer technology and productive strategies but we are not interested in licences for selling their products in Iran*." (Respondent M3D3)

To develop an adequate formula, Company Three was sometimes required to cooperate with universities. Cooperation with a university mainly took place in the form of outsourcing in order to reduce the cost of producing new medicines.

> "*We sustain a loss if we want to cut off the communication between universities and the industry. But from the university scholars who have reached a specific formula, we buy it and make it economical and somehow make use of outsourcing.*" (Respondent M2F3)

Another advantage of cooperating with a university is that it provides easier access to scientific publications. Company Three either duplicated a formula or developed an existing one by reviewing new scientific papers. Then, new science was implemented in order to develop a more reliable formula. The process of developing a reliable formula initially required the R&D department to compare and contrast the results of the existing studies in order to gain new knowledge. Then, Company Three implemented this new knowledge to develop a new formula.

> "*Our work starts with making similar things to a foreign good or, with a review article on a subject, take the existing idea, collect articles, and make some conclusions, do research on it, then present the product*." (Respondent C3-2)

Finally, the way by which Company Three values and acquires knowledge for developing new medicines is to acquire it from its consultants. Company Three may be familiar with new external knowledge and may acquire it without signing contracts with other organisations. The benefit of using consultants or having external people to introduce new knowledge is that the knowledge is valued and

acquired at the right time. The passage of time may erode the advantages of using the knowledge.

> "*Some science also gets performed without a contract. For example, if you are a consultant for our company, you might find something yourself and transfer it to the company. In our opinion, the knowledge finds meaning and value in time. If this knowledge is supposed to take 10 years, then it no longer will have any value for us. Knowledge has an expiration date*." (Respondent M2F3)

Before implementing the knowledge for developing new medicines, Company Three would decide on its use. An adoption decision was made by considering different factors. Company Three preferred to conduct its innovation activities with less cost. Accordingly, Company Three relied more on using its own existing facilities.

> "*When you create a new thing, it should not necessarily bring about much cost. If it is not similar to previous processes, meaning that we are changing everything so it will become costly. Innovation means to save money and you should get the best result using the least equipment. It is important to use similar strategies or experience to get the result*." (Respondent M2RD3)

Financial and human resources also affected the adoption decision in Company Three. Iranian managers use the term '*software*' in order to address financial and human resources. The financial aspect refers to whether the organisation has enough money to spend on the innovation processes. Company Three has sufficient financial resources. Apart from accessibility to financial resources, the capabilities of the human resources were important for making the adoption decision in this company. It was observed that the capabilities of the R&D managers and one of the CEOs played a significant role in making the adoption decision.

> "*The advantage of our company is that it uses its own facilities but if we want to implement long-run projects, we will use bank finance*." (Respondent C3)

> "*Financial and human resources are also essential for choosing a new medicine to develop. We have to evaluate the capabilities and the space*

to see whether there is enough room for doing this project in the factory." (Respondent M3D3)

Apart from the financial and human resources, having space in the factory to install new facilities was essential for making the adoption decision. Despite Company Three preferring to use its existing facilities and technology, this company was expanding its own production sites by buying more land and by installing new technology, as was observed. The intention of Company Three to buy more land might be due to its strategic orientation towards growth and because of the space limitations for installing new technology. In other words, the physical limitations of this company affected its adoption decision.

5.4.2.2 The Influence of the Transformative and Exploitative Learning Processes on Implementation

After the adoption decision is made, Company Three seeks to use the knowledge in order to innovate medicines. Using external knowledge refers to the implementation stage of the innovation processes. As explained in Chapter 3, the implementation stage refers to modifying innovations and developing routines for launching new products. This stage requires organisations to develop a shared understanding of newly acquired knowledge, which is known as the transformative learning process, and establish routines for the continual use of knowledge, which is defined as the exploitative learning process.

When Company Three made its decision on adopting new medicines, it used mostly scientific knowledge, which had been acquired from external sources, and the experience of its managers to develop an acceptable formula inside its own R&D department. R&D was responsible for developing the formula for the medicine in Company Three. Developing an acceptable formula took a lot of time because it involved creating and testing different formulas by doing experiments and utilising external knowledge. Then, Company Three used the recently developed formula in order to launch a new medicine. Then, this knowledge would be transferred across the departments.

"*Its knowledge will be created before its production. We produce some products experimentally with different formulas; different tests will be done in order that a formulation is obtained. Then, by getting the*

> *formulation, its knowledge will be created and the medicine is introduced industrially into the market*." (Respondent M3D3)

> "*In R&D, the formulation becomes ready; trial and error is done in this section on a new experimental method. Then, the final product will be examined and its flaws will be removed*." (Respondent M6QA3)

After developing a formula, Company Three should transfer the knowledge to other departments and assimilate the new knowledge in order to reach a common understanding of it. One of the main problems of transferring knowledge from the R&D to the production department is that the situation of the production department is different from that of R&D.

> "*If the production wants to produce, then R&D works on the formula to get the licence, tests a batch of the product; once the licence is obtained, then the production begins its work. Maybe during production some issues show themselves and changes are required*." (Respondent M5P3)

> "*Maybe those ideas might not work correctly in production since the laboratory conditions are different; what works in the laboratory might not work on a larger scale*." (Respondent M5P3)

The R&D department was also responsible for detecting and eliminating errors before and during the new medicine production. Therefore, achieving a collective understanding of the knowledge may involve further modifications of the knowledge and the medicine formula that was created in the R&D department. In other words, the transformative learning process may also contain some changes to the developed knowledge.

> "*R&D does a primary test so as to prevent those errors, faults, or errors during operation*." (Respondent M5P3)

Modification of knowledge and changing the production processes should be performed based on industrial standards, which are performed around the world. Imposing changes in the production processes or even formulating a new medicine should follow such standards. These standards can be found in some reference books, which are widely used in the pharmaceutical industry, such as Pharmacopoeia.

Company Three was also like other generic pharmaceutical companies, which adopt medicines from other companies, and have formulated or even modified the production processes based on the pre-defined standards. In spite of the importance of pharmaceutical standards, pharmaceutical companies may develop their own production standards if they do not exist in the existing reference books. The reference books are updated regularly and new knowledge is constantly added to them.

> "*The medicines are divided into many groups. But, the methods have not changed much since we are performing our production based on the world's methods. There are many types of standards that exist in this context, which we make use of. We have the standard EP in Europe, BP in England, USP in America; it depends on which country's standards you are working with. In the system of pharmacy, you cannot add much of your own experience. Unless it has not been defined and we call it in-house, meaning, it is the time, we could say, when we innovate something by ourselves*." (Respondent C3-2)

Few managers knew much about modifying formulas and developing production processes in Company Three. In other words, the knowledge regarding developing a new medicine is shared among particular managers. The reason for not sharing the knowledge across the organisation, as explained during lunchtime, was to prevent competitors from accessing the knowledge underlying a new medicine. Protecting knowledge is essential as adopting an innovation relies more on explicit knowledge, where it can be easily communicated and documented.

> "*We have made it feasible in the pilot plan and in fact the individuals involved in that are informed, but all aspects of that knowledge are limited to a series of key individuals*." (Respondent MQ1C3)

After the knowledge is developed, it should be documented. Documentation is a part of the pharmaceutical standards, which cannot be ignored. Moreover, it assured Company Three that the knowledge underlying a new medicine was stored and it provided a guideline for its reuse. It was observed and even noted during some of the interviews that Company Three started valuing documentation more than before. The

R&D manager was in charge of doing all the documentation regarding new medicines.

> "*All of the products should be documented. It should be noted that the framework of R&D has been defined and should be up-to-date. People should know about its structure and it must be documented so that in future the person who replaces me knows what to do. It should not be dependent on people and it is very important*." (Respondent M1RD3) (R&D is in charge of developing documents for external knowledge exploitation.)

Once the documentation regarding the production process of a new medicine is developed, the production process of that medicine is hard to change.

> "*Once something is approved, it does not change*." (Respondent M5P3)

The reason for avoiding changes in the production process referred to the quality of the new medicine. Following the documentation for a new medicine assured Company Three that they would produce high-quality medicine. It was observed that this company aimed to develop distinguishable medicines which are of high quality. The reason for valuing medicine quality in this company partly referred to the positive effects of high-quality medicine on people's health. This showed Company Three's commitment towards society. Moreover, the influence of new medicine on people's health reflects the importance of quality in the pharmaceutical industry.

> "*But it is important for us because the lives of people are being compromised. It is not the case in other industries. If other industries are not sensitive to it, it does not matter when the quality is changed. But it is important for us who work as teams and should obey the standards*." (Respondent M1RD3)

Producing high-quality medicine therefore required Company Three to consider facilitating the exploitative learning process because it ensures the reuse of knowledge. Reusing the knowledge adequately led to producing medicines at the same level of quality as that in the first production. It was revealed that doing the same activities is part of the GMP standards, which ensures that the quality of a new medicine will be the same as what had been planned during the transformative

learning process. During the fieldwork and even during the pilot study stages, it was observed that the GMP standards were highly acknowledged among the innovative pharmaceutical companies. Following the GMP standards was highly acknowledged in Company Three, as was observed on several occasions. For example, on one occasion, it was noticed that inspectors of the MOHME came to the factory and they acknowledged adequate implementation of the GMP standards in Company Three.

> "*We have some standards such as GMP. GMP discusses how to make quantitative medicine. The quality should always be certain for selling the medicines in the market.*" (Respondent M1RD3)

The specifications of GMP highlight the importance of control during the medicine production. Control also ensures that the underlying knowledge for producing a new medicine is implemented. Therefore, control is part of the exploitative learning process.

Imposing control and following GMP standards enhanced the reuse of knowledge (exploitative learning process) in order to launch a new medicine of high quality into the market (innovation implementation). Reuse of knowledge required performing the same activities (routines) based on a document developed by the R&D department. Creating such a document depends on reaching common knowledge (transformative learning process) in the first place. However, as was discussed in Chapter 3, the leadership styles of the top and middle managers foster or inhibit the learning processes required to innovate medicines.

5.4.3 The Influence of Leadership Styles on the AC Learning Processes

5.4.3.1 The Influence of Leadership Styles on the Exploratory Learning Process

The CEOs played a key role in the exploratory learning process in Company Three because of their position, educational, and family backgrounds. Both the CEOs were highly educated. One of them was a medicine doctor and the other held two PhDs (one in pharmacology and one in veterinary). They both were stockholders of a pharmaceutical company before establishing Company Three. It was also noted that their father was one of the scholars in the field of pharmacology in Iran and he was well-respected. The CEOs' educational and family backgrounds obviously helped them, particularly respondent C3, to value and acquire external knowledge for

developing new medicines. The CEOs, therefore, made most of the decisions regarding acquiring external knowledge (exploratory learning process) because of their technical knowledge.

> "*The company's managers are vets and pharmacists and the founder of the company was also their father and had 40 years' experience, so they transferred their knowledge to their children and they can easily evaluate whether it is helpful or not*." (Respondent M2S3)

> "*One part of the work is the transfer of technology, where the top management make a decision themselves as to where to get this knowledge, from inside or outside the country. In the technology part, it is the CEO [respondent C3] who is somehow technically orientated, decides where to purchase; and knowledge of the production depends on where the technology is coming from; its transfer could be different*." (Respondent MQ1C3)

Despite the decisions being made mainly by the CEOs, other top and middle managers provided them the necessary information. The CEOs of the company valued the importance of their middle managers' engagement in the decision-making. Engaging other managers in the process of decision-making aided this company to value and acquire knowledge effectively from the external environment. Decisions on acquiring external knowledge were made through reasoning and discussions among the middle and top managers.

> "*Even though the decision-making is performed at the top, the information for this decision-making comes from the bottom level: recognition, production problems, market needs and so on*." (Respondent C3-2)

> "*In some companies, the top managers do not ask for the opinions of other managers because they want to decide individually. But if all the managers give their opinions, they can discuss them and get a result*." (Respondent M2D3)

To give freedom to the middle managers in their decision, the top managers created a common vision inside their organisation. This increased the involvement of the middle managers in searching for and acquiring external knowledge.

> "*Therefore, to value and acquire knowledge and make use of it, everyone must be involved. At least the managers who need to have this information and work towards it. To achieve this, we emphasise on developing a shared vision inside our company. We try to make this clear with middle manager and leave the rest of decision making to them*." (Respondent C3-2)

It was observed that the CEOs were keen on new ideas regarding new medicines. They welcomed all ideas from all levels of their organisation. To foster brainstorming and encourage their followers to share their ideas, they created a friendly environment. They tried to build one-to-one relationships, particularly with their managers, based on respecting different views. It was noticed that one of the CEOs (respondent C3) went to each of the middle managers' offices and spent a couple of minutes with them. The managers respected the CEOs, particularly respondent C3.

> "*I trust the knowledge and education of the CEOs. I should say that the CEOs have interesting ideas for product innovation. I always told them that our department works productively on innovating products and my knowledge has been improved under their leadership*." (Respondent M1RD3)

The CEOs had several meetings with the managers to discuss any problems in the daily activities. Moreover, on one occasion, this company held a brainstorming session regarding developing a new medicine, as observed during the fieldwork. Two weeks before this brainstorming session, an assignment was given to the other top and middle managers to study the newly initiated medicine.

> "*A friendly environment in an aggregate causes us to speak and to give ideas more freely and exchange the ideas with respect. Meaning, not to put his personality under question and second, to keep the environment open, which is to have the brainstorming. We also consider that various*

> *ideas might exist and the ideas must be refined and be implemented*." (Respondent C3-2)

> "*We open the environment so that more discussions can be made about the subject*." (Respondent C3-2)

The CEOs of Company Three were aware of their role in creating an environment which facilitated discussion and sharing ideas on initiating new medicines and making adoption decisions. They gave freedom to the other top managers and their middle managers in their activities, as observed. They acknowledged the benefit of collective discussions for making adequate decisions.

> "*This domain must be developed by top managers and naturally, if the environment is not open, consequently the individual cannot move*." (Respondent C3-2)

> "*Naturally, everyone is given authority in his domain. But our effort is to keep the door open for ideas and their acceptance. We cooperate in this context so that the work is performed as collective wisdom and our beliefs are based on the fact that no one has more intellect than the collective*." (Respondent C3-2)

The CEOs also developed a knowledge network in order to allow initiation of new medicines and acquisition of external knowledge. This company established a network with some individuals who worked in universities or other pharmaceutical companies. Establishing the network facilitates the exploratory learning process within the R&D department because its R&D employees have quicker access to new external knowledge. Therefore, developing the external network facilitated the exploratory learning process, which enabled the CEOs and the R&D manager to value and acquire external knowledge quicker.

> "*We have a network that was developed by the CEOs, which works with expert individuals with various intentions. These individuals are either university scholars or experts who work at other companies. They receive a salary from us to transfer new information that the company can use economically. Then, the knowledge is introduced to the company through*

> *these individuals and then the company tries to make use of its economical aspects*." (Respondent M2F3)

The R&D managers acquired external knowledge in different ways. Unlike other departments, training helped the R&D manager to acquire external knowledge for developing a new medicine formula. Moreover, the R&D managers acquired scientific knowledge which can be found in scientific journals, in books, or on the internet.

> "*In medicinal factories, it is very important and the personnel try to get this knowledge from papers, magazines, the internet, and training courses*." (Respondent M4T3)

The other middle managers were also responsible for transferring their followers' views to the CEOs, particularly those which were related to innovating medicines. Other middle managers motivated their employees to engage in brainstorming in order to support product innovation. To achieve brainstorming, they had closer relationships with their employees and valued them.

> "*Nearly in the same system, if there is an idea from a brainstorming, the transference of this idea is the task of the middle managers*." (Respondent C3-2)

> "*The middle managers could motivate the lower forces to some extent, to give value to this innovation's creativity. Another thing is to be so close to his manpower under his command such that, even if a simple worker has a new idea, to receive that idea and not to ignore it because of their higher ranking. This makes the worker feel proud and not feel that they're being neglected; therefore, this increases the creativity of the personnel*." (Respondent M2F3)

Implementing external knowledge for product innovation and disseminating the knowledge to other departments referred to the transformative learning process, as it enabled Company Three to reach a common understanding about the acquired knowledge regarding new medicines, which occurred in the R&D department.

5.4.3.2 The Influence of Leadership Styles on the Transformative Learning Process

Middle managers play a more important role during the transformative learning process. They are directly involved in the implementation stage of the innovation processes. After the acquired external knowledge has been turned into a medicine formula, this knowledge should be transferred from the R&D department to other parts of the organisation. Transferring this knowledge facilitates the transformative learning process because it helps to develop a common understanding regarding the transferred knowledge. The R&D manager transferred the knowledge to other middle managers in order to facilitate the implementation of the knowledge and to develop a common understanding regarding the transferred knowledge.

> "*Implementation of an innovative thing starts with the middle managers. They can easily solve any problems that occurred in innovation, so they can have a great effect on solving the problems of innovation*." (Respondent M4T3)

The acquired knowledge should be transferred to other departments. However, only a few middle managers were involved in the transformative learning process. In other words, shared understanding of the acquired knowledge relied on a few middle managers. One of the reasons was to retain the acquired knowledge within the organisation. Company Three realised that its knowledge would be transferred to other companies if its experts left it. There was the possibility that if an expert were to leave the company, he or she might transfer his or her knowledge. This may erode the benefits gained by Company Three because its competitors may imitate its medicines. Moreover, one of the CEOs (respondent C3-2) explained that this is the norm in the pharmaceutical industry, to keep knowledge within a few people in order to prevent rivals from accessing the knowledge. The technical part of the knowledge was more important, such as the manufacturing methods and medicine formulas. It was observed that all SOPs remained confidential and Company Three was very careful about their medicines' formulas. It was noted that all of the SOPs remained in a safe place where a few managers could access them.

> "*We try to protect and control information, if we can change and improve the method of production, but in terms of propagation of knowledge, the*

> *pharmaceutical company works the same way. All try to have that knowledge controlled at the level of a few people…particularly in the field of pharmacy, some manufacturing methods and technical issues are protected*." (Respondent C3-2)

> "*The knowledge is spread to not more than five people. Since people change jobs, this knowledge might be transferred; therefore, the central core who know about the information is not more than five people*." (Respondent C3-2)

The transformative learning process took place in the organisation in order to facilitate the production of new medicines. Disseminating the knowledge among a few managers in Company Three showed that not all the employees are involved in improving and maintaining the knowledge. Improving knowledge in some cases required knowledge modification when Company Three faced problems during the innovation implementation stage. Therefore, the modification of knowledge relied on a few middle managers as they have greater influence on innovation. This reflected that the CEOs needed to know the capabilities of their middle managers. This allowed the CEOs to allocate tasks to their middle managers based on their capabilities.

> "*Now some systems realise that the individuals who have key roles in fact need to have all knowledge, so in the case of a problem, have the power of manoeuvrability. Recognition of what types of individuals must know the knowledge is very important*." (Respondent MQ1C3)

The CEOs were actively holding meetings at Company Three's headquarters, as observed. Every problem was quickly addressed due to the presence of the middle managers. Activities were allocated to the middle managers based on their readiness and capability to solve the problems. The middle managers have complete authority to deal with organisational problems.

> "*Naturally, when we keep the solutions open, the middle managers have a major role. I do believe that going from A to B could be performed using many methods but the decision is on them*." (Respondent C3-2)

The CEOs and other top managers' trust in the middle managers was essential because it facilitated communication and sharing ideas.

> "*Meetings held between middle and top managers are very effective. They trust our views, which encourage us to share our solutions and ideas in any matters regarding the implementation of acquired knowledge.*" (Respondent M4T3)

The inspirational behaviour of the CEOs articulated a common vision across the organisation, specifically among their middle managers. Articulating a common vision to the middle managers was important because their support helped the organisation to achieve its vision. The middle managers worked hard towards their organisational vision, as observed. For example, during the researcher's visit to Company Three's factory, it was noted that the middle managers worked for more than eight hours in the factory.

> "*For example, the programme of the company is such that, by the year 2012, to be the first in Iran in terms of the basket of products, volume of sales and credit. We try to arrange the activities, to move towards pre-defined goals. Then every day those goals must be reminded until the result is obtained. Therefore, to realise all the discussed goals, everyone must be involved. At least the managers, who need to have this information and work towards it. If we hide the goals such that the aggregate cannot move in that direction, we try to make this clear with the middle manager and leave the rest of the decision-making to them.*" (Respondent C3-2)

Although the middle managers had the authority to solve problems, they had to report their progress to the CEOs. It was observed that the CEOs provided feedback and guidelines to the middle managers if they had difficulty in solving a problem. This also reflected that the CEOs' awareness of their company's status quo enabled them to support their middle managers fully and facilitated problem-solving activities.

One of the middle managers' responsibility was to transfer knowledge to their employees. The top managers, particularly the CEOs, developed harmony between

the middle managers in order to facilitate the transfer of knowledge across Company Three. The CEOs developed a culture which encouraged teamwork. It was observed that teamwork was acknowledged both at the headquarters and in the factory. In the case of conflict, the CEOs or other top managers took action to solve any problems.

> "*In our factory, group work is very good because it is based on a good view and the results of group work are better than individual work.*" (Respondent M4T3)

> "*The top management coordinates them. If there is a conflict between them, the manager tries to settle it.*" (Respondent M2S3)

Company Three's CEOs did not achieve the level of teamwork that they had aimed for. Therefore, they imposed some level of control in order to ensure that external knowledge was retained and disseminated across the organisation. Imposing control showed that the CEOs also used the transactional leadership style if the middle managers did not want to transfer certain knowledge. The CEOs suggested that they could not develop the teamwork to the level that they wished due to the national culture.

> "*Cultural issues are involved very much in this subject. Meaning, opening the environment is very good but it also has disadvantages. The culture of work group is not yet in place; therefore, the top manager needs to be present…Our role in the middle of all this could be going along with these groups and controlling them and getting to a conclusion as a group*." (Respondent C3-2)

The middle managers' intention towards using external knowledge influenced the transfer of knowledge. Once the middle managers see the advantages of using external knowledge in improving their activities, they have more intention towards using it.

> "*Now, in other words, believe that there are weak points and methods exist for their improvement and that the existing methods are not necessarily the best and have to be inspected and validated continuously. When this is acceptable and there is the commitment to transfer the knowledge, then there would be no problem*." (Respondent MQ1C3)

The leadership styles of the middle managers also influenced the transformative learning process in Company Three. The middle managers should transfer knowledge correctly. To transfer knowledge effectively, they supported the collective process of learning. Considering the individual differences was also important because it increases the speed of knowledge dissemination.

> "*To attain the goals, the middle manager must transfer the knowledge correctly for it to be used correctly. They explain new knowledge to the lower forces so that they support their efforts. If there is no such support, there is no result for the company, even if the top manager has the best ideas*." (Respondent M2F3)

> "*Sometimes some personnel are not able to use knowledge. So we refer it to the person who can use it properly*." (Respondent M6QA3)

The middle managers also communicated the success of their company to their employees. This encouraged their employees to learn, as the employees could see the progress of their company. Articulating a brighter future reflects that the inspirational motivation of the middle managers is also important for increasing learning within their departments.

> "*Our company progressed very quickly. This ensured our employees that the company has a good future and they can work here with peace of mind. The middle managers communicate the success of the company to our employees, which encourages them to work harder*." (Respondent S2-3)

The leadership styles of both the top and middle managers influences the transformative learning process in Company Three. Facilitating the transformative learning process helped Company Three to maintain and use knowledge to adopt innovations successfully. However, continual use of knowledge, which refers to the exploitative learning process, is also essential for the success of the innovation implementation stage.

5.4.3.3 The Influence of Leadership Styles on the Exploitative Learning Process

The exploitative learning process involves developing the organisational routines which ensure the reuse of knowledge. The documentation of the process provided a

basis to reuse the knowledge in the pharmaceutical industry, as it provided a basis for carrying out routine activities. Doing routine activities continually assures Company Three that the knowledge is used spontaneously. The middle managers, particularly the R&D manager, were responsible for developing the documentation. In other words, the middle managers fostered the exploitative learning process by documenting the processes and activities, which led to the launch of new medicines in the market.

> "*In fact the documentation of the entire process could be evidence that all the things are being implemented*." (Respondent MQ1C3)

> "*The middle managers should believe in documentation in order to share and record information*." (Respondent M4T3)

The middle managers closely monitored the activities and the results of the process of developing new medicines in different ways. It was observed that inside the factory, cameras were installed inside the production sites and the production managers monitored the line workers closely. If an activity was performed wrongly, the production manager immediately took action. Because entering each production site required some preparation such as changing clothes and covering shoes, some '*wireless communication devices*' were provided by the CEOs. These wireless communication devices facilitated communication between the production manager and his line managers, as observed. The wireless communication devices also helped the production manager to give adequate instructions to the line managers to take adequate actions immediately if some activities were performed wrongly.

> "*I think controlling and checking are very effective. If there is no control, the subordinates may evade the work. So we have to see whether they are doing their work correctly or not*." (Respondent M6QA3)

Developing routines helped Company Three to deal with the employees' resistance towards reusing knowledge. The middle managers impose control to assure Company Three that the knowledge is implemented correctly by the employees. Therefore, employees' resistance towards implementing knowledge disappeared as the AC learning processes moved from the transformative to exploitative learning process in Company Three.

> "*... Sometimes it is difficult because some of them resist against it and do not want to do what they have been ordered to do. But when it is institutionalised, it becomes routine and we randomly check them and we will see that everything is OK. For example, in the early days, the workers had to be forced to wear helmets or gloves; after some days it became routine for them*." (Respondent M6QA3)

Like the production managers, the quality assurance (QA) manager was also responsible for imposing control in order to assure customers about the quality of the medicines. In Company Three, there is one person who has both QA and quality control (QC) responsibilities. Quality assurance ensures consistency in the medicines' quality, while QC checks the quality of the medicine in each production batch. As explained, pharmaceutical companies should follow the GMP standards in order to ensure the quality of their medicines. Company Three implemented the GMP standards accurately, as observed. The GMP standards make the pharmaceutical companies impose control during and after the medicine production. It was observed that control was tightly imposed during and after the medicine production in Company Three in order to assess the quality of the medicines. The QA manager tightly imposed control during and after the medicine production in line with the production manager.

> "*Quality assurance ensures the customer that the medicine is of high quality*." (Respondent M1RD3)

In a similar way to the middle managers, the top managers also monitored the reuse of knowledge in Company Three. However, the top managers did not directly monitor the reuse of knowledge because they engaged in strategic activities such as increasing organisational profitability, as observed. They periodically monitored the organisational activities in order to evaluate the extent to which the knowledge was reused. The middle managers provided reports for the top managers. The control and the middle managers' reports to the top managers reflect the accurate use of knowledge. The reports facilitated the exploitative learning process because the top and middle managers of Company Three could then make an accurate decision regarding the reuse of knowledge.

> "*Sometimes the top manager is too busy to engage in lower-level activities and he has to get information from some consultants in the company. Sometimes he can monitor and evaluate everything periodically. The manager gives some information to the system and expects feedback from it*." (Respondent M4T3)

> "*This information does help to specify what products the organisation is required to produce, where we have a deficiency, where we made errors and to correct the errors*." (Respondent C3-2)

The top managers allocate rewards to those employees who have implemented the knowledge correctly over time in order to motivate the employees to follow their managers. The rewards are allocated to such employees at the request of the middle managers. The top managers, during the exploitative learning process, used the transactional leadership style for all of the production employees by providing rewards to those who achieved the requested results.

> "*The middle managers could simply make requests of the top managers. The middle managers notice that their employees are performing good work; they could request a reward for their employees, and usually they do so*." (Respondent M5P3)

Accordingly, the top and middle managers clarifying tasks, imposing control, and providing rewards facilitate the exploitative learning process in Company Three. Moreover, the role of the top managers reduced during the exploitative learning process and they indirectly controlled the reuse of knowledge by receiving reports from their middle managers.

5.4.4 Discussion

It was found that the learning processes of AC influence the innovation adoption process in Company Three (Appendix G). The exploratory learning process influenced the initiation and adoption decision stages of the innovation adoption process through clear strategic focus, motivation to use external knowledge sources, prior knowledge of individuals (particularly the CEOs), openness towards external knowledge sources, identification of new knowledge in external sources, acquisition of knowledge through various sources, and participatory decision making. The

transformative learning process facilitated the implementation stage of innovation adoption through adding new knowledge to the acquired knowledge, experimentation, and achieving a collective understanding of the acquired knowledge. Finally, the influence of the exploitative learning process came from launching the innovation in the market and formalisation of the systems and processes.

It was shown that the CEOs, and the R&D, and marketing managers played a significant role in the exploratory learning process in Company Three. New medicine was mainly initiated by one of the CEOs, where all the market information was provided by the marketing manager. The close interaction between the CEOs, the R&D, and marketing managers facilitated the initiation of new products and the exploratory learning process. The adoption decision was made by considering the economical and technical aspects. Then, the innovation started in the R&D department. The R&D department relied on external scientific knowledge on innovating new medicines to develop its medicine formulas. After the new formulas were developed in the R&D department, the knowledge was transferred to the production lines. However, the transferred knowledge might be modified if Company Three is faced with a problem during this stage. During this stage, the underlying medicine's knowledge was transferred between the middle managers and they allocated tasks to their followers. The transformative learning process took place in this stage because the R&D manager disseminated the knowledge across the organisation in order to achieve a collective understanding of it. After this stage, the organisation implemented the knowledge continually (exploitative learning process) by developing routines. The middle managers specified the activities that each employee should perform during the exploitative learning process.

The CEOs' determinant roles in the exploratory learning process resided in their position, education, and background. However, Company Three's CEOs were open to new ideas in order to engage more people in the exploratory learning process. The CEOs had one-to-one relationships, particularly with their middle managers. The CEOs also encouraged their middle managers during the brainstorming sessions to think differently and to explain different points of view, which facilitated the exploratory learning process and the adoption decision. They involved their middle

managers in the organisational decision-making and in establishing the organisational objectives. Moreover, they provided all the required facilities for R&D to increase their valuation and acquisition of external knowledge. The CEOs' admiration had a positive influence on the exploratory learning process. Therefore, the CEOs, by performing the individualised consideration, inspirational motivation, idealised influence, and intellectual stimulation behaviours of transformational leaders, facilitated the exploratory learning process, as illustrated in Table 5.4 (Appendix H).

Table 5.4: Determining the influence of the transformational and transactional leadership styles on the AC learning processes

Themes	Categories	Exploratory learning process	Transformative learning process	Exploitative learning process
Transformational leadership style	Intellectual stimulation	• The use of reasoning before taking action (♦) • Soliciting new ideas and creative solutions to problems from followers (♦) • Supporting the collective process of organisational learning (♦) • Encouraging followers to think in a new way (■)	• Allowing experimentation (♦) • Supporting the collective process of organisational learning (■)	×
	Inspirational motivation	• Creating a common vision (♦) • Motivating followers by providing meaning and challenges to their work (■)	• Creating a common vision (♦) • Encouraging followers to envision an attractive future (■)	×
	Individualised consideration	• Creating new learning opportunities along with a supportive climate (♦) • Building one-to-one relationships with his or her	• Considering individual differences (♦, ■)	×

		employees (■)		
	Idealised influence	• Admiring and respecting in managers (♦)	×	×
Transactional leadership style	Management by expectation	×	• Tracking progress in development of new products (◈)	• Tracking progress in development of new products (♦, ■) • Specifying the standards for compliance (■)
	Contingent rewards	×	×	• Clarifying expectations and offering recognition as the goals are achieved (♦)

♦ Behaviours constantly performed by top managers ■ Behaviours constantly performed by middle managers

◈ Behaviours occasionally performed by top managers × No evidence

The R&D manager was more involved in acquiring external knowledge and the exploratory learning process than the other middle managers. The other middle managers could support the exploratory learning process in the R&D department by giving their ideas regarding new products. They also motivated their followers to engage in idea generation. The middle managers' leadership style was transformational. They performed intellectual stimulation, inspirational motivation, and individualised consideration in order to motivate their followers to engage in the exploratory learning process.

As with the exploratory learning process, the CEOs played a determinant role during the transformative learning process. Their trust in their middle managers encouraged them to become involved in problem-solving activities. The top managers performed individualised consideration to learn about their middle managers' abilities, which helped them to stimulate their middle managers intellectually to increase the transformative learning process. The CEOs provided IT facilities for the middle managers to share knowledge between them. Another role of the CEOs was to enhance collaboration between the middle managers by developing a teamworking culture. Their inspirational motivation encouraged their middle managers to work towards the organisational vision. In the case of the middle managers resisting the transference of knowledge, the CEOs used the transactional leadership style.

The middle managers' intentions influenced their involvement in the transformative learning process and transferring knowledge to their followers. The middle managers transferred knowledge to their employees effectively through individualised consideration, inspirational motivation, and intellectual stimulation. Individualised consideration allowed the middle managers to know the abilities of their followers. Inspirational motivation encouraged the employees to learn. Intellectual stimulation supported collective learning.

During the exploitative learning process, the leadership styles of both the top and middle managers changed from transformational to transactional for the line employees and managers, because both the top and middle managers imposed control over their employees. It was also explained that the production and QA managers directly imposed control, while the top managers indirectly controlled the innovation activities through the middle managers' reports. The middle managers

determined what activities their followers should accomplish. The top managers rewarded the employees in order to encourage the reuse of knowledge.

5.5 Conclusion

Chapter 5 presented a description of each of the three case studies which were used for data collection. As a result of the case descriptions, a rich understanding was achieved about how the AC learning processes and the leadership styles of the top and middle managers contribute to innovation adoption success. The descriptions of the cases were structured by considering the conceptual model. The next chapter compares the findings on the AC learning processes and leadership styles for innovation adoption in each case company.

Chapter 6: Cross-Case Findings

6.1 Introduction

In this chapter, the three cases (Companies One, Two, and Three) are compared and contrasted. Contrasting the cases together provides an in-depth understanding of the learning processes (exploratory, transformative, and exploitative) of absorptive capacity (AC) which enable innovation adoption. It also helps to understand how the leadership styles of top and middle managers change during the AC learning processes. As this research considers the combinative influence of top and middle managers on the AC learning processes for innovation adoption, the comparison includes some factors including initiating new products, adopting decisions, innovation implementation, exploratory learning process, transformative learning process, exploitative learning process, transformational leadership, and transactional leadership. A comparison of additional factors to the conceptual model of this study is also discussed in this chapter. These factors provide a richer understanding about learning processes and the top and middle managers leadership styles.

6.2 Comparing Cases One, Two, and Three

Providing deeper understanding, this thesis implemented tables and figures in order to facilitate cross-case explanation. The source of data was also added to the components of each table. Knowing the source of data would have helped to compare the findings of each case together with confidence.

6.2.1 Comparing the Influence of the AC Learning Processes on Innovation

Here, it is explained the similarities and differences between the three stages of innovation adoption and the AC learning processes (exploratory, transformative, and exploitative) in the case companies. By considering the conceptual model, the way in which each stage of the AC learning processes facilitates accomplishing the process of innovation adoption is explained. It needs to be reminded that innovation adoption comprises of three stages: initiation, adoption decision, and implementation. By considering the conceptual model, it is explained the influence of AC learning processes on innovation adoption stages.

6.2.1.1 The Effects of the Exploratory Learning Process on Initiation

The first issue is to compare the ways new products initiate in the case companies, as illustrated in Table 6.1. All three companies produced different types of medicines. They aimed to improve their knowledge about new medicines in order to increase their performance. For example, Company One moved towards developing new products that this company had less experience and knowledge in producing such medicines. Therefore, Company One improved its knowledge in a way which facilities the identification of new medicines. Company One aimed to be first to market before its competitors. Being first to market therefore required Company One to increase the speed of the accomplishment of the innovation adoption process. On the other hand, Company Three aimed to differentiate its products from their rivals. This company produces at the moment the same products as their rivals. However, this company differentiated its products from their rivals by improving their products. Therefore, this company relied more on its own R&D capability to differentiate its medicines.

Table 6.1: Comparing the influence of the exploratory learning process on innovation

	Company One	Company Two	Company Three
Ways to initiate new products	- Global market (I)	- Global market (I)	×
	- CEO (I)	- CEO (I)	- CEO (I)
	- R&D and marketing managers (I)	- Marketing and R&D managers (I)	- Marketing and R&D managers (I)
	- Suggestion by foreign companies (I)	×	×
	- The websites of international pharmaceutical (I)	×	×
	- Personnel (I)	×	×
	×	- Attending seminars and using recent publications (I)	- Domestic and foreign seminars and exhibitions (I)
	×	- Higher authority website (I)	×
	×	- University scholars (I, O)	- University scholars (I, O)
	×	×	- Consultants (I)
	×	- Imported medicines (I)	×

Importance of external knowledge	- Lack of knowledge (I)	- Lack of knowledge (I)	- Lack of knowledge (I)
	- Cost and time reduction (I)	×	×
	×	- Knowledge progress (I)	- Knowledge progress (I)
Factors facilitating the exploratory learning process	- Existence of different production lines (I, D)	- Existence of different production lines (I, O)	- R&D capabilities (I, O)
	- Company's history (I)	- Company's history (I, D)	×
	- Strong R&D (I)	- Strong R&D (I, O, D)	×
	- Openness towards external knowledge (I)	- Openness towards external knowledge (I, O)	- Openness towards external knowledge (I, O)
	×	×	- CEO's background and education (I, O)
	×	- Visiting international pharmaceutical companies (I)	×
	- Having a knowledge network (I)	- Having a knowledge network (I, O)	- Having a knowledge network (I)
	×	×	- Having new technologies (I, O)

(I, D. O) - I means interview evidence, D means document evidence, O means evidence from observation - × No evidence

Company Two, like the first case company, aimed to be first to the market in order to benefit more from its medicine innovation. As respondent C2 from case Company Two mentioned, this company followed a progressive strategy. Meaning that, the company aims to be ahead of their rivals for developing new medicines. This company has a close relationship with universities as well as with other pharmaceutical companies. As explained, this company started developing its production lines in order to decrease its reliance on purchasing new technologies for innovating medicines.

Company One and Two aimed to develop medicines which have not been already produced in Iran. These two companies used different approaches to initiate new products. These companies monitored the development of new medicines across the globe. The CEOs of both companies, based on their experiences and knowledge, proposed the development of new medicines. These companies browsed the internet to gain further information regarding new medicines. However, there were some differences between these two companies for searching for new medicines. Company One managed to engage its personnel in initiating new medicines and a suggestion box was the way in which its employees can share their ideas. However, Company Two failed to engage their personnel in initiating new medicines. Nonetheless, the top managers of this company, in particular its CEO, were very eager to involve the employees in the initiation stage of innovation adoption. The other difference between Company One and Two was that sometimes representatives of other pharmaceutical companies would have suggested the development of new medicines to Company One. On the other hand, Company Two had a closer relationship with universities and participated more in seminars and exhibitions to get familiar with new medicines.

Company Three aimed to increase the number of the medicine that it produced rather than being first to the market. Part of the reason as revealed during the interviews might be that this company was relatively younger than the other two cases. Therefore, this company initially focused on expanding its medicine baskets. In spite of having a different strategy from the other two case companies, it almost followed similar approaches to the first two cases to initiate new products. The initiating of new medicines mainly occurred at the top management level, particularly the CEOs, and two middle managers including the marketing and R&D managers also played a

significant role. Moreover, like Company Two, this company attended domestic and foreign seminars and exhibitions and it has a close relationship with universities. The two differences between the search strategies were that this company does not monitor the global market, which still may be due to its age, and it uses individual consultants or external people to introduce new medicines. Such external people did not work in academic environments which made the difference between Company Two and Three.

The similarities and differences between these three cases revealed two types of search strategy. One is to initiate a new market opportunity, which depended on the managers' market knowledge. For example, Company's One CEO asked their followers to assess the future direction of a medicine for a particular illness. The other pattern is to initiate new medicines, then evaluate to see whether or not such market opportunities exist. It was the case, for instance, when a new medicine was suggested to Company One by other organisations. The other example for getting familiar with a new medicine before valuing market opportunity could be the case for Company Two and Three. These two companies may get familiar with new products in exhibitions, then they start evaluating the market for the new medicine.

After initiating a new medicine, the search for knowledge began in the case companies. All of the three case companies highly valued the external knowledge. There were reasons which encouraged the case companies to search for external knowledge. One of the main reasons was lack of knowledge, which was common across all three cases. Some respondents in the case companies Two and Three highlighted the speed of knowledge changes in the pharmaceutical industry which made these two companies consider searching for and using external knowledge. On the other hand, Company One searched for external knowledge in order to reduce its cost and time in order to launch its medicine quicker to market than their rivals by reducing trial and errors.

Two factors could therefore be seen which encourage these firms to value the exploratory learning process in order to search for external knowledge. These factors were categorised as 'economical aspects' and 'existence of capability'. Economical aspect refers to issues such as time and cost which was the case for Company One, despite their having the ability to develop knowledge internally for innovating medicines in most of the cases. Moreover, the lack of knowledge (capabilities)

encourages searching for new knowledge. The findings of interviews highlighted two issues which increased the importance of external knowledge. As it was the case for Company One, it aimed to develop medicines that it had not any knowledge and experience in producing such medicines. To improve the capabilities to develop such medicines, Company One search for external knowledge.

It was found that similar factors facilitated the exploratory learning process among these three companies. The first factor referred to the importance of external knowledge. All of these companies were open towards external knowledge and they developed a knowledge network for recognising new external knowledge and medicines. However, the findings showed that these companies established and use their knowledge network differently. For example, Company One sometimes recognised and valued external knowledge from representatives of international pharmaceutical companies, while Company Three relied on its individual consultants. All of these companies had strong R&D departments. As explained in Chapter 5, having strong R&D helped these companies to recognise and value external knowledge. Moreover, having different production lines improved these organisational knowledge bases, which increased their organisational knowledge regarding different types of medicines. Having knowledge regarding different types of medicines facilitated recognising and valuing external knowledge. Having a long history aided Company One and Two to search for external knowledge quicker because knowledge accumulation took place over time in these companies. Unlike these two companies, Company Three did not have a long history but their founders have solid backgrounds in the pharmaceutical industry which facilitated recognising and valuing external knowledge.

6.2.1.2 The Effects of the Exploratory Learning Process on Adoption Decision

Adoption decision stage allows organisations moving from the exploratory learning process to the transformative and exploitative learning processes. The case companies almost considered similar factors to decide on adopting new medicines. The factors considered by these companies can be categorised into three groups: economic aspects, human capabilities, and organisational facilities. Economic aspect refers to issues such as market size which reflect the organisational revenues. If developing new products would not increase the companies' revenue, obviously there is no need to carry on the AC learning processes. Moreover, human capabilities

show that whether employees have enough knowledge to acquire and implement external knowledge. The case companies also considered the existence of technologies. If technologies do not exist, these firms initially consider acquiring it. It should be noted here that financial problems were not a serious matter for accomplishing the AC learning processes as these companies have good access to financial resources.

The discussion in Chapter 5 showed that the exploratory learning process influences adoption decision. It was found that the knowledge of top and middle managers influences the adoption decision. For example, the CEOs knowledge allowed the introduction of new knowledge in all three case companies. The knowledge of middle managers helped the top managers in making adoption decision. The CEOs of all three companies consulted their top and middle managers to decide to innovate initiated medicines. Middle managers' knowledge provided the necessarily information. The middle managers searched for specific part of knowledge required for making decision. For instant, marketing managers provided market information, while R&D managers collected the technological knowledge of new medicines. The group discussion between top and middle managers allowed knowledge transfer from individual to group level. This group level knowledge helped the CEOs to make adoption decision.

6.2.1.3 The Effects of the Transformative Learning Process on Implementation

The transformative learning process enables organisations to transfer group level learning to organisational level learning as explained in Chapter 3. The empirical data showed that the success of the transformative learning process led the case companies to achieve in implementing innovation successfully. Here, three case companies were compared in order to interpret the way transformative learning process was conducted.

The transformative learning process enabled the organisations to modify, combine, and assimilate external knowledge into organisational knowledge, as illustrated in Table 6.2. The R&D department played a key role in this learning process. This department not only modifies the drug formula but also transfers knowledge to other parts of the organisations. Having a strong R&D department was the reason which helped these companies to add newly acquired knowledge to their organisational knowledge.

Table 6.2: Comparing the influence of the transformative learning process on innovation

	Company One	Company Two	Company Three
Innovation implementation	- Developing formula (I, D)	- Developing formulas (I)	- Developing formulas (I)
	- Scaling up (I,D)	- Scaling up (I)	- Scaling up (I, O)
	- Making knowledge native (I)	- Making knowledge native (I)	×
The transformative learning process	- Transferring knowledge from R&D to other departments (I) - Increasing interactions between the R&D and production departments (I)	- Knowledge flowing from R&D to other departments (I)	- Transferring knowledge among a few managers at Top and middle level (I, O)
	×	- Detecting and eliminating faults (I)	- Detecting and eliminating errors (I)
	×	- Problem solving during production (I)	- Problem solving during production (I)
	- Working closely with knowledge providers (I)	- Maintaining the relationship with knowledge providers (I)	×
	×	- Following industrial standards (I, O)	- Following industrial standards (I, O)
	- Documenting production process (I, D)	- Documenting production process (I)	- Documenting production process (I, O)

(I, D. O) - I means interview evidence, D means document evidence, O means evidence from observation

× No evidence

External knowledge was used and assimilated into the organisational knowledge in these three companies almost in the same ways. The R&D department had a pivotal role here to do some trial and error in order to assimilate or transform external knowledge. The R&D employees applied external knowledge. After developing a reliable medicine formula, R&D transferred its knowledge to the production department in order to produce it. Transferring knowledge to the production department sometimes requires modification of the medicine formula because of the difference between the conditions in the R&D and the production departments. Therefore, the R&D department also played a significant role in scaling up the new medicine.

Another way to produce new medicine is to purchase knowledge from other pharmaceutical companies. Company One and Two purchased knowledge due to their lack of capabilities. In such cases, the R&D department in Company One and Two modified the purchased knowledge in order to adopt it to their technological facilities to produce new medicines. Unlike the other two case companies, Company Three developed medicines which they have been familiar with. Therefore, this company did not need to buy knowledge from other companies for producing its current medicines. However, like the other two case companies, producing the new type of medicine, which the company has less familiarity with, encouraged Company Three to enter into a licensing agreement with one of the European pharmaceutical companies in order to develop injection medicines.

The R&D departments documented the process of developing new medicines after the knowledge transfer to the production departments. The case companies might have been faced with problems or faults during the pilot production. The R&D department was responsible to solve any problems during the pilot production. Then, the R&D department documented the process of developing new medicines. The documentation regarding the development of a new medicine provided a roadmap in order to produce the new medicine in a certain way.

6.2.1.4 The Effects of the Exploitative Learning Process in Implementation

The innovation adoption process can be accomplished if external knowledge is used continually for launching new products to markets. Innovation implementation in the last part requires developing routines which ensure the continual use of innovation by developing routines, as explained in Chapter 3. The exploitative learning process

refers to the reuse of external knowledge which facilitates the development of organisational routines.

The discussions on the exploitative learning process in the three case companies were similar. All of the three companies performed based on the documentation which was developed during the transformative learning process in order to launch their new medicines to the markets. Following the documentation ensured these companies that their employees reused the knowledge accurately. In other words, these organisations ensured that the assimilated knowledge was reused as the production routines were followed. Therefore, developing routines enabled these case companies to reuse knowledge. Using documentation for developing routines for producing new medicines is a norm in the pharmaceutical industry which is encouraged by the industrial structure. This means that all pharmaceutical companies should perform their medicine production based on related documents, which are known as 'standard operating procedures' (SOPs). Each SOP explains the activities that need to be done for accomplishing a new medicine production and the critical points which control should be imposed. Control is an essential part during the exploitative learning process which ensures the quality of the new medicine. Control is imposed during the production process at certain points based on the SOPs of the medicines. Moreover, each production batch was also controlled at the end of the production process before selling the medicine.

After SOPs are developed for a new medicine, they cannot be changed. Following certain activities during the exploitative learning process was essential in order to ensure the quality of the medicine. By following certain activities, the case companies ensured that all of their production batches had the same quality. This is part of the standard which is widely followed in the pharmaceutical industry known as the 'Good Manufacturing Process' (GMP). The Good Manufacturing Process was acknowledged in all three case companies. The importance of following the GMP standard was to increase the quality of the medicines. The pharmaceutical companies cannot launch their medicines if the required quality is not achieved. Therefore, the quality of the medicine is important, as it was evident in the three case companies.

6.2.2 Comparing the Influence of Leadership Styles on the AC Learning Processes

It was explained in Chapter 3 that leadership styles can be transformational and transactional. Transformational leadership has four elements: idealised influence, individualised consideration, inspirational motivation, and intellectual stimulation. The idealised influence element enables the transformational leaders to gain the respect, trust, and admiration of their followers. Through individualised influence, such leaders make one-to-one relationships. Inspirational motivation helps transformational leaders to articulate an interesting vision. Finally, intellectual stimulation enables their followers to think differently about the organisational problems. On the other hand, transactional leadership determines the tasks their followers should perform. Doing their tasks accurately brings rewards to the followers, mostly a monetary one. Moreover, the followers will be punished if they do not do their tasks accurately.

The rest of this chapter explained the leadership styles which facilitates the AC learning processes. The leadership styles of the case companies changed as the learning processes moved from the exploratory to transformative learning process and from the transformative to exploitative learning process. It was also explained that elements of transformational leadership in each case company facilitate the AC learning processes to adopt innovation. The similarities and differences between the leadership styles and the important component of transformational leadership during the AC learning processes across the three case companies are explained in the following.

6.2.2.1 Leadership Styles during the Exploratory Learning Process

The exploratory learning process is about valuing external knowledge. Organisations should therefore search for external knowledge in the first place. Table 6.3 illustrates the factors which enabled the exploratory learning process in three case companies as well as behaviours and leadership styles of top managers. This table also illustrates other factors which influence the exploratory learning process. The result of within-case analysis revealed that production knowledge is constantly progressing. Maintaining the production at high quality therefore requires leading pharmaceutical companies to constantly search for external knowledge. It was

observed during Chapter 5 that all of the three cases recognised the importance of acquiring and using external knowledge.

Table 6.3: A cross-case comparison of leadership styles for the exploratory learning process

	Company One	Company Two	Company Three
Key managers	- CEO (I)	- CEO (I, O)	- CEO (I, O)
	- R&D (I)	- R&D (I, O)	- R&D (I, O)
	- Marketing (I)	- Marketing (I)	- Marketing (I, O)
Enablers of the exploratory learning process	- External knowledge highly valued (I, D)	- External knowledge highly valued (I, O, D)	- Highly valuing external knowledge (I, O)
	- Employees' participation (I)	×	×
	- Education and experience of the CEO (I)	×	- Education and family background of the CEOs (I, O)
	- Having a knowledge network (I)	- Having a knowledge network (I, O)	- Having a knowledge network (I, O)
	- Following common objectives (I)	×	×
	- Employees' intention towards learning (I)	×	×
	- Close relationship between top and middle managers (I)	- Close relationship between top and middle managers (I, O)	- Close relationship between top and middle managers (I, O)

		- Mutual relationship between middle managers and the R&D department (I, O)	- Mutual relationship between middle managers (I, O)
	×	- Positive intention towards change (I, O)	×
Behaviours and attitudes of top managers	- Suggesting new products (I)	- Actively engage in knowledge search (I)	- Suggesting new products (I, O) - Actively engage in knowledge search (I)
	- Creating common goals by reminding the organisational objectives (I)	- Conveying interesting future (I)	- Reminding organisational vision (I)
	- Allowing middle managers to establish objectives for their departments (I)	- Allowing middle managers to establish objective for their department (I)	×
	- Reviewing middle managers' objectives quarterly (I, D)	×	×
	- Involving middle managers in making adopting decisions (I)	- Involving middle managers in making adoption decisions (I)	- Engaging middle managers for making decisions through reasoning (I, O)

	- Giving responsibility to middle managers (I) - Giving assignments for searching for and identifying future opportunities (I)	- Providing freedom for middle managers (I, O)	- Providing freedom for middle managers (I, O) - Giving middle managers' assignment (I, O)
	- Being open towards new ideas (I) - Motivating creative employees to share their ideas (I)	- Being open to new ideas (I, O, D)	- Being open to new ideas (I, O) - Respecting their followers' views (I, O)
	- Increasing the awareness of middle managers about the objective and work of other departments (I)	- Reminding organisational values to develop a common culture (I, O)	- Creating a friendly environment (I, O)
	×	- Improving the infrastructure and facilities (I, O, D) - Providing books and searching tools such as internet access (I, O)	- Providing books and searching tools such as internet access (I, O)
	- Having intention to rely less on the help of external organisations (I)	- Aiming to improve the organisational knowledge to the level of intentional companies (I, O) - Having intention to rely less on the help of external organisations (I, D)	×

	×	- Providing learning opportunities (I, O, D) - Valuing and reminding the importance of organisational learning (I, O, D)	- Supporting learning (I, O) - Giving priority in enhancing organisational knowledge rather than financial performance (I)
Transformational Leadership Style of Top Managers	- Intellectual stimulation	- Intellectual stimulation	- Intellectual stimulation
	- Inspirational motivation	- Inspirational motivation	- Inspirational motivation
	- Idealised influence	- Idealised influence	- Idealised influence
	- Individualised consideration	- Individualised consideration	- Individualised consideration
Transactional Leadership Style of Top Managers	×	×	×
Behaviours and attitudes of middle managers	- Reminding organisational objectives (I)	- Guiding their followers towards organisational objectives (I)	×
	- Emphasising on group learning (I)	- Giving assignments to the R&D employees (I)	- Engaging their followers in initiating new products (I)
	×	- Identifying their followers' needs for training (I, O)	- Determining and meeting their employees' needs (I, O)
	- Valuing followers' knowledge (I)	×	- Valuing their followers' opinion

			(I) - Transferring their followers' view to the top managers (I)
	- Accepting responsibility (I)	×	×
	×	- Searching for new external knowledge (I)	- Introducing new ideas (I, O)
Transformational leadership style of middle managers	- Intellectual stimulation	- Intellectual stimulation	- Intellectual stimulation
	- Inspirational motivation	- Inspirational motivation	- Inspirational motivation
	- Individualised consideration	- Individualised consideration	- Individualised consideration
Transactional leadership style of middle managers	×	×	×
Other factors increasing the exploratory learning process	- Knowledge of top managers (I, O)	- Knowledge of top managers (I, O)	- Knowledge of top managers (I, O)

(I, D. O) - I means interview evidence, D means document evidence, O means evidence from observation - × No evidence

There are certain factors (Table 6.3) which enabled the exploratory learning process in the three case companies. These factors were grouped into four categories, as illustrated in Table 6.4. Relying on these four categories helped the case organisations to search for and value new external knowledge effectively. There were similarities between four of these factors across the three case companies. Table 6.4 also highlights the importance of top and middle managers in the exploratory learning process.

Table 6.4: Categorising the enablers of the exploratory learning process

Category	Category description	Example of the exploratory learning process from data
Knowledge network	Providing the opportunity to search for and acquire knowledge	- Developing a knowledge network
Organisational knowledge	Facilitating searching for and valuing external knowledge	- The firm's history - CEO's background
Organisational prospect	Encouraging employees to be involved in searching for external knowledge	- Following common objectives
Relationship between managers	Allowing sharing ideas and participation in valuing external knowledge	- Close relationship between top and middle managers - Mutual relationship between middle managers and the R&D department

Top and middle managers across the three cases had two roles. One was to directly search for external knowledge. Their other role was to facilitate the engagement of

their employees in searching for external knowledge. It was discovered that some managers were involved more in the exploratory learning process such as the CEOs, the R&D, and marketing managers. The importance of the R&D and marketing managers in the exploratory learning process refers to their critical role in initiating new products. Although top managers played a more critical role in the exploratory learning process, due to their direct engagement, the case companies motivated their followers at all levels to be involved in searching for external knowledge.

The leadership styles of top and middle managers, particularly the R&D managers and the CEOs, influence the exploratory learning process across the three cases. Tables 6.5 and 6.6 illustrate the behaviours and attitudes of top and middle managers which facilitated the exploratory learning process.

Table 6.5: Top managers' leadership styles during the exploratory learning process

Top managers leadership style		Codes	Company One	Company Two	Company Three
Transformational leadership style	Intellectual stimulation	Soliciting new ideas and creative solutions to problems from followers	✓	×	✓
		Promoting employees' intelligence, knowledge and learning for being innovative	✓	✓	×
		The use of reasoning before taking action	✓	✓	✓
		Encouraging followers to think in a new way	✓	×	×
		Supporting the collective process of organisational learning	×	✓	✓
	Inspirational motivation	Creating a common vision	✓	✓	✓
		Encouraging followers to envision an attractive future	✓	✓	×
		Paying attention to effective communication and sharing values	×	✓	×
	Individualised consideration	Creating new learning opportunities along with a supportive climate	✓	✓	✓
	Idealised influence	Admiring and respecting in managers	✓	✓	✓

✓ Code presented × Code not presented

The leadership style of top managers, particularly the CEOs, was transformational during the exploratory learning process. They performed intellectual stimulation, inspirational motivation, individualised consideration, and idealised influence behaviours. Nevertheless, these behaviours performed slightly different across the three companies. As Table 6.5 illustrates, there are similarities and differences exist between the ways each of these companies' CEOs performed inspirational motivation and intellectual stimulation. All of these companies' CEOs intellectually stimulated their middle managers through the use of reasoning before taking action and inspirationally motivate the middle managers through creating a common vision. On the other hand, Company One's CEOs also performed intellectual stimulation through encouraging followers to think in a new way by allowing critical discussion between other top and middle managers. The evidence regarding the encouragement of followers to think in new ways was not found in Company Two and Three. The evidence about individualised consideration and idealised influence of top managers was similar across three case companies. We found that the idealised influence of the CEOs was commonly achieved in the three companies due to high level of their knowledge.

Table 6.6: Middle managers leadership styles during the exploratory learning process

Middle managers leadership style		Codes	Company One	Company Two	Company Three
Transformational leadership style	Intellectual stimulation	Supporting the collective process of organisational learning	✓	✓	✗
		Allowing experimentation	✓	✗	✗
		Avoiding public criticism of individual members' mistakes	✓	✗	✗
		Encouraging followers to think in a new way	✗	✗	✓
	Inspirational motivation	Creating a common vision	✓	✗	✗
		Motivating followers by providing meaning and challenges to their work	✗	✓	✓
	Individualised consideration	Creating new learning opportunities along with a supportive environment	✓	✓	✗
		Proving coaching and teaching	✗	✓	✗
		Building one-to-one relationships with his or her employees	✗	✗	✓

✓ Code presented ✗ Code not presented

Middle managers also performed transformational leadership style in the three companies. They facilitated the exploratory learning process through intellectual stimulation, inspirational motivation, and individualised consideration behaviours. Like top managers, similarities and differences between these behaviours were found across the three companies. The middle managers created new learning opportunities along with a supportive environment in both Company One and Two. This reflected that the individual consideration of middle managers in these two companies was performed in the same way. On the other hand, middle managers in Company One intellectually stimulate their employees through supporting the collective process of organisational learning, allowing experimentation, and avoiding public criticism of individual members' mistakes, while the middle managers perform intellectual stimulation by encouraging followers to think in a new way.

Despite the similarities between the components of the transformational leadership styles across the three case companies, there were some differences between the transformational leadership styles of the CEOs and middle managers. The idealised influence of the CEO motivates their middle managers to actively engage in the exploratory learning process. The idealised influence of the CEO brought them the respect and trust of their middle managers. Despite some differences in behaviours of top and middle managers, their leadership styles supported searching and acquiring external knowledge activities.

6.2.2.2 Leadership Styles during the Transformative Learning Process

It was explained that the transformative learning process occurs at the beginning of the innovation implementation stage. The transformative learning process facilitates combining external knowledge with the organisational knowledge. It was revealed during the cross-case analysis that there were some factors which help the three case companies to accomplish their transformative learning process. Top and middle managers, specifically the CEOs and the R&D managers, in the three case companies facilitated this learning process (Table 6.7).

Table 6.7: The transformative learning process and leadership styles

	Company One	Company Two	Company Three
Key managers	- R&D (I)	- R&D manager (I, O)	- R&D (I, O)
	×	- Deputy of R&D (I, O)	×
	- CEO (I)	- CEO (I, O)	- CEO (I, O)
Enablers of the transformative learning process	- Agreement between top and middle managers (I)	- Agreement between top and middle managers (I, O)	- Agreement between top and middle managers (I, O)
	- Harmony between departments (I)	- Harmony between departments (I, O)	- Harmony between departments (I, O)
	- Company's future prospects (I, D)	- Company's future prospects (I, D)	- Company's future prospects (I)
	- Learning environment (I)	- Learning environment (I, O)	- Learning environment (I, O)
	- Middle managers' intention towards learning (I)	- Middle managers' intention towards learning (I, O)	- Middle managers' intention towards learning (I, O)
	- Knowledge ownership (I)	×	×
Top managers' behaviours and attitudes	- Giving authority to middle managers (I) - Giving responsibility based on employees' capabilities (I)	- Giving authority to middle managers (I)	- Giving authority to middle managers (I, O)
	- Creating learning-and-teaching culture (I, D)	- Providing learning opportunity (I, O)	- Providing learning facilities (I, O)

	- Trusting middle managers (I)	- Trusting middle managers (I, O)	- Trusting middle managers (I, O)
	- Creating a Common Vision (I)	- Reminding the organisational vision (I, O)	- Reminding organisational vision (I, O)
	- Regular meetings with middle managers (I, D)	- Constant communication with middle managers (I, O)	- Regular meeting with middle managers (I, O)
	- Providing feedbacks (I)	×	- Providing feedback for middle managers (I, O)
	- Keeping knowledge inside the organisation (I)	- Keeping knowledge inside the organisation (I)	- Keeping knowledge inside the organisation (I)
	- Coordinating the speed of innovation activities across departments (I)	- Encouraging cooperation (I, O) - Fostering a cooperative culture - Facilitating communication (I, O)	- Creating a team working culture (I, O) - Facilitating communication between departments (I, O)
	- Valuing the experience of the middle managers (I)	- Valuing the experience and knowledge of young and old managers (I, O)	- Valuing middle managers' knowledge by engaging them in problem-solving activities (I, O)
	×	- Regular contact with middle managers (I, O)	- Regular meetings with middle managers (I, O)
	×	×	- Fulfilling middle managers' needs (I)

	- Coping with middle resistance towards implementing external knowledge (I)	- Coping with middle resistance towards implementing external knowledge (I)	- Coping with middle resistance towards implementing external knowledge (I)
Transformational leadership style of top managers	- Intellectual stimulation	- Intellectual stimulation	- Intellectual stimulation
	- Inspirational motivation	- Inspirational motivation	- Inspirational motivation
	- Individualised consideration	- Individualised consideration	- Individualised consideration
Transactional leadership style of top managers	- Clarifying consequences of failure to assimilate knowledge (I)	- Ordering middle managers to transfer knowledge (I) - Punishing employees (I)	- Ordering middle managers to transfer knowledge (I) - Assigning tasks to perform (I)
Middle managers' behaviours and attitudes	- Allowing experimentation (I)	×	×
	- Middle managers' intention towards learning (I)	- Middle managers' intention towards learning (I, O)	- Middle managers' intention towards learning (I, O)
	- Trusting employees (I)	×	×
	- Motivating their followers to cooperate with the R&D and top managers (I)	×	×
	- Valuing their employees' knowledge (I)	×	×
	- Communicating the direction of the company (I)	- Communicating the success of the company and its direction	- Communicating the success of the company (I)

	- Transferring knowledge (I)	- Transferring knowledge based on their employees characteristics and explaining the importance of knowledge (I)	- Transferring knowledge (I, O)
	×	- Monitoring and assessing personnel needs (I, O) - Identifying training courses (I, O, D)	×
Transformational leadership style of middle managers	- Intellectual stimulation	- Intellectual stimulation	- Intellectual stimulation
	- Inspirational motivation	- Inspirational motivation	- Inspirational motivation
	- Individualised consideration	- Individualised consideration	- Individualised consideration
Transactional role of middle managers	×	×	×
Other factors increasing the transformative learning process	- Middle managers' intention (I)	- Middle managers' intention (I)	- Middle managers' intention (I)

(I, D. O) - I means interview evidence, D means document evidence, O means evidence from observation

× No evidence

It was revealed through within-case analysis (Chapter 5) that top managers should provide a foundation in first place to facilitate the transformative learning process. For example, having skilful R&D manager helped Company One to make external knowledge native effectively. To transfer this knowledge across organisation, the CEO played a significant role in improving a learning-and-teaching culture. This culture increased the cooperation between middle managers which facilitated transferring knowledge from the R&D department to other part of this organisation. It was also explored that in all of the three cases the middle managers were more directly engaged in the transformative learning process. The success of this learning process therefore relied on the middle managers' intention towards using recently acquired knowledge. Moreover, their behavioural patterns influence the transformative learning process (Tables 6.8 and 6.9).

Table 6.8: Top managers' leadership styles during the transformative learning process

Top management leadership styles		Codes	Company One	Company Two	Company Three
Transformational leadership style	Intellectual stimulation	Supporting the collective process of organisational learning	✓	✓	×
		Encouraging followers to think in a new way	✓	×	×
		Promoting employees' intelligence, knowledge and learning for being innovative	✓	×	×
		Allowing experimentation	×	×	✓
	Inspirational motivation	Creating a common vision	✓	✓	✓
		Paying attention to effective communication and sharing values	×	✓	×
		Encouraging followers to envision an attractive future	×	✓	×
	Individualised consideration	Considering individual differences	✓	×	✓
		Treating each follower as a respected individual	✓	×	×
		Building one-to-one relationships with his or her employees	✓	✓	×
Transactional leadership style	Management by expectation	Often-punish non-compliance	⭘	×	×
		Specifying the standards for compliance	×	⭘	×
		Tracking progress in development of new products	×	×	⭘

✓ Code presented	⭘ Code occationally presented	× Code not presented

It was discovered that top managers perform both transformational and transactional leadership styles during the transformative learning process. Top managers through intellectual stimulation, inspirational motivation, and individualised consideration facilitated the transformative learning process. These behavioural patterns increased cooperation between middle managers and their departments to transfer knowledge effectively. Nevertheless, the top managers performed these behavioural patterns slightly different across the three case companies, as Table 6.8 illustrates.

There were two commonalities across these companies. First it was also found that trust in middle managers allowed modifying external knowledge in these three cases. Trust in middle managers allowed experimentation which allowed top managers to perform intellectual stimulation. There other similarity was that their CEOs changed their leadership style from transformational to transactional leadership style in order to deal with their middle managers resistance or failure to use external knowledge. In this situation, the CEOs involves in the transformative learning process and ordering middle managers to transfer knowledge or punishing them. For instance, Company One's CEO did transactional leadership style by punishing those middle managers which had not achieved to assimilate knowledge.

Table 6.9: Middle managers leadership style during the transformative learning process

Middle managers leadership styles		Codes	Company One	Company Two	Company Three
Transformational leadership style	Intellectual stimulation	Supporting the collective process of organisational learning	✓	✓	✓
		Promoting employees' intelligence, knowledge and learning for being innovative	✓	✓	×
	Inspirational motivation	Creating a common vision	✓	✓	×
		Encouraging followers to envision an attractive future	×	×	✓
	Individualised consideration	Providing teaching and coaching	✓	✓	×
		Creating new learning opportunities along with a supportive climate	✓	×	×
		Considering individual differences	×	✓	✓

✓ Code presented × Code not presented

The middle managers performed the transformational leadership style during the transformative learning process. Between different middle managers, the R&D managers played a significant role in combining external knowledge with organisational knowledge. For example, the R&D managers had an important role in making external knowledge native. Then, such knowledge transferred to other departments such as production departments. The other middle managers were in charge of transferring knowledge. The middle managers performed transformational leadership style through intellectual stimulation, inspirational motivation, and individualised consideration behavioural patterns. Although there were some differences in the middle managers' behavioural patterns (Table 6.9), middle managers' transformational leadership style supported the transformative learning process in the case organisations. The other commonality between them refers to their intention towards using external knowledge. The middle managers' intention facilitated transferring knowledge.

6.2.2.3 Leadership Styles during the Exploitative Learning Process

As it was explained in Chapter 5, the leadership styles of top and middle managers changed from transformational to transactional as the AC learning processes moved from the transformative to exploitative learning process. The exploitative learning process refers to constant application of recombined knowledge. This achieves by developing and following routines. Table 6.10 illustrates top and middle managers' leadership styles and its requirements for successful exploitative learning process.

Table 6.10: The exploitative learning process and leadership styles

	Company One	Company Two	Company Three
Key managers	- Quality control (I)	- Quality control (I)	✖
	- Quality assurance (I)	- Quality assurance (I)	- Quality assurance (I)
	- Production managers (I)	- Production managers (I)	- Production managers (I)
Requirements	- Following SOPs (I)	- Following SOPs (I)	- Following SOPs (I)

Top managers' behaviours and attitudes	- Indirectly controlling the outputs (I) - Rewarding employees (I)	- Indirectly controlling the outputs (I) - Rewarding employees (I)	- Indirectly controlling the outputs (I) - Rewarding employees (I)
Leadership style of top managers	Transactional	Transactional	Transactional
Middle managers' behaviours and roles	- Controlling the production processes (I)	- Controlling the production processes (I)	- Controlling the production processes (I,O)
	- Controlling the outcomes of innovation processes (I)	- Controlling the outcomes of innovation processes (I)	- Controlling the outcomes of innovation processes (I, O)
	- Providing feedback and reports to top managers (I)	- Providing feedback and reports to top managers (I)	- Providing feedback and reports to top managers (I, O)
	- Assessing the employees' performance (I)	✗	✗
	✗	- Coping with employees' resistance (I)	- Dealing with employees' resistance (I)
Leadership style of middle managers	Transactional	Transactional	Transactional

(I, D. O) - I means interview evidence, D means document evidence, O means evidence from observation - ✗ No evidence

The exploitative learning process in the case companies depended on following medicines SOPs. Performing and controlling tasks based on SOPs ensured the reuse of knowledge in order to produce their medicines continually. Following SOPs was driven by the pharmaceutical standards such as GMP. Acknowledging pharmaceutical standards is an essential part of the success of leading innovative pharmaceutical companies, as reported by several managers across the cases. Controlling is inevitable as it enabled the organisations to keep the same quality level over time. The cross-case analysis showed that top and middle managers facilitated the exploitative learning process through imposing control.

The influence of top and middle managers changed considerably during the exploitative learning process. Certain middle managers influence the exploitative learning process. Unlike the exploratory and transformative learning processes, it was discovered that the top managers do not directly influence the exploitative learning process. Similarly, this learning process was facilitated by middle managers. Some of the middle managers played a more significant role including quality control (QC), quality assurance (QA), and production managers. They had a key role in controlling the product quality based on the SOPs which was determined by the R&D department. Top and middle managers' leadership styles are shown in Table 6.11. Table 6.11 was derived for the three case companies because the behaviours and attitudes of the top and middle managers were almost the same across all three cases.

Table 6.11: Top and middle managers leadership styles during the exploitative learning process

Top and middle managers leadership styles		Codes	Company One	Company Two	Company Three
Top managers' transactional leadership style	Management by expectation	Tracking progress in development of new products	✓	✓	✓
	Contingent rewards	Clarifying expectations and offering recognition as the goals are achieved	✓	✓	✓
Middle managers' transactional leadership style	Management by expectation	Specifying the standards for compliance	✓	✓	✓
		Tracking progress in development of new products	✓	✓	✓
		Analysing and refining the traditional work processes	✓	✓	✗

✓ Code presented ✗ Code not presented

Middle managers calcified activities which should be performed by their employees. To encourage the reuse of knowledge, employees who were engaged in production activities were motivated financially to perform their tasks correctly. Middle managers assessed the progress of their employees. Financial rewards were given by the top managers to the production staff based on the middle managers' assessment. Middle managers imposing control also enabled the middle managers to provide reports about the reuse of knowledge. Such reports helped the top managers to control indirectly the production process and outcomes. Controlling the process and outcomes ensured the reuse of knowledge. Therefore, the leadership styles of top and middle managers were transactional.

6.3 Conclusion

The cross-case analysis showed that the three case companies relied on initiating new products and acquiring external knowledge. It was revealed that they look for external knowledge for different reasons from knowledge providers. The second stage of the adopting innovation processes is to make decisions. Certain factors such as economical and capability aspects were considered in order to make decisions. The last stage of innovation adopting refers to implementing innovation. The R&D department played a critical role in all three cases for developing new products and enabled the case companies to produce continually the new products.

The result of the cross-case analysis showed that the AC learning processes take place as the innovation adopting processes progress from the exploratory to transformative and from the transformative to exploitative learning process. The similarities and differences between the ways that the three case companies conduct their AC learning processes were explained. The leadership styles of top and middle managers influence the AC learning processes in the three case companies. The leadership style moves from transformational to transactional as the learning processes move towards the exploitative learning process. The behaviours of the transformational leadership style for both top and middle managers are explored during the exploratory and transformative learning processes. Moreover, it was explored that top managers played a more critical role in the exploratory learning process, while middle managers played a more important role in the exploitative learning process.

Table 6.12 illustrates the managerial themes which influenced the AC learning processes which affected the innovation adopting processes in the case companies. As it is evident, similar themes emerged from the three case companies. Some themes such as transformational leadership derived from the literature. On the other hand, three themes were raised during the data collection and analysis including top managers' knowledge, trust in middle managers, and middle managers' intention. Both of these two types of themes affect the AC learning processes and they also influence the leadership styles of top and middle managers.

Table 6.12: Managerial themes in the AC learning processes

Themes across cases	Exploratory learning process	Transformative learning process	Exploitative learning process
Transformational leadership style	✓	✓	×
Transactional leadership style	×	⭘	✓
Top managers' knowledge	✓	×	×
Middle managers' intention	×	✓	×
Trust in middle managers	×	✓	×

✓ Fully presented ⭘ Occationally presented × Not presented

In Chapter 7, the findings of this study will be compared with the existing literature in order to validate the study's conceptual framework.

Chapter 7: Discussion

7.1 Introduction

This thesis aims to revise the conceptual model in the light of empirical data. As discussed in Chapter 2, there is a need to understand the joint influence of top and middle managers in the absorptive capacity (AC) learning processes in innovation adoption. Most of the models on AC focused on its antecedents, outcomes, and its nature. A few studies that focused on the AC learning processes, either did not reflect the importance of top and middle managers or did not deeply investigate the influence of the AC learning processes on innovation adoption (e.g., Sun and Anderson, 2012; Easterby-Smith et al., 2008_a). This thesis argues that investigating the AC learning processes reflects how organisations value, assimilate, and implement external knowledge. Knowing how organisations value, assimilate, and implement external knowledge helps to investigate deeply the combinative influence of both top and middle managers' leadership styles in the AC learning processes. The findings of this thesis (chapters 5 and 6) indicated the necessity of modifying the conceptual model which was proposed in Chapter 3 (Figure 3.1). The revised model consists of the transformational leadership style, transactional leadership style, top managers' knowledge, middle managers' intention, and trust in the middle manager. The influence of these factors on the AC learning processes to adopt innovation is explained in this chapter.

7.2 The Relationship between the AC Learning Processes and Innovation Adoption

The results of the cross-case analysis (Chapter 6) support the linearity assumption which was made for developing the study's conceptual model. Therefore, organisations adopt innovation through specific stages. As explained in Chapter 3, the process of innovation adoption occurs in three stages including initiation, the adoption decision, and implementation (Table 7.1).

Table 7.1: The stages of innovation adoption

The process of innovation adoption	Description
Initiation	Becoming aware of new products
Adoption decision	Making decisions and allocating resources
Implementation	Developing new products and establishing routines for continual production

Source: Damanpour and Schneider (2006)

Each stage of innovation adoption requires its own learning. This means that the learning should be different across each stage of innovation adoption, as proposed by the conceptual model.

7.2.1 The Exploratory Learning Process and Initiation

The exploratory learning process refers to valuing and understanding external knowledge in the organisational context (Lane et al., 2006). This stage of the AC learning processes occurs initially at the individual level where individuals search for and acquire external knowledge (Sun and Anderson, 2010; 2012). Similarly, this thesis found that particular top and middle managers (CEO, R&D, and Marketing managers) participate in the exploratory learning process, which allows them to initiate new products. However, this thesis advanced the work of Sun and Anderson's (2012; 2010). The work of Sun and Anderson (2010; 2012) did not distinguish between individuals, while this study found that the exploratory learning process for adopting innovation occurs within particular individuals. This finding is in line with the fact that not all employees have strategic value (Bornay-Barrachina et al., 2012). It is suggested that employees who do repetitive and secondary work do not create value for the organisations (Barney and Wright, 1998; Wright et al., 2001). Product innovation including innovation adoption involves change, initiating new products, and searching for new external knowledge resides in those employees who have strategic value. This point can be supported further by considering the

nature of AC. Absorptive capacity is strategic in nature and it imposes changes (Zahra and George, 2002).

Our research also explored that knowledge and experience of CEO, R&D, and marketing managers influence the exploratory learning process by initiating new products quickly, as discovered in this thesis. The marketing and R&D managers played a key role in initiating products by valuing external knowledge. The CEO is at the interface of the company and engagement of the CEO in introducing new external knowledge facilitates the exploratory learning process, according to this study's findings. This is similar with Sun and Anderson (2012), Zahra and George (2002), and Cohen and Levinthal (1990) studies which highlight the importance of employees in organisational AC, including those who enable the interaction between their organisations and the external environment or those who facilitate the relationship between departments. Moreover, it is proposed that past experience and knowledge enable organisations to search for new external knowledge and understand it in their context (Cohen and Levinthal, 1990). Since product innovation relies on the implication of new knowledge (Escribano et al., 2009), individuals' knowledge and experience in particular products help them to become familiar with new products. The learning occurs for initiating new products known as intuition, which involves pattern recognition (Sun and Anderson, 2010). The exploratory learning process through intuition learning enables organisations to initiate new products. It is suggested that intuiting learning depends on individuals' experience and knowledge (Crossan et al., 1999).

Proposition 1: *The influence of the exploratory learning process on the initiation stage of innovation adoption depends on the top and middle managers' knowledge, particularly CEOs, marketing, and R&D managers.*

Therefore, the exploratory leaning process influences initiation stage as proposed in the conceptual model. The influence of the exploratory learning process on the adoption decision stage will be explained in the following.

7.2.2 The Exploratory Learning Process and Adoption Decision

The findings of this thesis supported the prior research for transferring individual to group-level learning as innovation processes progress from initiation to adoption

decision stage. The past study showed that the exploratory learning process occurs in linear fashion and moves from individual to group-level learning within the organisational frame through collegial discussion (e.g., Sun and Anderson, 2010; 2012; Crossan et al., 1999). Collegial discussion allowed the case companies to decide in adopting new products or not by considering financial, technological, and human resources limitations. This is consistence with the findings of Damanpour and Schneider (2006) who argued that after new products are initiated, organisational members at the managerial level, particularly at the top level, evaluate the products from different aspects including technological and financial. However, this thesis found that middle managers provided required information for top managers for making decisions. In other words, each middle manager tries to explain the feasibility of the production of initiated products based on their own knowledge and experience. This refers to learning, which is known as interpreting. Interpreting learning stage is defined as "the explaining, through words and/or actions, of an insight or idea to one's self and to others" (Crossan et al., 1999). It is proposed that interpreting enables people within the same group to reach the same understanding regarding possible outcomes (Crossan et al., 1999). Therefore, evaluating proposed ideas from different perspectives enables the companies to make a decision by reaching a common understanding about their company's potential to develop initiated products.

Proposition 2: *The exploratory learning process facilitates the adoption decision of innovation through the interpretation and exchange of knowledge between the top and middle managers.*

Adoption decision is influenced by the exploratory learning process. This is supported the proposed effect of the exploratory learning process on the adoption decision process. The influence of the transformative learning process on the implementation stage of innovation adoption will be discussed in the next part.

7.2.3 The Transformative Learning Process and Implementation

The transformative learning process enables organisations to combine external knowledge with organisational knowledge in order to develop a common understanding of the knowledge (Sun and Anderson, 2012; Lane et al., 2006). It was

explored within the case companies that the recipient organisations cannot always use external knowledge in the way the knowledge senders use it. There are reasons including technological differences between the knowledge senders and recipients which do not allow the recipients to apply external knowledge in the same way as the knowledge senders do. The empirical data showed the important role of the R&D department in modifying external knowledge. Similar to this thesis, some researchers such as Zhara and George (2002) and Todorova and Durisin (2007) argue that organisations may modify external knowledge through assimilation and/or transformational capabilities. Assimilating capability enables organisations to fit new ideas such as initiated new products into the existing knowledge structure by slightly modifying the external knowledge (Todorova and Durisin, 2007). Therefore, when the case companies tried to modify external knowledge in order to be able to use their own existing platforms including their current technology, they assimilated knowledge.

The findings of the cross-case analysis (Chapter 6) presented that another way which organisations combine external knowledge is through transformation capability. Transformation capability lets organisations fit new ideas which are not compatible with the existing organisational knowledge bases (Todorova and Durisin, 2007). Transformation capability enables organisations to add entirely new knowledge to the organisational knowledge, while they try using external knowledge for adopting innovation. This is particularly true when the organisation tries to adopt new products of which they have no past experience or knowledge. For example, it was seen in Chapter 5 that Company One moved towards developing high-tech medicines which had been completely new knowledge for Company One. This shows that transformative capability enables Company One to adopt products which they have less knowledge of. Therefore, the lack of knowledge regarding adopting new products does not limit the organisations to absorb and use external knowledge for innovating these products when external knowledge is available.

Valuing, assimilating, and implementing external knowledge that organisations have less knowledge about may be seen in contradiction with the seminal work of Cohen and Levinthal (1990). They (1990) show that valuing, assimilating, and exploiting external knowledge are associated with the organisational past experience and

knowledge. There are other studies which confirm Cohen and Levinthal's findings (e.g., Zahra and George, 2002; Todorova and Durisin, 2007; Lenox and King, 2004; Volberda et al., 2010). This thesis argues that past experience and knowledge at organisational level enable assimilation of external knowledge. This is because assimilating capability enables changes which are not radical (Todorova and Durisin, 2007). However, when organisations value a new opportunity through initiating new products, of which the company has less capability and knowledge, they adopt the newly initiated products by using transformation capability. This capability enables the organisation to perform innovation activities beyond its existing knowledge and capabilities. In consistence with this argument, Todorova and Durisin (2007) suggest that transformation capability allows organisations to adopt competence-destroying change. An example of competence-destroying is Company One, by not limiting itself to producing the traditional products as others were and moving towards products, which other companies cannot do. Therefore, transformation capability lets organisations have the capability to perform beyond their own knowledge and experience.

It was shown in the cross-case analysis that after knowledge is modified in the R&D department, the knowledge is transferred to different departments, specifically to the production department. Through transferring the modified knowledge, the case companies achieve a common understanding of the knowledge because the R&D department is responsible for the external knowledge modification during the implementation stage. Through transferring knowledge, employees who are responsible for implementing innovation follow the same actions. Therefore, learning occurs in the form of integration. Integration learning involves "the process of developing shared understanding amongst individuals and the taking of coordinated action through mutual adjustment" (Crossan and Berdrow, 2003). It is suggested that the transformative learning process lets the organisation develop a shared understanding about external knowledge (Sun and Anderson, 2010). Shared understanding of knowledge in the transformative learning process is achieved through the interaction between individuals at the organisational level (Sun and Anderson, 2012). Consistence with these studies, the results of the cross-case analysis showed that the interaction between the individuals in the R&D department

and the individuals of other departments facilitates the transfer of external knowledge and share understanding of it.

Shared understanding of knowledge is essential for the implementation stage of innovation adoption. The results of the cross-case analysis showed that the implementation stage starts by modifying the innovation, trial use, and preparing the organisation for innovation uses. The case companies modify innovations through improving the drug formula and/or making their own technology native. The processes of improving a drug formula and/or making technology native involve trial and error, which prepares the organisation to start producing initiated medicines. Through these processes, as explained in chapters 5 and 6, the case organisations develop knowledge to initiated medicines. This is consistent with the work of Damanpour and Schneider (2006), where they consider the implementation stage of innovation adoption as activities and actions which involve innovation modification, trial use, and preparing organisations for innovation use.

Proposition 3: *The transformative learning process facilitates the implementation stage of innovation adoption through the transfer of knowledge from R&D to other departments, which requires (i) modification of the external knowledge by doing trial and error if the organisations have knowledge, at least to some extent, about the initiated products or (ii) adoption of a new technology if they have not produced similar products.*

As the conceptual model proposed, the transformative learning process facilitates implementation stage of innovation adoption process. The influence of the exploitative learning process on this stage of innovation adoption will be explained in the next part.

7.2.4 The Exploitative Learning Process and Implementation

The exploitative learning process allows organisations to achieve commercial outcomes (Lane et al., 2006) and it occurs at the organisational level (Sun and Anderson, 2010; 2012). It is suggested that this learning process is about the continual use of knowledge in order to ensure the implementation of combined knowledge (Lane et al., 2006; Sun and Anderson, 2010; 2012). The results of the cross-case analysis showed that the R&D department documents all the activities

which require for the continual production. All the individuals who are involved in production activities should perform their tasks based on these documents. In other words, the R&D department develop routines which ensure similar production outcomes are achieved over time.

Our research also found that achieving similar production outcomes ensures the reuse of knowledge. The implementation stage of innovation involves developing routines through the continual use of innovation (Damanpour and Schneider, 2006). The results of the cross-case analysis revealed that the continual use of innovation as explained is achieved through documentation which is developed in the R&D department. Similarly, it is argued that developing and following routines refer to institutionalising learning (Crossan et al., 1999). Institutionalising learning enables organisational learning through developing routines (Crossan and Berdrow, 2003). Therefore, institutionalising learning helps organisations to accomplish the exploitative learning process because both of them occur at the organisational level and aim to develop routines.

Proposition 4: *The exploitative learning process facilitates the implementation stage of innovation adoption through developing routines and imposing control to ensure reuse of knowledge which has been absorbed.*

Like other stages of the AC learning processes, the exploitative learning process affects innovation adoption process. The rest of this chapter will be explained the influence of top and middle managers on the AC learning processes.

7.3 Leadership Styles and the AC Learning Processes

The leadership styles refer to the behaviours and attitudes which are constantly performed by the leaders (Base, 1995_a). The transformational and transactional leadership styles are considered in this thesis. Transformational leaders motivate their followers to perform beyond their expectations by transforming their values and increasing their aspirations (Bass, 1995_b; Jung, 2001). As explained in Chapter 3, there are four dimensions embodied in the transformational leadership style: idealised influence, individualised consideration, inspirational motivation, and intellectual stimulation. Idealised influence refers to how much a leader is admired, respected, and trusted by his/her employees (Jansen et al., 2009). Individualised consideration occurs when a leader pays attention to his/her followers' needs in order

to increase the individuals' success by providing assistance and guidelines (Jansen et al., 2009). Inspirational motivation is defined as articulating an interesting and challenging vision (Gumusluoğlu and Ilsev, 2009). Intellectual stimulation is about motivating employees to think in a creative and innovative way about old problems (Gumusluoğlu and Ilsev, 2009; Jansen et al., 2009).

The transactional leadership style, on the other hand, is based on an exchange relationship between leaders and followers, where leaders clarify objectives, reward followers for attaining the objectives, and correct their followers' mistakes (Bass, 1999). Drawing on the findings of this thesis, both the transformational and transactional leadership styles are required for successful of the AC learning processes, as explained in chapters 5 and 6. Consistence with this thesis, Lane et al. (2006) point out that each stage of the AC learning processes involves different activities (Lane et al., 2006). Therefore, the leadership styles of top and middle managers may change.

7.3.1 Leadership Styles and the Exploratory Learning Process

The exploratory learning process refers to the process which enables organisations to value and understand external knowledge (Lane et al., 2006; Sun and Anderson, 2012). Similar to Sun and Anderson (2012), the empirical data showed that both top and middle managers perform the transformational leadership style in order to facilitate the exploratory learning process, as illustrated in Table 7.2. This finding is in line with the prior studies which found a positive relationship between transformational leadership and the exploratory learning process (e.g., Berson et al., 2006; Jansen et al., 2009; Vera and Crossan, 2004).

Table 7.2: Leadership style in the exploratory learning process

Transformational leadership style	Company One	Company Two	Company Three
Top managers	-Intellectual stimulation -Inspirational motivation	-Intellectual stimulation -Inspirational motivation	-Intellectual stimulation -Inspirational motivation

	-Individualised consideration -Idealised influence	-Individualised consideration -Idealised influence	-Individualised consideration -Idealised influence
Middle managers	-Intellectual stimulation -Inspirational motivation -Individualised consideration	-Intellectual stimulation -Inspirational Motivation -Individualised consideration	-Intellectual stimulation -Inspirational motivation -Individualised consideration

The empirical data shows that the top and middle managers performed intellectual stimulation in order to facilitate the exploratory learning process. The top managers use intellectual stimulation by using reasoning before taking actions, being open to new ideas, supporting collective learning, and asking middle managers opinion to solve problems. The middle managers perform intellectual stimulation by allowing experimentation to their employees, supporting the collective process of learning, avoiding public criticism, and supporting idea generation. Similar to this thesis, Gong et al. (2009) report that the intellectual stimulation increases individual learning. The intellectual stimulation behaviour of top and middle managers motivates their followers to think differently in order to adopt creative and exploratory thinking (Sosik et al., 1997).

It is verified in this thesis that the inspirational motivation of top and middle managers increases the exploratory learning process. The top managers perform inspirational motivation by encouraging managers to envision an attractive future, creating a common vision, and paying attention to effective communication and sharing values. The middle managers use inspirational motivation by creating a common vision and motivating followers by providing meaning and challenges to their work. This finding can be further support by organisational learning and innovation literature. These studies suggested that inspirational motivation increases the exploratory learning process because it encourages employees to integrate their personal objectives with organisational objectives on the same line (Jung et al., 2003;

Shamir et al., 1993) and increases their motivation to become involved in the exploratory learning process (Jansen et al., 2009).

It is also evidence that individualised consideration facilitates the exploratory learning process. According to the findings of this thesis, the top managers attempt to create learning opportunities with developing a supportive climate. Moreover, the middle managers in the case companies use individualised consideration by creating new learning opportunities along with a supportive environment, proving coaching and teaching, and building one-to-one relationships with their employees. These empirical findings are in line with many studies which highlight the influence of individualised consideration on the exploratory learning process. For example, Gong et al. (2009) point out that individualised consideration facilitates the exploratory learning process because transformational leaders, by showing empathy, consideration and support, increase their followers' creativity through overcoming their fear regarding questioning the status quo.

It was found that the idealised influence enables the top managers to facilitate the exploratory learning process. Idealised influence increased trust and respect in top managers, specifically in the CEOs. The empirical findings can be supported by the existing literature. For example, it is suggested that the combination of idealised influence, intellectual stimulation, and inspirational motivation facilitates the exploratory learning process by encouraging individuals to share their intuitive learning, challenge the existing situation, and generate creative solutions (Jansen et al., 2009). Another study shows that intellectual stimulation, inspirational motivation, and idealised influence behaviours enable the leaders to be role models and enable the lower-level managers to perform these behaviours (Waldman and Yammarino, 1999).

Proposition 5: *The transformational leadership style facilitates the exploratory learning process for innovation adoption when the top managers perform intellectual stimulation, inspirational motivation, individualised consideration, and idealised influence; and the middle managers use intellectual stimulation, inspirational motivation, and individualised consideration.*

Therefore, transformational leadership style is more effective for facilitating the exploratory learning process. In the following part, it will be explained the influence of leadership on the transformative learning process for innovation.

7.3.2 Leadership Styles and the Transformative Learning Process

It is suggested that the transformative learning process requires interaction between individuals at the organisational level (Crossan et al., 1999; Sun and Anderson, 2010; 2012). The results of the cross-case analysis showed that both top and middle managers perform transformational leadership in order to encourage interaction between individuals across different departments, as illustrated in Table 7.3. Unlike prior studies, this thesis explored some situations where the top managers performed the transactional leadership style during the transformative learning process. Coexistence of the transformational and transactional leadership styles has been ignored in most but not all of the prior studies. Some studies such as Vera and Crossan (2004) consider the importance of both the transformational and transactional leadership styles in the learning processes. The reason for not reporting the effect of both the transformational and transactional leadership styles of top managers during the transformative learning may refer to the assumption that transformational leadership style is more effective than transactional leadership style (e.g., García-Morales et al, 2008_b; Gardner and Avolio, 1998; Lowe et al., 1996; Howell and Avolio, 1993).

Table 7.3: Transformational leadership style during the transformative learning process

	Company One	Company Two	Company Three
Top managers	-Intellectual stimulation -Inspirational motivation -Individualised consideration	-Intellectual stimulation -Inspirational motivation -Individualised consideration	-Intellectual stimulation -Inspirational motivation -Individualised consideration
Middle managers	-Intellectual	-Intellectual	-Intellectual

	stimulation -Inspirational motivation -Individualised consideration	stimulation -Inspirational motivation -Individualised consideration	stimulation -Inspirational motivation -Individualised consideration

The top managers performed intellectual stimulation by allowing experimentation, promoting employees' intelligence and knowledge for being innovative, encouraging followers to think in a new way, and supporting the collective process of organisational learning. They inspirationally motivated their followers by creating a common vision, paying attention to effective communication and sharing values, and encouraging followers to envision an attractive future. Individualised consideration allowed them to consider individual differences, treating each follower as a respected individual, and building one-to-one relationships with their middle managers. The findings of this thesis can be supported by sun and Anderson's study. They (2012) show that top managers' transformational leadership style facilitates the transformative learning process. It is argued that top managers' transformational leadership increases the transformative learning process by motivating their employees to share their knowledge within and across their departments (Vera and Crossan, 2004). It was showed in chapters 5 and 6 that transferring knowledge is main part of the transformative learning process. Top managers' transformational leadership style increases the middle managers' intention towards learning by creating positive attitudes towards transferring knowledge (Waldman and Yammarino, 1999).

Middle managers' transformational leadership style facilitated the transformative learning process in the case companies. This finding is in contrast with Sun and Anderson's (2012) study. They (2012) suggest that middle managers, by being transactional, enhance the transformative learning process. This thesis argues that the transformational leadership style of middle managers is more influential than the transactional leadership style in facilitating the transformative learning process for two reasons. The first reason is that the transformational leadership style increases individual AC (Cohen and Levinthal, 1990; Van den Bosch et al., 1999). Knowledge

transfers from the R&D department to other departments. This knowledge needs to be understood and used by individuals and specifically by other middle managers in other departments. Therefore, middle managers, by performing the transformational leadership style, improve individuals' AC, which facilitates knowledge transfer between and across different departments because they are closer to the employees. The second reason is that transformational leaders through performing individualised consideration, inspirational motivation, and intellectual stimulation promote organisational learning, as it was explored through cross case analysis (Sarros et al., 2002).

Proposition 6: *The transformational leadership style facilitates the transformative learning process for innovation adoption when the top and middle managers perform intellectual stimulation, inspirational motivation, and individualised consideration.*

Top managers changed their leadership style in some situations in order to facilitate the transformative learning process. Similar to Zahra and George (2002), this thesis explored that transferring and using external knowledge for innovation may bring new changes such as the establishment of new production lines or the introduction of a new technology to the organisations. To overcome the middle managers failure or resistant towards transferring and using external knowledge, top managers order those middle managers who do not want to be involved in the transformative learning process. Vera and Crossan (2004) mention that top managers, by performing both transformational and transactional leadership styles, influence the learning processes. Consistent with Vera and Crossan's (2004) argument, this thesis found that the top managers of the case companies prefer to use the transformational leadership style, but some situations such as middle managers resistant towards transferring and using external knowledge, the top managers change their leadership style from transformational to transactional. This reflects the importance of adopting a contingency approach of leadership during the transformative learning process.

Proposition 7: *The top managers facilitate the transformative learning process by changing their leadership style from transformational to transactional when middle*

managers fail in or resist transferring and using external knowledge for innovation adoption.

As noted, both transformational and transactional leadership styles influence the transformative learning process. In the following part the effect of leadership styles on the exploitative learning process will be explained.

7.3.3 Leadership Styles and the Exploitative Learning Process

Our research explored that both the top and middle managers' leadership styles are transactional during the exploitative learning process. Similar to this thesis, Sun and Anderson (2012) find that the transactional leadership style facilitates the exploitative learning process. The transactional leadership style is based on determining tasks for the followers and controlling the progress and quality of the determined tasks in order to prevent and correct errors. This leadership style provides rewards for those who do their tasks correctly (Sun and Anderson, 2012; Jansen et al., 2009). The result showed that the tasks for each department which is involved in product development are determined by the R&D department. The research and development department produce a specific document, which is called the standard operation procedure (SOP), for each product. The information provided in every SOP determines the tasks that should be performed in order to ensure the quality of the end products and reuse of knowledge.

Controlling imposed by quality control (QC), quality assurance (QA), and production managers during the exploitative learning process ensures the end products' quality and reuse of knowledge. Therefore, the middle managers are involved in managerial activities because they monitor the employees and take corrective actions. As explained in Chapter 3, the transactional leadership style is more to do with managerial activities which are evident clearly during the exploitative learning process. Unlike the middle managers, which are involved directly in controlling and guiding their employees, top managers are indirectly involved in the exploitative learning process. Top managers control activities indirectly through a report that they receive from their middle managers.

Proposition 8: *The transactional leadership style facilitates the exploitative learning process for innovation adoption by ensuring reuse of knowledge when the middle*

managers identify, guide, and control their employees to perform their tasks correctly, and the top managers provide financial rewards through the reports that they receive from their middle managers about the employees' performance.

The discussion supported the influence of both transformational and transactional leadership styles in the AC learning processes, as proposed in the conceptual model.

7.4 Managerial Factors Affecting the AC Learning Processes

Apart from the leadership styles of top and middle managers, there are other factors which facilitate the influence the AC learning processes. These factors are illustrated in Figure 7.1. These factors are different for each stage of the AC learning processes.

7.4.1 Top Managers' Knowledge

It was explored during the cross-case analysis (Chapter 6) that top managers, specifically CEOs, have an important role in facilitating the exploratory learning process. A recent study suggests that successful searching for and understanding external knowledge requires both technological (or know-how) and market knowledge (Lichtenthaler, 2009). The results of the cross-case analysis showed that the CEOs of the case companies have technological and market knowledge because they have worked in the industry for a long time as academics and practitioners. The CEOs' knowledge enables the case companies to value and adopt new technologies and knowledge, of which the companies have not been aware. Consistent with this finding, past studies highly acknowledge the importance of individuals' knowledge in valuing and acquiring external knowledge (e.g., Sun and Anderson 2010; Cohen and Levinthal, 1990).

Proposition 9: *The top managers' knowledge facilitates the exploratory learning process for innovation adoption by identifying and valuing external knowledge that organisations have not been familiar with.*

There are other managerial factors which influence the transformative learning process. These two factors are explained as follows.

7.4.2 Middle Managers' Intention and Trust in Middle Managers

Middle managers' intention and trust of top managers in their middle managers increases the transformative learning process according to our cross-case analysis

findings. One part of the transformative learning process is to transfer knowledge to other departments and share knowledge within each department. Middle managers are closer to the employees and, therefore, transferring and sharing knowledge reside in them rather than the top managers, as it was explored. The results of the cross-case analysis showed that if middle managers do not have any intention to share combined knowledge, the transformative learning process cannot be accomplished. It is suggested that the intention towards sharing knowledge is higher when organisations value and internalise knowledge sharing (Gagné, 2009). It was revealed that the case companies value knowledge sharing and they internalise it by creating a knowledge-sharing culture. For example, Company One developed a culture which encourages not only learning but also transferring knowledge which has been learnt. Establishing a learning and teaching culture enabled the top managers to increase the employees' intention, particularly the middle managers, to transfer and share knowledge in Company One.

The top managers also used other approaches to increase the middle managers' intention to transfer and share knowledge, including reducing the organisational hierarchy and establishing IT facilities. For example, Company Two's CEO increased communication between different departments by reducing the layers of the organisational hierarchy. Company Three invested in improving the IT facilities which enables middle managers to not only save their knowledge but also transfer and share their information with other middle and top managers. Therefore, the top managers, by providing the necessary platforms such as establishing IT facilities, enhance the middle managers' intention to transfer and share their knowledge.

The effectiveness of creating such platforms, including providing IT facilities, developing a learning and teaching culture, and reducing the organisational hierarchy, is more effective when the top managers trust their middle managers. The existing study acknowledges trust as a factor which enhances innovation and knowledge transfer as well as knowledge sharing. For example, it is mentioned that increasing trust fosters innovation (Sonnenberg, 1994; Fairholm, 1994). On similar lines, the existing studies suggest that trust among team members increases knowledge sharing in new product development teams (e.g., Lee et al., 2010).

Proposition 10: *The middle managers' intention to transfer and use external knowledge facilitates the transformative learning process if the top managers internalise a knowledge-sharing culture, develop IT facilities, and reduce the organisational hierarchy.*

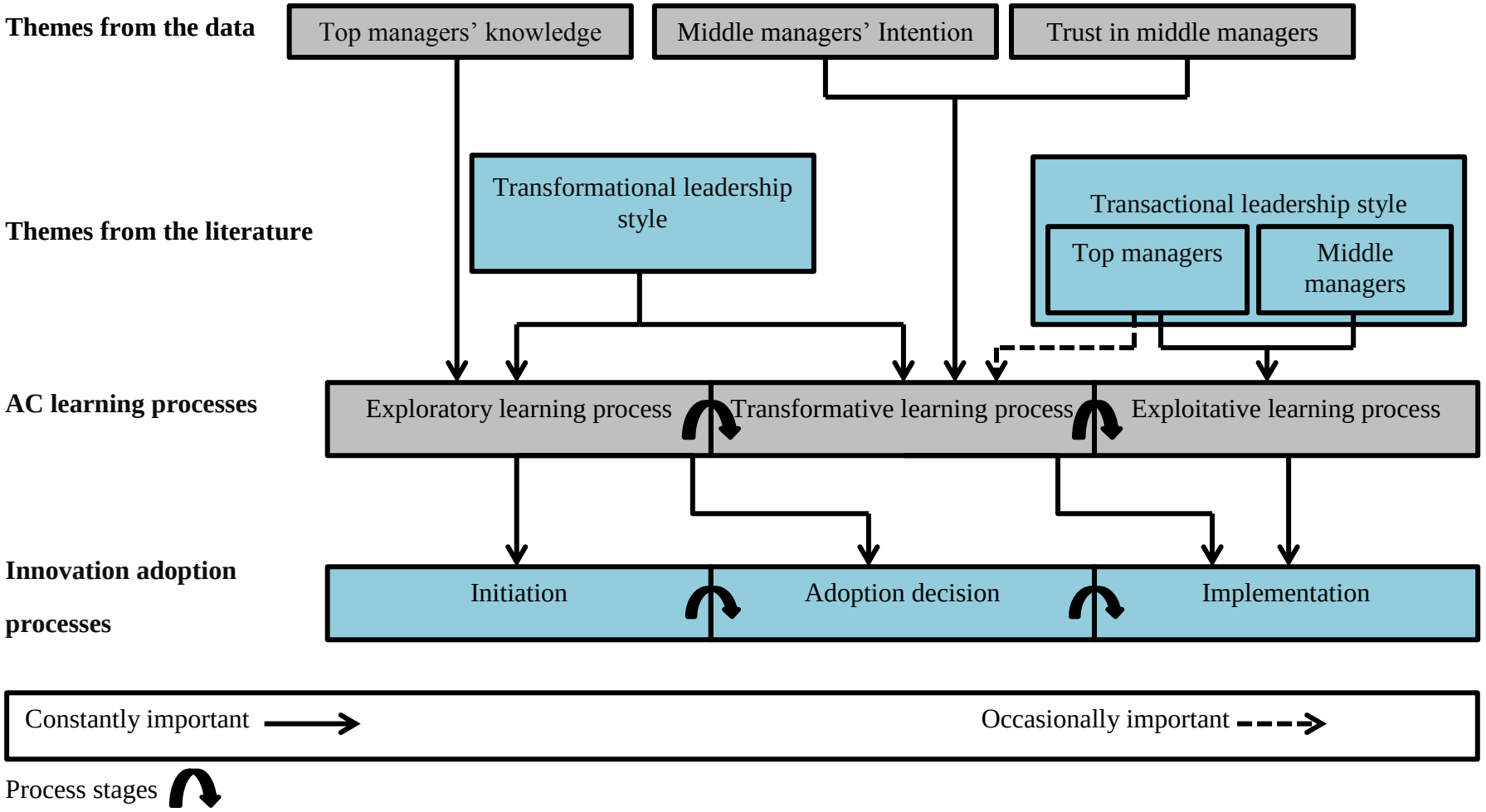
Proposition 11: *The middle managers have more intention towards transferring and using external knowledge if the top managers trust them.*

The influences of three managerial factors on the AC learning processes are added new insight to the conceptual model. The conclusion of this chapter will be given in the next part.

7.5 Revised conceptual model

Comparing the cross-case findings of this study with the existing literature which was presented in this chapter, we modified the original theoretical framework (Figure 3.7), as illustrated in Figure 7.1. The conceptual framework provides a detailed understanding about the AC learning processes and the roles of managers in innovation adoption.

Figure 7.1: A managerial model of AC for innovation



As shown in Figure 7.1, the framework suggests an interactive relationship between innovation adoption and the learning processes of AC. The exploratory learning process facilitates the initiation and adoption decision stages by searching for new products, acquiring external knowledge, and providing information to make decisions. This type of learning depends on particular individuals at the top and middle management levels, with their experience, knowledge, and collegial discussions.

Both the transformative and exploitative learning processes influence the implementation stage of the innovation adopting processes but in different ways. The employees in the R&D department try to combine external knowledge with organisational knowledge in order to develop a shared understanding of knowledge across different departments. Mutual adjustment and interactive relationships between the R&D and production departments are necessary when modifying or adopting external knowledge. On the other hand, organisations develop their own knowledge for continual production during the exploitative learning process by developing routines. This requires imposed control over production activities. The quality and production departments have a critical role here in controlling the product development processes continually. When organisations successfully launch new products in the market, it shows the success of their innovation and learning processes. Therefore, the success of innovation adoption when using external knowledge depends on the exploratory, transformative, and exploitative learning processes which are different in nature.

The top and middle managers facilitate the learning processes of AC by performing both the transformational and transactional leadership styles due to the differences between the exploratory, transformative, and exploitative learning processes, as we argued in Chapter 3. The revised theoretical framework shows that the top and middle managers perform similar leadership styles. Nevertheless, there are some situations when the top managers switch from the transformational to transactional leadership style to facilitate the transformative learning process. This reflects a contingency approach in the top managers' leadership style.

The revised theoretical framework also suggests three conditions, along with leadership styles, which influence the AC learning processes for innovation adoption. First, the top managers' knowledge provides the opportunity for organisations to identify new products and search for new external knowledge. Second, the middle managers' intention towards transferring and using external knowledge positively influences the transformative learning process. Finally, the top managers, by trusting their middle managers, encourage them to become involved in the transformative learning process. Because the role of the middle managers increases as the AC learning processes progress towards exploitative learning, the middle managers' engagement in innovation activities is important. On the basis of the revised conceptual model, we suggest a relationship between the AC learning and innovation adoption processes, which are facilitated by the top and middle managers' leadership styles more effectively; if the top managers have knowledge on products, the middle managers are eager to use and transfer external knowledge, and the top managers trust their middle managers.

7.6 Conclusion

Chapter 7 revised the conceptual framework which was proposed in Chapter 3. The conceptual model of this thesis was improved after arguing and justifying the managerial issues regarding the AC learning processes, showing the influence of these learning processes on the innovation adoption process, and exploring extra themes affecting the AC learning processes. Combining the themes, which were derived from literature and data, enables this thesis to suggest a conceptual model for accomplishing the AC learning processes for innovation adoption from a managerial perspective. Therefore, this chapter restructures the study's conceptual model in the light of empirical findings. The verification of the conceptual model in this chapter improves the researchers' understanding of the AC learning processes.

We showed a new perspective about the relationship between the AC learning processes and innovation. According to our revised conceptual model, innovation accomplish as the learning processes of AC accomplished. This thesis revealed that each learning processes of AC contribute to a specific stage of innovation adoption process.

The discussion of this chapter showed that the transformational leadership style of top and middle managers is essential for the exploratory and transformative learning processes, while the transactional leadership style of top and middle managers is important for the exploitative learning process. Nevertheless, there are situations such as middle managers' resistance towards transferring and using external knowledge which make top managers change their leadership style to transactional. It was also noted that some middle managers and top managers, based on the type of job, have a highly important role in each stage of the AC learning processes. Moreover, the influence of top managers reduces as the learning processes move from the exploratory to exploitative learning process, while the influence of middle managers increases.

Our research at this stage also presented new findings. The knowledge of top managers facilitated the exploratory learning process. The transformative learning process is facilitated by the middle managers' intention and trust in middle managers. A summary of the findings and research contribution is provided in the next chapter.

Chapter 8: Conclusion

8.1 Introduction

In the previous chapter, the conceptual model was evaluated by considering the empirical findings. The discussion in Chapter 7 highlighted the importance of different sets of managerial factors which facilitate the absorptive capacity (AC) learning processes.

Chapter 8 aims to provide a synopsis of the research which was done in this thesis. This chapter is organised as follows. First the key findings and summary of this thesis is explained. Then, knowledge and empirical contributions are presented. The limitations of this thesis are discussed in the third part of this chapter. This thesis offers further research based on its limitations.

8.2 Research Overview

The aim of this thesis was to answers two research questions in order to understand how managerial behaviours influence AC for innovation. This provided a solid understanding on how some organisations are successful in innovation. The following paragraphs represent main points of the past seven chapters.

Chapter 1 provided an introductory section. The research background and problems were explained. This chapter also included the aim, questions, and objectives of this thesis. Increasing innovation is important for organisations as it increases their competitiveness (Fang et al., 2011; Gumusluoğlu and Ilsev, 2009). There were extensive body of knowledge about the factors which enables organisations to increase their innovativeness (Damanpour and Schneider, 2006). However, the importance of how organisations can increase their innovation remains as an interesting topic for both academics and practitioners (Kim and Huarng, 2011). This was the motivation of this thesis to propose and asses empirically a model which shows how organisations can innovate continually by linking AC to managers' leadership styles as much innovation drives by external knowledge. This chapter also included the objectives and brief explanation about the research design. Moreover, the structure of this thesis also asserted.

Chapter 2 presented a critical literature review on AC and its relationship with leadership styles and innovation for discussing gaps in the existing studies. First part was to define concepts including Knowledge, innovation, and organisational learning. Moreover, the relationship between these concepts was also explained. Using AC was also justified in the second stage. Finally, the research in AC was reviewed. It was revealed that the existing study mainly focused on organisational aspects such as its antecedents. The literature review findings showed four gaps in the AC literature including: (1) the AC learning processes, (2) the relationship between AC and innovation, (3) highlighting the type of innovative organisation, and (4) the role of leadership styles in the AC learning processes. Due to the relationship between knowledge, learning, and innovation, developing a model for investigating the influence of leadership styles on AC in product innovation becomes a necessity.

Chapter 3 proposed a conceptual model. Absorptive capacity theory was implemented in order to develop the conceptual model for innovation adoption. The conceptual model developed by linking the leadership styles to the influence of the AC learning processes to innovation processes. The proposed model showed the relationship between leadership styles, the AC learning processes, and innovation adoption process.

Chapter 4 explained the methodological approach behind this thesis. The suitability of philosophical and research design were discussed in Chapter 4. This thesis followed an interpretive paradigm and conducted three qualitative case studies. Data was collected through triangulating different methods including interviews, documents, and observation. Triangulating different sources of data enabled the researcher to increase its internal validity and to develop a comprehensive understanding regarding day-to-day life in the three case companies. Data was analysed by applying thematic analysis technique. It should be also noted that data was managed and coded by using Nvivo 9.2 during data analysis.

The research findings of this thesis were analysed in chapter 5 and 6. In Chapter 5, each case was described separately. Then, in Chapter 6, the findings of each case were compared with other cases. The aim of Chapter 6 was to compare cases in order to develop themes. Developing similar themes from three cases ensured this thesis about achieving theoretical saturation.

Comparing cases together helped to asses and modify the proposed conceptual model in Chapter 7. The themes (key findings) from comparing cases were discussed

in chapter 7 which verified and improved the proposed conceptual model through enfolding the literature. This thesis showed how the AC learning processes influence the process of innovation adoption. The results also indicated the role of both transformational and transactional leadership styles in facilitating the AC learning processes. This thesis found that the role of middle managers in assimilating, transferring, and exploiting external knowledge, while top managers have a key role in initiating new products and facilitating access to external knowledge. The outcomes of this thesis revealed the contribution of particular middle and/or top managers to the each stage of the AC learning processes. Moreover, there were some themes which were emerged from the data including top managers' knowledge, trust in middle managers, and middle managers' intention.

8.3 Research Contributions and Implications

This research proposed and examined a model for academic and practical contribution. The next two sub-sections highlight knowledge and practical contribution of this thesis.

8.3.1 Contributions to Knowledge

This thesis provides insightful contributions to the increasing interest towards understanding the nature of AC and developing new models for innovation. The major theoretical contribution of this thesis is the development of a novel model of AC in the light of leadership styles for innovation, as proposed in Figure 3.1. The proposed conceptual model was validated and developed based on the themes derived from literature and emerged from data (Figure 7.1). As explored in Chapter 2, there is lack of understanding about the influence of leadership styles on AC in relation to innovation. Therefore, this integrative and coherent model is important as the academics interest towards exploring new models for enhancing innovation require more attention particularly from AC perspective (Kim and Huarng, 2011).

Extant studies have fallen short to explain processes in which organisations can achieve continual innovation in a systematic way (Ota et al., 2013). The popularity of this topic encouraged this thesis to suggest and examine a conceptual model in this respect. By validating the conceptual model, this thesis showed that the AC learning processes enable organisations to systematically innovate and adopt new products. The relationship between innovation and AC learning processes reflected

how organisations achieve innovation by facilitating learning from individual to group and from group to organisational level. The relationship between learning and innovation is acknowledged (Lane et al., 2006). Innovation drives by individual and collective learning processes (Alegre and Chiva, 2008). Drawing on organisational learning, showed that learning moved from individual to group and to organisational level (Crossan et al., 1999). Innovation studies mainly focus on organisational level (e.g., Jansen et al., 2009; Alegre and Chiva, 2008). This means that there is lack of understanding on how the learning processes leads to innovation. Validating the conceptual model allows this thesis to establish this relationship and to provide a structured approach towards innovation.

Investigating the AC learning processes also improve understanding about the essence of its processes. One of the limitations of AC studies is the lack of knowledge about the process aspects of AC (Easterby-Smith et al., 2008_a). It is argued that each learning process of AC requires different organisational activities (Cepeda-Carrion et al., 2012; Lane et al., 2006). The influence of each stage of AC on innovation adoption showed that innovation drives from accomplishing its learning processes. This increases the existing body of knowledge on AC by highlighting the differences between the nature of learning activities across the innovation processes and the importance of elaborating different learning for innovation.

It is found that AC positively increases innovation (Zahra and George, 2002; Cepeda-Carrion et al., 2012). However, it was not clear whether they focus on generating or adopting innovation. This clarification allows researchers to compare their findings with other studies in order to check the validity of their researches. Lane et al. (2006) mention that one of the problems in AC studies is lack of validity. This thesis suggests that AC enables organisation to adopt innovation effectively. The adoption of innovation increases the organisational ability to compete by enabling organisations to change and adopt to change in external environment (Damanpour and Wischnevsky, 2006). Similarly, it is suggested that AC allows organisation to adapt to environmental change (Zahra and George, 2002). Because learning processes occurs within innovation activates, AC enables organisations to adapt to environmental changes through innovation adoption. This study by linking

AC to innovation adoption offers an opportunity to future researchers to focus on particular type of innovative organisation.

Our research showed the influence of the leadership styles of top and middle managers on the AC learning processes increase innovation. A few studies considered the influence of both transformational and transactional leadership styles on learning (e.g., Sun and Anderson, 2012; Jansen et al., 2009; Vera and Crossan, 2004). Most of these studies investigate the leadership styles at a single level (Sun and Anderson, 2012). The other drawback is that only few studies considered the influence of leadership styles on learning processes in general (e.g., Berson et al., 2006) and on the AC learning processes in particular (Sun and Anderson, 2012). These studies do not explicitly investigate the influence of this relationship in innovation processes. Such investigation is extremely important because learning occurs as organisations try to implement knowledge. By considering how learning takes place within innovation processes, this thesis provided new valuable theoretical and empirical contribution to AC theory by showing how leadership styles facilities the AC learning processes for innovation.

The thesis contributed to AC theory by adopting a qualitative strategy. One of the drawbacks of AC study refers to extensive use of quantitative approach. It is suggested that using qualitative research may add new dimension or ideas to AC theory (Easterby-Smith et al., 2008_a). This thesis therefore by doing a qualitative study contributes to the AC theory by exploring new managerial perspective to it. This thesis explored three new factors which influence the AC learning processes. These factors are: (1) top managers' knowledge which influences the exploratory learning process, (2) top managers' intention towards using external knowledge which affects the transformative learning process, and (3) trust in middle managers which also influences the transformative learning process.

Finally, adopting qualitative study revealed the importance of individuals in the AC learning processes. The top managers' role decreases as the AC learning processes moves towards the exploitative learning process, while the middle managers' role increases. This thesis contributed to the knowledge by showing the role of top and middle managers changes as the AC learning processes moves from the exploratory to transformative learning and from the transformative to exploitative learning.

8.3.2 Contributions to Practice

This study contributes to practice by providing some valuable suggestions for managers who aim to adopt innovations. Managerial learning processes have the obvious potential to increase and sustain proactive organisational innovation. Organisations invest more in their AC due to increasing the use of external knowledge for innovation and tighter competition. The benefits of AC rely on managing the exploratory, transformative, and exploitative learning processes effectively. The challenge for managers is that the nature of each of these learning processes is different. Investigating the role of top and middle managers enables this study to reach a solid understanding of the management of these processes.

The first lesson that can be drawn from this study refers to the role of managers in creating a learning environment to facilitate the exploratory learning process for innovation. In this respect, the top managers should communicate continually the importance of innovation and knowledge to their employees. They should provide a safe environment for their employees to share their new ideas and knowledge with each other in order to reach a reliable decision. According to our empirical data, developing the learning environment also depends on the commitment of the top managers to support learning. Investment in training and R&D activities are valuable ways of encouraging the employees to enhance their knowledge. The R&D department plays a key role in valuing and acquiring external knowledge for innovation because the development of new products starts from here. Therefore, increasing the abilities of R&D employees is important. Another way is to provide facilities such as the internet and scientific publications. Increasing the employees' knowledge enhances the potential of organisations to value new external knowledge and initiate new products, as the empirical data suggested. This helps organisations to involve their employees in searching for new products and external knowledge. Moreover, increasing cooperation with research institutions, particularly universities, and international companies enables organisations to familiarise themselves with different types of products.

The empirical evidence shows the importance of middle managers' intention for facilitating the transformative learning process. External knowledge may be changed or modified during this learning process in order to combine it with the organisational knowledge, as explained in Chapter 3 and observed in the empirical

data. The top managers, by trusting their middle managers and giving them freedom, can increase their engagement to modify or change the external knowledge. This motivates the middle managers to use knowledge for innovation which increases their intention to transfer this knowledge. Moreover, developing a learning and teaching culture positively influences the flow of knowledge within and between departments across organisations. The other factors which facilitate the knowledge flow refer to the cooperation between the R&D and production departments. Close relationships between the middle managers and having information about new products encourage dissemination of new knowledge. Investment in IT facilities for recording and sharing information ease the communication across the organisation by allowing authorised employees to access the required information faster. These facilities also allow organisations to record any problems and their solutions for future use.

Unlike the exploratory and transformative learning processes, the exploitative learning process requires control and following certain rules and procedures. The exploitative learning process can also benefit from IT Investment. IT facilities enable managers to design and control work procedures because they can record activities and organise their information effectively. Managers therefore should value documentation because it helps organisations to ensure that the organisational knowledge is used.

8.4 Limitations and Directions for Future Research

This thesis provides an insightful vision about the way firms can accomplish their AC learning processes for innovation. However, this thesis like other research has some limitations which worth to explore by future researchers.

The first limitation is that this thesis collected data from pharmaceutical industry where R&D plays a key role in innovation (Pavitt, 1984). It is argued that the determinants of AC in low- and medium-technology industries are different because these industries rely less on R&D activities (Santamaría et al., 2009). Innovation is less to do with the R&D department in low- and medium-technology industry (Spithoven et al., 2011). Consequently, the AC learning processes for innovation may be different in these industries. Differences in the AC learning processes may require different managerial practices than high-tech industries. Therefore, this thesis

suggests that a future research revises its conceptual model in low- and medium-technology industry.

Second, some propositions inducted from data. Conducting a deductive approach is worth to carry out. Conducting survey will allow checking the validity of this thesis propositions. This surely leads to a better development of AC theory because deductive approaches are more suitable for testing a theory.

Third, this thesis considered a single learning project and proposed a linear conceptual model. This model is acceptable if organisations carry out a single project at a time (Sun and Anderson, 2012). However, in reality organisations conducted multiple learning projects and these projects may be at different stages of learning. Future research can identify organisational conditions and mechanisms for understanding how organisations manage their multiple learning projects successfully.

Finally, our research recommends that future studies to pay more attention to managerial factors which influence the AC learning processes for innovation. Damanpour and Schneider (2009) show that there is a direct and moderating relationship exist between managers' characteristics and innovation in public sector. Education and managers' pro-innovation attitudes have a direct influence on innovation adoption, while age and managers' tenure have an inverted-U shaped relationship with innovation adoption. Gender, managers' tenure, education, and managers' pro-innovation attitudes moderate the relationship between innovation complexity and innovation adoption. This thesis showed that the AC learning processes influence the process of innovation adoption. This was also explored that top and middle managers influence the AC learning processes. However, top and middle managers' characteristics and demographical factors such as age, gender, and education were not considered in this thesis. Accordingly, one stream for future research is to explore the relationship between top and middle managers characteristics and the AC learning processes.

8.5 Conclusion

This thesis researched the AC learning processes by synthesising it with leadership styles and innovation. The results supported the conceptual model. Moreover, further factors, which influence AC learning processes, were also explored. By validating its conceptual model, this thesis achieved its objectives including identifying gaps in the

literature, developing a conceptual model, collecting and analysing data, and revising the conceptual model. A summary of this thesis was provided in this chapter to provide a summary on how these objectives achieved. Theatrical and empirical contributions of this thesis were given in this chapter. Explaining the contribution highlighted the insightful outcomes of this thesis in fulfilling the research gaps. This chapter were concluded by explain the limitations of this thesis and proposing future research.

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Appendices

Appendix A: Interview Protocol

Code: **Interview guide** **The influence of leadership styles on using AC for product innovation**			
Interviewee name		**Email/Phone**	
Organisation/Department		**Job title**	
Date/Time		**Place**	

Interview opening:

- Thank the interviewees for their participation
- Explain the research purpose and its importance to the participants
- Describe the ethical issues
- Ask if it is OK to record the interviews

Section A	**Background**

- How long have you worked for this company?

- What is your position?

- What is your level of education?

- Can you explain your role in innovation activities?

Section B	Overview of product innovation

- What is the importance of product innovation in your organisation?

- How is product innovation conducted in your organisation?

- Which departments engage directly in innovation activities? How do these departments contribute to innovation activities?

- How does your organisation decide to innovate products?

Section C	Importance of external knowledge for product innovation

- How is it important for your company to use other firms' knowledge for innovating medicines?

- What type of knowledge does your organisation prefer to acquire?

- From where does your organisation access external knowledge (e.g., universities, international companies, seminars, etc.)?

- What types of contracts does your organisation have with other companies or research institutions (joint venture, licensing, joint R&D, etc.)?

Section D	Learning processes

- How does your organisation go after knowledge which resides outside its boundary?

- How does your organisation evaluate the usefulness of knowledge that resides in the external environment?

- How does your organisation ensure that the people understand the importance of newly acquired knowledge?

- How does your organisation utilise acquired knowledge?

- What challenges does your company face for utilising acquired knowledge?

- How does your company deal with such challenges?

- How does your organisation ensure the reuse of external knowledge?

Section E	Learning processes and leadership styles of top managers

- How do top managers facilitate valuing and acquiring knowledge which resides outside your organisation for product innovation?

- How do top managers facilitate common understanding of acquired knowledge?

- How do top managers ensure the reuse of acquired knowledge?

Section F	Learning processes and leadership styles of middle managers

- How do middle managers influence the process of valuing and acquiring knowledge which resides outside your organisation for product innovation?
    - Across departments
    - Within their departments

- How do middle managers influence common understanding of acquired knowledge?
    - Across departments
    - Within their departments

- How do middle managers ensure the reuse of acquired knowledge?
    - Across departments
    - Within their departments

Section G	Others

- Do you have further comments in regards to acquiring and using knowledge for innovating products in your organisation?

Section H	Interview closing

- Allow the interviewees to ask any questions that they may have regarding the interview
- Thank the interviewees for their participation

Appendix B: Informed Consent Form

Title of research: Learning Process Analysis of Absorptive Capacity on Organisational Innovation: The Influence of Leadership Styles

Researcher: Mohammad Rezaei Zadeh

Information Systems Evaluation and Integration Group (ISEing)

Brunel Business School, Brunel University, UK

Contact information: Mohammad.RezaeiZadeh@brunel.ac.uk

PARTICIPANT CONSENT FORM

I agree to take part in the above research. I have read the Participant Information Sheet, which is attached to this form. I understand what my role will be in this research, and all my questions have been answered to my satisfaction. I have been informed that the confidentiality of the information I provide will be safeguarded. I understand that I am free to withdraw from the research at any time, for any reason and without prejudice.

I have been provided with a copy of this form and the Participant Information Sheet. Data Protection: I agree to the University processing the personal data that I have supplied. I agree to the processing of such data for any purposes connected with the Research Project as outlined to me.

I permit the researcher to record the interview ☐ Yes ☐ No

Name and participant's signature …… Date……

Researcher's signature …… Date ……

Appendix C: Learning Processes Related to Innovation Adoption in Company One

The exploratory learning process related to innovation adoption

Codes	Empirical evidence
Clear strategic focus	*"Innovation does not mean that I start to produce a medicine which is being produced by five other companies. Rather it means that it should be number one and is being produced in Iran for the first time"*. (Respondent M1F1)
Motivation to use external knowledge sources	*"It is really important, especially those medicines which are introduced to us from foreign companies. Such medicines first need to solve one of the problems in the health area within our country and then it should be lucrative. This reduces the production time"*. (Respondent M1F1)
Prior knowledge of individuals	*"Since our CEO is a pharmacologist and teaches in the university, sometimes he will ask us to work on a particular medicine".*(Respondent M1QA3)
Openness towards external knowledge sources	"*One of the most important tools for initiating new medicines is the suggestion box. The top managers give rewards to those who share their creativity and opinion with others*". (Respondent M1M2)
Identification of new knowledge in external sources	"*There is a committee which suggests that there is a molecule and it is being sold in the international market at a certain cost".* (Respondent M1M2)
Acquisition of knowledge through various sources	*"Experts from different companies always visit the technical and formulation sections".* (Respondent M1F1)
Participatory decision making	*"In the committee, there is a financial manager, R&D manager, commercial manager, factory manager; each is responsible for reporting on their fields"*. (Respondent M1F1)

The transformative learning process related to innovation adoption

Codes	Empirical evidence
Team interaction and dialogue	*"Three batches are done in the presence of our personnel including production, packaging, and*

	quality control. If there are any questions, our personnel will be answered". (Respondent M1F1)
Adding new knowledge to the acquired knowledge	*"…if there are any problems during the three batches, the process may take up to four or five batches in order to know that it is fixed".* (Respondent M1F1)
Experimentation	"*Sometimes a product that is produced in a European company is not compatible with our facilities. The R&D sector wants to make the technology native".* (Respondent M1F1)
Social relationship within the organisation	"*R&D has to scale up in the pharmaceutical industry and teach staff on the production line".* (Respondent C1)
Achieving collective understanding of the acquired knowledge	*"Recently, we produced a product to control rejection of liver transplants so it caused the knowledge of the marketing and quality assurance staff to increase".* (Respondent C1)

The exploitative learning process related to innovation adoption

Codes	Empirical evidence
Converting innovative ideas into commercial application	"*There is a short- and long-term study for these batches. When we produce the products, we place them under severe conditions, meaning high temperature, high humidity, and we evaluate them during 3-6 months. If the product is intact in the given temperature, we will be sure that we have got the know-how*". (Respondent M1F1)
Launching innovation to the market	"*In order to produce the product, we start from A to reach B after repeating this stage two or three times. It is necessary to evaluate validity or credit. We have to use the same method to be sure that it will lead us to the correct result".* (Respondent M1QA3)
Formalisation of systems and processes	"*In every industry, we use some methods; we call them SOP*". (Respondent M1QA3)

Appendix D: Leadership Styles Related to the Learning Processes of AC in Company One

Top managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Idealised influence	Admiring and respecting in managers	"*Our CEO is a university professor and he is knowledgeable and a leading person in pharmacology. So he leads others towards this direction in order to produce new medicines or go into new fields*". (Respondent M1QA3)
Intellectual stimulation	Soliciting new ideas and creative solutions to problems from followers	"*We have faced it in the suggestion system and we try to have relationships with those who have key ideas by market research and get their opinions. Furthermore, much information is received through the suggestion box of the company*." (Respondent M1F1)
	Promoting employees' intelligence, knowledge and learning for being innovative	"*By his [CEO] thought, he wants to move all the sectors of the company towards this direction to obtain new information*." (Respondent M1QA3)
	The use of reasoning before taking action	"*Other managers also defend their action plans. It is possible for one manager to suggest some changes or ask to delete some parts of their colleague's action plans*." (Respondent C1)
	Encouraging followers to think in a new way	"*I give assignments to the employees who are in market research.*" (Respondent C1)
Inspirational motivation	Creating a common vision	"*So he leads others towards this direction in order to produce new medicines or go into new fields*." (Respondent M1QA3)
	Encouraging followers to envision an attractive future	"*Our CEO communicates the future direction of our company to those who engage in innovation activities, like the middle managers. He explains to us where we want to be in two years' time by considering our company's strategic plan.*" (Respondent M2RD1)
Individualised consideration	Creating new learning opportunities along with a	"*The co-workers are very interested in creating new ideas and the manager supports them*." (Respondent M1QA3)

	supportive climate	

Middle managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*In my unit, I always tell others that I do not know anything. We are all working in a group and we know everything together. I think it is very helpful. I try to explain the conditions for those who are working with each other*." (Respondent M1QA3)
	Allowing experimentation	"*Sometimes when there is a problem, the personnel try to solve the problem without asking me to help them but if we want to order them, it will not work*." (Respondent M1QA3)
	Avoiding public criticism of individual members' mistakes	"*Everybody makes mistakes and if I know that it was accidental, I try to speak with that person and maybe I do not talk directly about the mistake with him*". (Respondent M1QA3)
Inspirational motivation	Creating a common vision	"*...we communicate our objective with my employees in order to look for new external knowledge and medicines*." (Respondent M2RD1)
Individualised consideration	Creating new learning opportunities along with a supportive environment	"*When you do not use your followers' knowledge, you send them a message that we do not need your knowledge. This inhibits employees from increasing their knowledge*." (respondent M1M2)

Top managers' leadership style related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*One of the important things in our strategic plan is learning, we have a slogan in our company," you must learn and you must teach". It means that we should not be learner, we have to teach what we have learned to the others who do not know it and we try to develop this culture among staff*". (Respondent C1)
	Encouraging followers to	"*I think that the best thing is to trust on skillful people and give them authority. This causes*

	think in a new way	*middle managers from all sectors to think innovatively but using innovation is made by R&D council in which newly acquired knowledge modifies and transfers*". (Respondent C1)
	Promoting employees' intelligence, knowledge and learning for being innovative	"*The top managers act as coordinators here. They should allocate knowledge to each department based on their needs. Some knowledge is financial, market, and technical, which should be controlled by the top managers in order to make sure the activities related to such knowledge are going on.*" (Respondent M1QA3)
Inspirational motivation	Creating a common vision	"*The employees are aware of their interest; they should also be aware of the organisational interest and vision and they should not move against each other. The top managers, particularly the CEO, have to inform the personnel about the vision and encourage them to move towards it.*" (Respondent M1M2)
Individualised consideration	Considering individual differences	"*Sometimes people want to get respect, authority, financial sources, or knowledge promotion. So we tried to use the abilities and interests of people, meaning that we provide everything for our employees.*" (Respondent C1)
	Treating each follower as a respected individual	"*But in a recent event, which I have seen, employees cooperated closely together in a friendly environment. Sometimes they even worked till midnight. Sometimes they worked during weekends. This was an event in which the CEO directly, without anyone even telling him to give incentives to them, paid them some money in order to appreciate them*." (Respondent M1QA3)
	Building one-to-one relationships with his or her employees	"*However, a mutual relationship between him [CEO] and middle managers has been facilitated transferring knowledge*". (respondent M1QA3)
Management by expectation	Often-punish non-compliance	"*We want to have a new product and operative managers should deliver know-how from R&D during three batches and they will be punished if they do not do this based on three batches*". (Respondent C1)

Middle managers' leadership style related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*Look, R&D in the pharmaceutical industry is mainly responsible for scaling up a new medicine and train other people and production lines to use knowledge.*" (Respondent C1)
	Promoting employees' intelligence, knowledge and learning for being innovative	"*For example, as an expert, I feel that I have an opportunity to improve. If the knowledge of this group adds to my knowledge, it can be helpful. The most important element is that I feel increasing my knowledge helps the progression of the system.*" (Respondent M1M2)
Inspirational motivation	Creating a common vision	"*Sharing the vision among me and my followers helped us to support each other better and move towards our company's goals.*" (Respondent M1QA3)
Individualised consideration	Providing teaching and coaching	"*They should also explain to the subordinates where we are heading and encourage their followers to coordinate with the R&D department and the top managers.*" (Respondent M2RD1)
	Creating new learning opportunities along with a supportive climate	"*Yes, the employees should feel that they have to do the work. They feel valuable because of the responsibility. So I give them responsibility due to their abilities. I think responsibility is more suitable than tasks and duties, and people are encouraged to do work more accurately.*" (Respondent M1QA3)

Top managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Tracking progress in development of	"*When our goal is to produce a new product and we get a product with the desired quality, we will be sure that we have been running correctly. In many outputs, we return and*

	new products	*check the direction. We control the process and report to our CEO.*" (Respondent M1M2)
Contingent rewards	Clarifying expectations and offering recognition as the goals are achieved	"*We set different criteria for the employees. For example, we expect the people in R&D to be creative, while the employees on the production lines should do their routine tasks correctly. To encourage the employees on the production line to perform their tasks, we reward them financially*." (Respondent C1)

Middle managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Specifying the standards for compliance	"*All the processes are dependent on the SOPs. If there are no SOPs, there will be no quality control, no production, and no QA because all of them need the SOPs*". (Respondent M1F1)
	Tracking progress in development of new products	"*Keeping the quality is important. In the quality control sector, we just control the end product, raw materials, and some of the process. But in order to be sure about keeping quality control, we should use methods of quality guarantee.*" (Respondent M1QA3)
	Analysing and refining the traditional work processes	"*Every change in the main method, designing, and producing should be controlled.*" (Respondent C1)

Appendix E: The Learning Processes of AC Related to Innovation Adoption in Company Two

The exploratory learning process related to innovation adoption

Codes	Empirical evidence
Clear strategic focus	"*Inevitably, we need to have a progressive strategy. For having a progressive strategy must always be a part of top companies, which have updated technical knowledge, formulate new medicines, expand our production sections towards production of medicines which are progressive in the world. Company Two is a progressive company in principle.*" (Respondent C2)
Identification of new knowledge in external sources	"*We have a marketing section and since the marketing section has a wide outlook for the market, it continually assesses the competitors. It checks the market, lists, and identifies imported medicines. Myself, committee members, and board of directors of the company participate in international seminars in the world. We have a minimum of three CPhIs annually, where we are supplied with raw materials: one in India, one in China, and one in Europe. We participate in all of them and are informed of current information. The company have educated individuals in the section of research, where their job is searching for and attracting new information…. Other sections get their information from the Ministry of Health website*." (Respondent C2)
Openness towards external knowledge sources	"*One of the most important and good things we have available here is the discipline of recommendations.*" (Respondent F2M6)
Motivation to use external knowledge sources	"*But when we want to do a new thing on the production line or laboratory and we do not have any experience in it. We ask consultants in this field to help us.*" *(Respondent QA2M3)*
Acquisition of knowledge through various sources	"*We apply different methods until we attain the technical knowledge and make use of it*." (Respondent C1)
Prior knowledge of individuals	"*When I want to select something, first I make a review to see if the factory conditions are set up for it or essentially based on the scientific, expertise, facilities, financial*

	conditions that we have available, whether we could perform it or not." (Respondent C2)
Participatory decision making	"*They evaluate new knowledge to see whether or not it can be implemented. They also estimate the costs and benefits of implementing new knowledge. If our firm can implement new knowledge economically, then the managers operationalise such knowledge.*" (Respondent F2M6)

The transformative learning process related to innovation adoption

Codes	Empirical evidence
Maintaining and reactivating knowledge	"*When you have the experience which led to success, certainly you will follow and use the same experience to create new successes. The issue that I think is important and helps a lot is that, to register the successful experiences, study, review them and make use of the experiences in the following activities.*" (Respondent F2M6)
Experimentation	"*It happened many times that we purchased the technical knowledge from valid companies and after purchasing, we made it native through doing some tests until we figured out whether or not the made formula was appropriate for Iran's climate. We apply different methods until we attain the technical knowledge and make use of it*." (Respondent C2)
Team interaction and dialogue	"*In the product development, a new product goes to R&D; therefore, they do most of the research and the team defines the responsibilities among many related experts and the work is divided, and in the process the laboratory has an important duty to analyse the new formulation. Therefore, the final results will be available for production. In the production, special changes for scaling up are performed with the supervision of R&D. What I am trying to say is that the collected data in the R&D section gets finalised in the analysis and processes, which leads to new methods and standards.*" (Respondent F2M6)
Social relationship within the organisation (within and between	*But sometimes we have problems with the taste of new products; then we get external help. So the problem will be solved through a particular channel either through expert knowledge at universities or through the experience of individuals either internally in the company or externally*."

functions)	(Respondent PM2M5)
Decentralised structure – interactions and communication amongst members	"*Previously, there was a series of managerial layers for doing something in our organisation; with new technology, this process is changing rapidly and we have to think about how to manage it. A person sending a simple SMS anytime of the day or night could inform us about a new success or new phenomena.*" (Respondent C2)

The exploitative learning process related to innovation adoption

Codes	Empirical evidence
Launching innovation to the market	"*When we want to produce a medicine, we need to define some specifications and standards*." (Respondent M1RD2)
Formalisation of systems and processes	"*But once the setup is changed to an operation procedure, in fact it is registered, approved and signed, then from that point neither the laboratory nor the production interferes in the process. Meaning, we always go from A to Z under one specified direction and make no changes.*" (Respondent F2M6)

Appendix F: Leadership Styles Related to the Learning Processes of AC in Company Two

Top managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Idealised influence	Admiring and respecting in managers	"*As he is an educated person, he pays more attention to training and education and we have to work more to attract know-how and use it for innovation*." (Respondent QC2S1)
Intellectual stimulation	Supporting the collective process of organisational learning	"*He [the CEO] is an educated person; he pays more attention to training and education and we have to work more to attract know-how and use it for innovation*." (Respondent T2M2)
	Promoting employees' intelligence, knowledge and learning for being innovative	"*The top managers enhance the ability of the R&D employees to learn new knowledge by providing internet access and providing the required scientific books*." (Respondent F2M6)
	The use of reasoning before taking action	"*Therefore, all the information arranged as a questionnaire is sent to the managers to review the subject. The laboratory supervisor makes an assessment as to what the requirements are for the process and gives a recommendation; the same goes with R&D; all the collected information is sent to the managing director and, based on the available budgeting, the decision will be made*." (Respondent F2M6)
Inspirational motivation	Creating a common vision	"*I think, if you asked me 7-8 years ago, I would have said that there may be resistance to development. But now our organisational culture accepts changes*." (Respondent F2M6)
	Encouraging followers to envision an	"*Well, if it is specified for us what our goals are, then we could plan a direction to achieve those goals.*" (Respondent

	attractive future	F2M6)
	Paying attention to effective communication and sharing values	"*He [the CEO] makes the most speeches in the training sessions to remind personnel how important this subject [searching for knowledge] is*." (Respondent F2M6)
Individualised consideration	Creating new learning opportunities along with a supportive climate	"*We have an IT system connected to the internet. We set up these facilities to search for new medicine continually. We purchase all the related publications a month after they're published and make them accessible to our colleague*." (Respondent C2)

Middle managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*We also give them a subject based on their type of work to research on and transfer that knowledge to colleagues*." (Respondent M1RD2)
Inspirational motivation	Motivating followers by providing meaning and challenges to their work	"*The middle managers enable searching for and acquiring external knowledge by motivating their employees and training. … The most important issue is training and providing motivation. They also give freedom to their employees in their responsibilities to search for knowledge*." (Respondent PM2M5)
Individualised consideration	Proving coaching and teaching	"*The middle managers are experts and have experience in order to guide their subordinates*." (Respondent M1C2)
	Creating new learning opportunities along with a supportive climate	"*For our personnel, sometimes I do the training, sometimes we are allowed to use special training courses at the company's expense.*" (Respondent M1RD2)

Appendix F: Leadership Styles Related to the Learning Processes of AC in Company Two

Top managers' leadership styles related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*So I think their [top managers] view is very important so that they should trust me, give opportunities and equipment to me to see whether or not I can cope with it.*" (Respondent PM2M5)
Inspirational motivation	Creating a common vision	"*Therefore, our capabilities depend on how much we can cooperate with each other. We tried to make a good culture in Company Two, a culture along with love, interest and cooperation, and in my belief, I see the company as one of the most successful companies in the country.*" (Respondent C2)
	Paying attention to effective communication and sharing values	"*Previously, there was a series of managerial layers for doing something in the organisation; with new technology, this process is changing rapidly and we have to think about how to manage it. A person sending a simple SMS anytime of the day or night could inform you about a new success or new phenomena.*" (Respondent C2)
	Encouraging followers to envision an attractive future	"*At the end of last year, by the request of the managing director, a number of meetings were held where all the units came together and compiled their own strategy, and if they could, define the general strategy for the company. We as well as other units presented our opinions. All the information was propagated throughout the company and the company's strategy was specified*." (Respondent IE1M2)
Individualised consideration	Building one-to-one relationships with his or her employees	"*Meeting with different middle managers can be really helpful. Moreover, I think if they can improve empathy in their relationship, this will increase cooperation between them*." (Respondent P1M2-NRF)
Management by	Specifying the standards for	"*Sometimes some units cannot or do not want to cooperate; then they are assigned*

expectation	compliance	*to perform them*." (Respondent T2M2)

Middle managers' leadership style related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*Because the managers are familiar with the work, they can explain to their employees what problems this knowledge can solve. This motivates the employees to value the knowledge quicker*." (Respondent F2M6)
	Promoting employees' intelligence, knowledge and learning for being innovative	"*I mean that I translate for subordinates the information the top manager gives me. In general, they are doing the main work and are in direct contact with the systems*". (Respondent SG4S2)
Inspirational motivation	Creating a common vision	"*Middle managers communicate our company's vision to their employees. … Our work is teamwork. Therefore, each of us plays a role in order to get from A to Z. If the employees do not know the vision, the cooperation between them cannot be easily developed*." (Respondent F4M6)
Individualised consideration	Proving coaching and teaching	"*Well, our knowledge is dependent on the individuals who work there [R&D department]. There are university scholars who are working in our R&D department and are very knowledgeable and train the personnel to perform their tasks as experts*." (Respondent T2M2)
	Considering individual differences	"*The other one is that the middle managers can see training and transfer their knowledge according to the employees' characteristics.*" (Respondent T2M2)

Top managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Tracking progress in development of new products	"*He [the CEO] controls all the departments indirectly and checks them and asks for results*." (Respondent M1C2)
Contingent rewards	Clarifying expectations and offering recognition as the goals are achieved	"*Monetary rewards are one method that top managers do here for motivating employees to reuse knowledge. I think it is the most effective approach*". (Respondent P1M4-NRF)

Middle managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Tracking progress in development of new products	"*These things are related to the quality sections [QA and QC]. In fact, they are under the control of our quality assistants. They hold some meetings and some evaluations will be done by this section in order to see to what extent these standards are considered in the organisation*." (Respondent QC2M1)
	Specifying the standards for compliance	"*Obviously, everything is performed based on the documentation. Every process from purchasing to manufacturing and lab testing is performed based on certain documents, which are a major part of the operation.*" (Respondent PM2M5)
	Analysing and refining the traditional work processes	"*These things are related to the quality sections [QA and QC]. In fact, they are under the control of our quality assistants. They hold some meetings and some evaluations will be done by this section in order to see to what extent these standards are considered in the organisation*."

		(Respondent QC2M1)

Appendix G: The Learning Processes of AC Related to Innovation Adoption in Company Three

The exploratory learning process related to innovation adoption

Codes	Empirical evidence
Clear strategic focus	"*Our goal is to have distinction in our products. With respect to this distinction, our company has achieved faster innovative return on investment in the market*." (Respondent M2F3)
Openness towards external knowledge sources	"*New knowledge, which is very important, since it is an industry in which one should be updated constantly; every day something new is added*." (Respondent M5P3)
Identification of new knowledge in external sources	"*We have representatives in most of the domestic and foreign seminars because we have to be aware of today's science in order to make true decisions about the innovation and production of our products*." (Respondent M3D3)
Acquisition of knowledge through various sources	"*The experience of other companies shows its positive effect. For example, our injection systems are under a licence from an European Company.*" (Respondent M4T3)
Motivation to use external knowledge sources	"*We sustain a loss if we want to cut off the communication between universities and the industry. But from the university scholars who have reached a specific formula, we buy it and make it economical and somehow make use of outsourcing.*" (Respondent M2F3)
Prior knowledge of individuals	"*In general, the CEO [respondent C3] performs a knowledge search with the aforesaid network and after that, with respect to the information gained from the market section, decides what knowledge to enter into the system.*" (Respondent M2F3)
Participatory decision making	"*Financial and human resources are also essential for choosing a new medicine to develop. We have to evaluate the capabilities and the space to see whether there is enough room for doing this project in the factory*." (Respondent M3D3)

The transformative learning process related to innovation adoption

Codes	Empirical evidence
Experimentation	"*In R&D, the formulation becomes ready; trial and error is done in this section on a new experimental method. Then, the final product will be examined and its flaws will be removed*." (Respondent M6QA3)
Adding new knowledge to the acquired knowledge	"*If the production wants to produce, then R&D works on the formula to get the licence, tests a batch of the product; once the licence is obtained, then the production begins its work. Maybe during production some issues show themselves and changes are required*." (Respondent M5P3)
Achieving collective understanding of the acquired knowledge	"*We have made it feasible in the pilot plan and in fact the individuals involved in that are informed but all aspects of that knowledge are limited to a series of key individuals*." (Respondent MQ1C3)
Social relationship within the organisation (within and between functions)	"*If the production wants to produce, then R&D works on the formula to get the licence, tests a batch of the product; once the licence is obtained, then the production begins its work. Maybe during production some issues show themselves and changes are required*." (Respondent M5P3)
Team interaction and dialogue	"*We have made it feasible in the pilot plan and in fact the individuals involved in that are informed but all aspects of that knowledge are limited to a series of key individuals*." (Respondent MQ1C3)

The exploitative learning process related to innovation adoption

Codes	Empirical evidence
Launching innovation to the market	"*We have some standards such as GMP. GMP discusses how to make quantitative medicine. The quality should always be certain for selling the medicines in the market*." (Respondent M1RD3)
Formalisation of systems and processes	"*All of the products should be documented. It should be noted that the framework of R&D has been defined and should be up-to-date. People should know about its structure and it must be documented so that in future the person who replaces me knows what to do. It should not be dependent on people and it is very important*." (Respondent M1RD3)

Appendix H: Leadership Styles Related to the Learning Processes of AC in Company Three

Top managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Idealised influence	Admiring and respecting in managers	"*I trust the knowledge and education of the CEOs. I should say that the CEOs have interesting ideas for product innovation. I always told them that our department works productively on innovating products and my knowledge has been improved under their leadership*." (Respondent M1RD3)
Intellectual stimulation	The use of reasoning before taking action	"*Even though the decision-making is performed at the top, the information for this decision-making comes from the bottom level: recognition, production problems, market needs and so on*." (Respondent C3-2)
	Soliciting new ideas and creative solutions to problems from followers	"*A friendly environment in an aggregate causes us to speak and to give ideas more freely and exchange the ideas with respect. Meaning, not to put his personality under question and second, to keep the environment open, which is to have the brainstorming. We also consider that various ideas might exist and the ideas must be refined and be implemented*." (Respondent C3-2)
	Supporting the collective process of organisational learning	"*Naturally, everyone is given authority in his domain. But our effort is to keep the door open for ideas and their acceptance. We cooperate in this context so that the work is performed as collective wisdom and our beliefs are based on the fact that no one has more intellect than the collective*." (Respondent C3-2)
Inspirational motivation	Creating a common vision	"*Therefore, to value and acquire knowledge and make use of it, everyone must be involved. At least the managers who need to have this information and*

		work towards it. To achieve this, we emphasis on developing a shared vision inside our company. We try to make this clear with middle manager and leave the rest of decision making to them." (Respondent C3-2)
Individualised consideration	Creating new learning opportunities along with a supportive climate	"*We have a network that was developed by the CEOs, which works with expert individuals with various intentions. These individuals are either university scholars or experts who work at other companies. They receive a salary from us to transfer new information that the company can use economically. Then, the knowledge is introduced to the company through these individuals and then the company tries to make use of its economical aspects*." (Respondent M2F3)

Middle managers' leadership style related to the exploratory learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Encouraging followers to think in a new way	"*Nearly in the same system, if there is an idea from a brainstorming, the transference of this idea is the task of the middle managers*." (Respondent C3-2)
Inspirational motivation	Motivating followers by providing meaning and challenges to their work	"*The middle managers could motivate the lower forces to some extent, to give value to this innovation's creativity.*" (Respondent M2F3)
Individualised consideration	Building one-to-one relationships with his or her employees	"*Another thing is to be so close to his manpower under his command such that, even if a simple worker has a new idea, to receive that idea and not to ignore it because of their higher ranking. This makes the worker feel proud and not feel that they're being neglected; therefore, this increases the creativity of the personnel*." (Respondent M2F3)

Top managers' leadership styles related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Allowing experimentation	"*Naturally, when we keep the solutions open, the middle managers have a major role. I do believe that going from A to B could be performed using many methods but the decision is on them*." (Respondent C3-2)
Inspirational motivation	Creating a common vision	"*For example, the programme of the company is such that, by the year 2012, to be the first in Iran in terms of the basket of products, volume of sales and credit. We try to arrange the activities, to move towards pre-defined goals. Then every day those goals must be reminded until the result is obtained. Therefore, to realise all the discussed goals, everyone must be involved. At least the managers, who need to have this information and work towards it. If we hide the goals such that the aggregate cannot move in that direction, we try to make this clear with the middle manager and leave the rest of the decision-making to them*." (Respondent C3-2)
Individualised consideration	Considering individual differences	"*Now some systems realise that the individuals who have key roles in fact need to have all knowledge, so in the case of a problem, have the power of manoeuvrability. Recognition of what types of individuals must know the knowledge is very important*." (Respondent MQ1C3)
Management by expectation	Tracking progress in development of new products	"*Our role in the middle of all this could be going along with these groups and controlling them and getting to a conclusion as a group*." (Respondent C3-2)

Appendix F: Leadership styles related to the learning processes of AC in Company Two

Middle managers' leadership style related to the transformative learning process

Category	Codes	Empirical evidence
Intellectual stimulation	Supporting the collective process of organisational learning	"*To attain the goals, the middle manager must transfer the knowledge correctly for it to be used correctly. They explain new knowledge to the lower forces so that they support their efforts. If there is no such support, there is no result for the company, even if the top manager has the best ideas*." (Respondent M2F3)
Inspirational motivation	Encouraging followers to envision an attractive future	"*Our company progressed very quickly. This ensured our employees that the company has a good future and they can work here with peace of mind. The middle managers communicate the success of the company to our employees, which encourages them to work harder*." (Respondent S2-3)
Individualised consideration	Considering individual differences	"*Sometimes some personnel are not able to use knowledge. So we refer it to the person who can use it properly*." (Respondent M6QA3)

Top managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Tracking progress in development of new products	"*Sometimes the top manager is too busy to engage in lower-level activities and he has to get information from some consultants in the company. Sometimes he can monitor and evaluate everything periodically. The manager gives some information to the system and expects feedback from it*." (Respondent M4T3)
Contingent	Clarifying	"*The middle managers could simply*

rewards	expectations and offering recognition as the goals are achieved	*make requests of the top managers. The middle managers notice that their employees are performing good work; they could request a reward for their employees, and usually they do so*." (Respondent M5P3)

Middle managers' leadership style related to the exploitative learning process

Category	Codes	Empirical evidence
Management by expectation	Specifying the standards for compliance	"*In fact the documentation of the entire process could be evidence that all the things are being implemented*." (Respondent MQ1C3)
	Tracking progress in development of new products	"*I think controlling and checking are very effective. If there is no control, the subordinates may evade the work. So we have to see whether they are doing their work correctly or not*." (Respondent M6QA3)