Master Thesis in Engineering

Role of Organizational Structures: Balancing Exploitation and Exploration

- Qualitative Study of Korean Petroleum Firms -

February 2017

Graduate School of Seoul National University

Technology Management, Economics, and Policy Program

James Jihwan Jung

Role of Organizational Structures: Balancing Exploitation and Exploration

- Qualitative Study of Korean Petroleum Firms -

지도교수 강진아

이 논문을 공학석사학위 논문으로 제출함

2017 년 2 월

서울대학교 대학원

협동과정 기술경영경제정책 전공

정지환

정지환의 공학석사학위 논문을 인준함

2017 년 2 월

위 원 장 _____(인)

부위원장 _____(인)

위 원 _____(인)

Abstract

Under this dynamic environment, firms are faced with the need to make changes to adapt and enhance their competitive position. However, extreme difficulties exist to cope with such environments through internal knowledge capabilities, thus, firms need to learn how to absorb external knowledge and resources while leading to the decisions on whether to exploit exiting knowledge and capabilities or explore new ones. While previous literatures have heavily focused on the tension based on firm-level or subunit-level analysis, it has yet to understand how organizational structure (i.e., organizational unit-level) is able to manage the balance of exploration and exploitation. This research begins differentiating organizational structure into different dimensions. I purpose that the characteristics of the structural dimensions balance exploitation and exploration differently specifically within attribute domain (i.e., size and industry focus) as organizations possess different attributes. Three propositions were developed based on the relationship of the firm's organizational structure and organizational learning. Qualitative analysis of three firms engaged in the Korean petroleum industry was conducted in order to confirm whether the propositions appeared in the industry. Three firms are analyzed based on a ten year timeframe (2005~2015). Through qualitative research methodology based on observations of collected data, I compare different structural dimensions and how the characteristics influence organizational learning. As a result, I found evidence which firms associated with centralization were engaged with

exploitation within the attribute domain, and firm associated with structural complexity were engaged with exploration within the attribute domain. Finally, firm consisting both characteristics were able to balance exploitation and exploration within the attribute domain.

Keywords: Organizational Structure; Centralization; Structural Complexity; Exploitation; Exploration; Ambidexterity

Student Number: 2015-21198

Contents

List of Tables

List of Figures

Chapter 1. Introduction

Organizations are constantly confronted with impediments and challenges due to the rapidly changing environment resulted from technological discontinuities or radical innovations (Henderson & Clark 1990; Bower & Christensen 1996). As it is difficult to correspond to these environmental changes through internal knowledge capabilities, it is vital for organizations to learn on how to absorb external knowledge and resources (Tushman & Anderson 1986). Organizations are faced with decisions either to exploit existing competence or explore new ones. Exploration implies behaviors characterized by innovation, invention, experimentation, flexibility, discovery, while exploitation implies behaviors characterized by improvements, refinements, efficiency (March 1991).

The notion of exploration and exploitation has been one of the core topics in management literature. Several literatures have argued that the fundamental difference creates tension between exploration and exploitation while others further argue that organizations need to be ambidextrous which requires both exploration and exploitation to manage the tension created by the competitive and dynamic environment (Lavie & Rosenkopf 2006; Lavie et al. 2010; Raisch et al. 2009). As all organizations possess a certain organizational structure (Dalton et al. 1980), how do different organizational structures balance exploitation and exploration?

Previous research has shown that exploration and exploitation require different structures and strategies that have different influences on adaptation and performance.

Some scholars argue that decentralization and separation of small units enable to balance exploitation and exploration (Tushman & O'Reilly 1996) while others argue that providing the freedom and flexibility for individuals to participate in alignment and explorative activities enable to balance exploitation and exploration (Gibson & Birkinshaw 2004; Brown & Eisenhardt 1997). While the importance of balancing the explorations and exploitation within an organizational level or unit level has been highlighted in various literatures, there is little understanding as to how characteristics of the organizational unit-level (i.e., organizational structures) are able to balance exploration and exploitation through the their structural context.

An organizational structure plays an enduring role in coordinating and controlling functional activities while being composed as different structural dimensions (e.g., complexity, formalization, centralization) based on subunit size, span of control and administrative processes (Aldrich & Herker 1977; Hage & Aiken 1967; Fredrickson 1986; Dalton et al. 1980). As Dalton (1980) indicates, different structural components do not determine behavior of the organization structure, but rather provides framework in which the behaviors occurs. Structural complexity and centralization entails the behavior of the organization structure (Dalton et al. 1980; Miller 1987).

This paper examines each of the characteristics of the structural dimensions and how it is able to moderate the balance of exploitation and exploration within the attribute domain. Partner selection depends on the difference in organizational attributes among the different partners (Lavie et al. 2010). First, centralized organizations are associated

with centralized decisions-making processes by a select few (Fredrickson 1986). All decisions are integrated due to the decisions-makers intimate knowledge of the daily operations while the decisions are based solely on his or her preference or interest (Dalton et al. 1980). However, centralization is particularly effective when the environment is stable. Decision-maker face cognitive limitation in face of dynamic environments with requires diversified knowledge and capabilities (Fredrickson 1986). The first proposition proposes that organizations with centralized structures are likely to be engaged with exploitation within the attribute domain. Secondly, structural complexity consist wide range of occupations with different specialists. Specialists are able to provide diversified knowledge and expertise which is essential for adapting to the hostile environment. Despite the inter-stratum conflicts, the diversified knowledge and expertise are able to identify different opportunities within the environment while providing problem solving innovation (Kimberly & Evanisko 1981). Thus, the second proposition proposes that organizations with structural complexity are likely to be engaged with exploration within the attribute domain. Lastly, both structural dimensions consist conflicting, yet, synergetic characteristics. While structural complexity provides different knowledge and expertise, the centralized decision-making process is able to implement the decisions collectively and rapidly. Hence, the third proposition proposes centralized decision-making process with a structural complexity is likely to balance exploitation and exploration within the attribute domain.

I have conducted a qualitative study based on 3 different Korean petroleum firms

between 2005 and 2015. This period was carefully chosen due to number of highly visible corporate-level strategic changes based exploration and exploitation. Observation of collected data and various reports were used to analyze the exploitative and explorative behavior based on three different structural dimensions. The analysis shows how different structural dimensions pursue exploitation and exploration. In conclusion, organizations with centralized structure have shown to be associated with exploitation while structurally complex organization has shown to be associated with exploration. Lastly, organization with centralized decision-making process and structural complexity has shown to balance exploration and exploitation. Overall, it has shown support for all three propositions.

Several contributions can be made. First, the unit of analysis has been based on a firm-level or a unit-level with less focus on the organizational unit-level. While organizations consists various functional activities, organizational structures are able to provide a foundation in coordinating and controlling different activities of the different units. Hence, different structural dimensions directly influence whether to exploit existing knowledge and capabilities or to explore new alternative. It is able to make contributions to the topic of organizational structure and ambidexterity. Secondly, provide implications as to how different structural dimensions are able to cope with the external environment while contributing to the development of research on organizational structure and organization behavior. Different organizations will be able to refer this research and develop strategies to balance exploitation and exploration based on the organizational

structure to cope with the changing environment.

Chapter 2. Review and Theoretical Background

2.1 Organizational Learning Activities

As competition increases within the environment, it accelerates the need for change (Floyd & Lane 2000). Central concerns arise for different organizations to make decisions on how much to invest in different activities. More accurately, organizations need to learn to correspond to the competitive and changing environment. Organizations need to learn how to adsorb (i.e., organizational learning) external knowledge sources because it is difficult for organizations to respond to the environment only with internal knowledge and capabilities (Tushman & Anderson 1986). Environmental shifts either destroy or enhance organizational competence, where organizations are forced to either exploit existing competence or explore alternatives (March 1991).

The differentiation of two learning activities divides the attention and resources between exploration and exploitation. Based on March's (1991) framework, explorative behavior is characterized as "variation, risk taking, experimentation, play, flexibility, discovery, innovation" while exploitation is characterized as "refinement, choice, production, efficiency, selection, implementation, execution." (March 1991, p.71)

Exploitation of existing resource and capabilities are less likely to lead to different experimentations with new alternatives while exploration of new ideas, knowledge and technologies are likely to reduce the enhancement of existing ones. Based on Rosenkopf

and Nerkar (2001), Sony and Philips are prime examples for exploitation that builds upon existing competence. The original CD standard has not been modified and the core competence for both companies remained the same. The new devices were developed only as a supplement around its original CD standard (Rosenkopf & Nerkar 2001).

Conversely, searching for new alternatives is highly uncertain and unpredictable while proximity and feedback enables exploitation to be more stable and predictable (March 1991). Exploration has uncertain outcomes based upon distance search beyond the boundary of the organization which anticipates long-term performance rather than short-term performance. For example, the storage of a CD has brought strong limitations as they are only able to store 680 MB. However, DVD was introduced that can store up to 17 MB which was based on exploration of new production methods while dramatically departing from existing ones (Rosenkopf & Almeida 2003).

Further, studies begin to show the relationships between organizational forms highlighting different types. Different organizational forms engage in exploration and exploitation differently, where certain forms are more suitable than the others. While exploration and exploitation is distinguished within the organizational boundaries, others scholars begin to highlight the inter-firm relationships. In particular, Lavie and Rosekopf (2001) focuses three domains in alliance formation which includes function, structure and attribute of exploration-exploitation. Functional domain is based upon the value chain while structure and attribute domains are based upon network positions (i.e., direct and indirect ties) and organizational attributes (Lavie & Rosenkopf 2006). There are many

different forms on how exploration and exploitation is told and the difference of the two activities derives from several attributes which includes scarce resources, organizational inertia, and anticipated outcomes and performance.

2.1.1 Distinction and Tension between Exploitation and Exploration

Building on March's (1991) framework, the distinction of exploration and exploitation has been a key aspect in several management literatures. When organizations are engaged with exploration, there is a high probability to constantly search, explore and experiment without any definite returns. Alternatively, when organizations are engaged with exploitation, there is a high probability for organizations to be confined in a "suboptimal stable equilibria" (March 1991; Gibson & Birkinshaw 2004, p.212) or "competency traps" (Levitt & March 1988). Based on these two distinctive characteristics, tension between exploration and exploitation is created.

On one side, the adaption to the existing environment brings strong internal and external inertial pressures that prohibit organizations to adapt to environment changes and future opportunities (Hannan & Freeman 1984). Internally, there are several forms of sunk cost that have been incur without the possibility to retrieve it while externally, there are several legal and legitimacy issues that may bring devastating outcomes for the organizations (Hannan & Freeman 1984). On the other side, experimentation of alternatives prohibits organizations to enhance and refine existing competency. As

exploration is associated with high uncertainty which is “more variables and distant in time”, it creates high fluctuation in the performances (He & Wong 2004, p.481).

The tension between exploitation and exploration created by the trade-offs brings the dynamics of exploitation and explorations. Exploitation continues to focus on current resource and capabilities that enables an organization to seek enhancement, improvements and efficiency. It only brings incremental departure from existing competence or trajectory that enables incremental innovation. Exploration continues to focus on new resource and capabilities that enables an organization to seek experimentation suitable for radical departures and innovations (Gibson & Birkinshaw 2004; He & Wong 2004).

The self-reinforcement of organizational learning enables an organization to continuously maintain its focus despite environmental changes while transforming core-capabilities to core-rigidities. In other words, the result of excess exploitation that causes organizational myopia and spiral of competency trap (March 1991; Levinthal & March 1998). In order to overcome this, organizations need to explore new resources and capabilities beyond the boundary of the organization. Fundamentally, a difference in logic creates tension due to scarce resource and as a result, organizations need to manage the trade-offs created by the tension between exploitation and exploration.

2.1.2 Balancing of Exploitation and Exploration

Several literatures have highlighted the distinction and tensions between exploration

and exploitation. Levinthal and March (1993) argues that "conspicuous success in highly competitive situations is not closely related to either experience or knowledge as conventionally defined. Establishing preeminence involves exploration. Exploration is, on average, unfruitful, but it is the only way to finish first" (Levinthal & March 1998, p.107). In other words, organizations need to be engage in appropriate amount of both exploration and exploration to sustain existing and imminent viability (Levinthal & March 1998). Further, Raisch and Birkinshaw (2008) argue that the key aspect for long-term survival of organizations is having the "ability to be aligned and efficient in its management of today's business demands while simultaneously being adaptive to changes in the environment (Raisch & Birkinshaw 2008, p.375). Balancing exploration and exploitation are primary factors to enhance the competitive advantage of an organization (Gibson & Birkinshaw 2004)

The balance (i.e., ambidexterity) between exploration and exploitation has been further conceptualized by Tushman and O'Reilly's (1996) with the underlying question on how some organizations are able achieve sustainable competitive advantage within the dynamic environment while others face extreme difficulties. This was evident in the largest U.S. manufacturing organization in the 20th century, where majority of organizations failed to adapt while rapidly being replaced (Louçã & Mendonça 2002). Dominance in size and market share did not guarantee its survival or sustainability (Tushman & O'Reilly 1996). Despite high rate of failure, some organizations such as Zahner and Mergenthaler Linotype (Tripsas 1997) have survived more than 100 years

while overcoming several technological discontinuities.

“Ambidextrous” organizations maintain the ability to manage the tension created between exploration and exploitation while achieving overarching performances. Ambidexterity enables organizations to have the capabilities to compete in both established and emerging markets by simultaneously engaging in refining and enhancing existing competence while developing new ones (Raisch et al. 2009). This is also referred as “dynamic capabilities” which indicates that the organizations need to maintain a key role in adoption, integration and reconfiguration of organizational resources and capabilities to correspond to the dynamic environment (Eisenhardt & Martin 2000; Tushman & O’Reilly 1996). Katila and Ahuja (2002) further argues that exploration is able provide completely new set of resources and capabilities that enhance existing competence while exploitation is able combine existing resources that create new combinations to explore new resources and capabilities. The two concepts are inseparable while creating constant tensions which organization needs to manage in order to maintain its competitive advantage for survival.

There are various approaches in enhancing organizational capabilities which includes M&A, in-house development and joint venture. While an inter-firm relationship being an importance basis for competitive advantage, several literatures have highlighted the prominent role of strategic alliances including joint venture and M&A in the developing organizational capabilities (Siggelkow & Levinthal 2003; Brown & Eisenhardt 1997; Lavie et al. 2010). However, many of the literatures fail to understand how exploitation

and exploration is balanced through different inter-firm relationships (i.e., in clusters) (Lavie & Rosenkopf 2006; Lavie et al. 2010).

More recent literatures elaborate ideas based on inter-firm relationships (Lavie & Rosenkopf 2006). As firms compete for scarce resources and profitable niches, firms search for potential partnerships to enhance their competitive position within the market where selection of new partners emerge while old one are dropped (Bae 2012). Collaboration through partnership enables to facilitate learning through access of new knowledge that is located beyond the boundary of the firm or leveraging on existing ones (Lavie & Rosenkopf 2006).

While many forms of partnership exists, I focus on strategic alliances that have been vital in the development of capabilities and organizational learning (Bae 2012). I will discuss exploitation-exploration framework under strategic alliance. Based on Lavie and Rosekopf (2006), I focus on the attribute domain with an underlying the question on how the partner differ from the prior partner as different organization share different attributes (i.e., size and industry focus).

2.1.3 Ambidexterity and Organizational Structure

The concept of ambidexterity has been explored based on two perspectives. One side of research has put strong emphasis on differentiation of units that enables to balance exploitation and exploration. As the organizational capabilities are entrenched within the organizational structures, the division of tasks assigned to dispersed units is able to

achieve appropriate balance. In this case, separation of small organizational units through decentralization permits to engage in exploitation and exploration (Tushman & O'Reilly 1996). Subunits that are engage with explorative activities are smaller, flexible, and experimental while subunits that are engaged with exploitative activities are large and more focused on existing trajectories based on efficiency and incremental innovation. A clear distinction exists where Benner and Tushman (2003) argue that the "experimenting units are highly buffered from the exploiting units" (Benner and Tushman 2003 p.247). This was evident in the case for computer industry (i.e., Hard Disk Drive) where Christensen and Bower (1995) argue that establishment of small teams or organizations outside the mainstream business are critical in responding to technological shifts and market changes. The simple differentiation of the structural units is not important in facilitating the balance; however, it is the differentiation that enables an organization to reconfigure and reshuffle which creates new values. It is able to break from the past while creating new configurations that are able to match the changing environment. Hence, the differentiation of the organizational structure is able to help organization to maintain its mainstream business while capturing the inconsistent future demands that emerge from the new market.

Conversely, on the other side, exploitation and exploration activities are not differentiated through different units but rather balanced within the same unit (Gibson and Birkinshaw 2004). Eisenhardt (1997) have argued that combination of "limited structure (e.g, priorities, responsibilities) with extensive interaction and freedom to improvise"

different products within the same structural context establishes core capability to continuously pursue change (Brown & Eisenhardt 1997, p.3). While Gibson and Birkinshaw (2004) argue that within in the same business-unit level, ambidextrous organizations are able to maintain flexibility which enables individuals to make their own judgement on whether to engage in alignment or adaptive activities based on their own time constraints. Further, Lubatkin and colleagues (2006) observed that top management team (TMT) is able to facilitate such balance through processing various levels of demands.

In sum, previous studies have focused on either business-unit level or firm level while ignoring organizational unit-level. Organizations are integrated and linked with different parts while grouping key resources and interdependent functional activities. Organizational structures provide a platform that controls and coordinates the different functional activities based on distribution of task, resources and responsibilities among the different units (Dalton et al. 1980). Hence, different characteristics of structural dimensions can facilitate exploitation or exploration differently.

2.2 Organizational Structure and Structural Dimensions

Chandler (1962) made several key observations of the historical development of large industrial corporations such as DuPont and General Motors. These corporations has shown major growth in “unit, geographical dispersion and vertical and horizontal dispersion” (Fredrickson 1986, p.281) which has led to numerous changes within the

organizational structure. Diversifications became a standardized pattern for sustainable growth in the 1920s for large industrial corporations while leading to divisionalization (Thompson 1967).

The unitary form (U-form) (Williamson 1975) which was the traditional form faced extreme difficulties. The centrally administered (i.e., cost and profit centered) structure with a centralized decision-making process brought significant constraints in coordinating multiple activities because same resources are focused on same activities. Number and complexity in decisions required to operate multiple production lines overwhelmed the managers. Top managers were no longer involved in the development of future plans but rather heavily focused on operational decision-making processes (Chandler 1962). As a resulted, U-form, a vertically integrated structure, branches out to a multidivisional form (M-form), which allocates the budget and decisions-making authority to various divisional level (Argyres & Silverman 2004). M-form is able to assigns decisions to monitor and coordinate the operations to multiple divisions while long-term plans were developed as a whole. General office was able to facilitate such decisions and plans while providing a flow of information and specialized skills. The transition to M-form highlighted the notion that “structure follows strategy” (Chandler 1962, p.401) .

Organizations have developed into different dimensions based on different organizational goals, while the developing various management techniques facilitate cooperation between the between different mangers in different hierarchy level (Adler 2012). Various individual views diverge. As a result, the divergence embodies

ambivalence that is taken as a group of workers (Adler 2012) which is characterized by "brevity, fragmentation, and verbal communication" (Mintzberg 1990, p.163). This reduces conformity of goals amongst the different parts of the organization while continuous conflicts emerge that shapes the organizational life (Simon 2007).

To ensure conformity among managers, bureaucracy or a cooperative system is used as technique to coordinate the cooperative activities and collective workers. It comprises a formalized behavior based on "extensive formalized and standardized procedures, complex structures of specialized roles and departments, differentiated vertical hierarchy and centralized policy making, and substantial staff department" (Adler 2012, p.246).

Under such bureaucracy or a cooperative system, Mintzberg (1983) and Bae (2013) indicates that decisions-making authority can be either centralized or decentralized within an organization. As Weber (1986) highlights bureaucracy is based on written documents and scribes that provides a common communication vocabulary (i.e., codification and standardization) that objectifies collective memory into implementation. Hence, the degree of formalization and standardization is important structural dimension that controls "recalcitrant and unreliable labor" (Adler 2012, p.253). Underlying the importance of formalization and standardization, this paper focuses on two different bureaucratic structuring which includes centralization (i.e., hierarchy of authority) and structural complexity (i.e., specialization). Different structural dimensions are likely to affect the behavior of the members and performance differently.

2.2.1 Centralization

Organizations with high centralization implies that the decision-making authority is concentrated and exercised by a few top executives (Olson et al. 2005). Conversely, less degree of centralization indicates that decision-making authority is dispersed and shared among different individuals (Dalton et al. 1980). Hence, the degree of centralization specifies the decision-making process (Dalton et al. 1980; Fredrickson 1986).

Centralization implies a structure that tends to have clear distinguished roles and tasks (Olson et al. 2005; Dalton et al. 1980). This type of structure puts restrictions on individuals performing different tasks which makes the task repetitive and routine (Ruekert et al. 1985) while having less administrative supportive staff and no differentiation among the various units which provides a faster route for final approval (Olson et al. 2005). Although fewer innovative ideas are likely to exist within such structure, strategic decision-making process is faster because it is able to avoid political bargaining among different members (Cohen et al. 1972; Fredrickson 1986). Further, organizations with centralized structures are beneficial when the environment are stable and non-complex (Olson et al. 1995).

The simplicity of the structure enables the members of the organizations to be exposed to different problems and opportunities (Fredrickson 1986; Mintzberg 1978). Highly centralized organizations makes problems and opportunities highly visible and identifiable (Mintzberg 1978; Huy & Mintzberg 2003). However, problems and opportunities are likely to be unrecognized unless it is noticeable by a coalition of

members (Fredrickson 1986; Miller 1987; Kotter 2007). This is because the knowledge to make subsequent change and the decisions-making authority is concentrated to a few. This was evident in the case of Volkswagen. Under a strong leadership of former division chef of Opel, Heinrich Nordhoff, no strategic changes were made despite the changing environment (Mintzberg 1978). Profits were being squeezed by the competition while the original strategy remained unchanged. For 10 years, Volkswagen failed to be proactive in responding to different problems and opportunities which has led to a complete failure (Mintzberg 1978).

Centralized organization have an organizational structure that are highly coordinated and integrated based on a simple decision-making process; however, concentrated decision-making authority can either accelerate or put large constraints on the process itself. Without a strong coalition or a sense of urgency, implementation of a certain decision becomes extremely difficult while jeopardizing the future of the organization (Fredrickson 1986; Dalton et al. 1980; Mintzberg 1978).

2.2.2 Structural Complexity (i.e., Specialization)

Complex organizations have structures that are horizontally complex with highly differentiated units (Fredrickson 1986; Ruekert et al. 1985) and wide range of occupational specialist (Dalton et al. 1980). This is referred as “professional bureaucracy” (Mintzberg 1989) which is most commonly seen in universities and hospitals (Fredrickson 1986). Number of “specialists” exist who have substantial authority to direct

highly coordinated activities while determining the best approach of a certain task (Olson et al. 2005; Ruekert et al. 1985). As result, complex organizations broken down with additional layer of specialists who are to able coordinate and control dispersed tasks while decision-making authority and process is dispersed into different teams, subunits or divisions that enables different members to make their own decisions (Siggelkow & Levinthal 2003).

Level of complexity brings difficulties in coordinating and controlling different activities within the organization (Fredrickson 1986). This is commonly seen in organizations with wide range of products with diverse challenges rising from different needs and requirements (Ruekert et al. 1985). Conversely, the level of complexity also implies diversified specialties and greater knowledge about the customer's needs in the market (Tellis et al. 2009). As innovation require new knowledge, it is important to have an adopting sub-unit or a referent sub-unit of the organizations that could exploit such knowledge based on different expertise. Thus, the organizations that are highly complex are likely to possess proximate resource and capabilities that enables to exploit new knowledge, which are primary factors to survive and prosper (Gibson & Birkinshaw 2004).

When organizational structure consists an array of specialized sub-units interact with one another, it will create conflict of interests due to different orientations of individual goals and preferences (Miller 1987). As more people are involved in the strategic decision-making process, more perspectives and ideas need to be considered and

incorporated. In other words, the notion of complexity means that the strategic decisions are distributed and divided into smaller decisions and processes that lead up to a certain decisions (Mintzberg 1978). Diversified opinions are likely to create series of constraints during the strategic decision-making process (Fredrickson 1986). These process and decisions are constantly interrupted, blocked and delayed by several members. Further, this can also happen directly by decision-makers themselves as well, causing repeated costly delays.

Chapter 3. Proposition

3.1 Centralization and Organizational Learning

Centralized organizations imply that decision-making is concentrated to a selected few while decisions are made “only as a whole” which induces conformity of goal (Siggelkow & Levinthal 2003, p.651). Hence, centralization specifies the centralized degree of decision-making process. This type of structural dimension is not based on discussions or dialogues but rather designation or command centered based on a power structure (Miller 1987; Fredrickson 1986).

Centralized decision-making process reinforces internal configurations (e.g., strategies and structures) while becoming cohesive and entrenched overtime. Centralized decisions-making authority ensures that all decisions are tightly integrated and consistent which creates intimate knowledge and capabilities based on the current operations (Miller 1991). As a result, the perception of the environment and communication channels narrows down while reducing the quality and quantity of innovative perceptions and ideas (Fredrickson 1986; Miller 1987). The involvement of lower level workers provides access to various information and resources. Centralized decision-making process prohibits such exposures and accessibility to relevant information for decisions-makers while it diminishes the sense of control of the individual works and activities which is less likely to stimulate new innovative ideas. Hence, centralized organizations are likely exploit existing knowledge and capabilities. Exploration may be insufficient for centralized

decision-making process (Lavie et al. 2010).

Burns and Stalker (1961) argue that volatile and dynamic environment with high uncertainty obligates to have authorities with diversified knowledge rather than position. However, centralized decisions-making authority brings strong cognitive limitations that sets heavy constraints on top executives which increases the time to initiate different decisions (Miller 1987; Fredrickson 1986). More accurately, it is extremely difficult for any single individual to comprehend all the relevant information of the situations unless the expertise of the decision-maker is aligned with the situations (Mintzberg et al. 1976; Mintzberg 1978; Ruekert et al. 1985).

Further, attribute domain indicates "intertemporal variance in organizational attributes" (Lavie & Rosenkopf 2006, p.800). While attributes include industry focus and size, exploration increases the variance of new knowledge and attributes beyond its existing domain (Lavie & Rosenkopf 2006). Hence, alliance formation with organization that has different attributes is considered to be exploration while deviating from the systematic pattern. Conversely, alliance formations with organizations that have similar attributes are considered as exploitation. This type of formation is able to apply its previous experience to the learning process based on efficiency and effectiveness (Lavie et al. 2010; Lavie & Rosenkopf 2006).

Due to cognitive limitations and limited access to knowledge and resources, centralized organizations are likely to rely on past experience in forming alliances. While strong inertia forms routines and abilities that are rooted within the decision-

making process, it is automatically triggered in responding to different opportunities and problems. Experience provides guidance in selecting partnership while favoring a certain profile based on accumulation of those experience (Bae 2012). Centralized organizations will form partners similar to prior partners in respect to their attributes due to the efficiency and desired outcomes (Lavie & Rosenkopf 2006). Such alliance is based on repetition of refinement, improvements and specialization that is associated with exploitative behavior. Hence, centralized organizations are likely form alliances with partners with similar attributes and favorable profile based on their past experiences (Lavie et al. 2010). Hence, I propose proposition 1:

Proposition 1: Organizations with centralized structures are likely to be engaged with exploitation in forming alliances within the attribute domain.

3.2 Structural Complexity and Organizational Learning

As size of an organization indicates the resource availability and differentiation (Pierce & Delbecq 1977) structural complexity implies broad range of occupational titles and functional activities (Dalton et al. 1980). The division of labor becomes highly differentiated and specialized while increasing supervisions for coordination and control. Structural complexity brings extreme difficulties in coordination and control, especially because more and more individuals become involve in the process which creates “inter-stratum conflicts” (Mintzberg 1978).

Structural complexity consist various specialists that provide broad knowledge (Kimberly & Evanisko 1981) and increase of cross-fertilization of perceptions and ideas (Hage & Aiken 1967). Kimberly and Evanisko (1981) provide a primary example which is hospitals. Within hospitals, medical specialists are found in various fields where each of domains is highly specialized. Different specialist is linked with a core technology within the hospital while providing access to a broader knowledge. Also, these specialists are connected resources beyond the boundaries of the hospital which helps to adjust their behavior rapidly (Ruekert et al. 1985). This enables to establish new relationships with new partners is a form of exploration, where organization expand their knowledge and access to resources (Beckman 2006).

Based on pervious literatures, high complexity implies diversified expertise's (Pertusa-Ortega et al. 2010). Various individuals working together to accumulate and obtain knowledge that increases the likelihood of an organization to identify wide range of problems and opportunities within the environment (Sheremata 2000; Mintzberg 1989). Further, the availability of such knowledge and resources are able to provide problem solving innovations while providing proposals for diversified innovative solutions. As Tushman and Anderson (1986) indicates that decentralization consists high absorptive capacity which is the ability to value, assimilate, and apply external knowledge while identifying external opportunities to pursue exploration (Tushman & Anderson 1986). While strong inertial behavior is likely to lead to exploitation, absorptive capacity enables to counter pressure such behavior. As a result, organizations are more accustomed in

seeking opportunities while proactively engaging in explorative activities (Lavie et al. 2010).

Absorptive capacity motivates to pursue and adapt external knowledge in which motivates the organization to pursue alliance formation that processes new knowledge and capabilities (Lavie & Rosenkopf 2006). While exploration is associated with experimentation and variance routine, knowledge and capabilities, exploration enables to adapt to the hostile environment through increasing the variances in the attributes that enables reorientation or a complete a radical change (Amis et al. 2004). This enables to adopt new knowledge and capabilities beyond the boundaries or domains of the firm which is considered as a explorative behavior (Lavie & Rosenkopf 2006).

Structural complexity improves effectiveness and efficiency of a firm's exploration activities which makes it possible for a firm to examine a relatively large number of potential opportunities. Hence, organizations are likely form alliances with partners that have different attributes such as industry focus and size that enables to adapt to the changing environment. Hence, I propose the proposition 2:

Proposition 2: Organizations with structural complexity are likely to be engaged with exploration in forming alliances within the attribute domain.

3.3 Structural dimension and Organizational Learning

The conflict between structural organizational inertia and absorptive capacity,

balancing within domains bring extreme difficulties and challenges. Different structural dimensions have the tendency to either exploit or explore. Centralized organizations are based on complete dependence to cognitive capabilities, personal preference and interests of the decision-maker. This structure imposes constant risk where failure and success depends entirely on the decision-maker. Minzberg (1978) argue that decision-makers do not have the capacity to process large amount of information while transmission distorts the information when they actually do receive it. Centralized decisions-making processes impose decision-maker to be centered to intimate and specific knowledge of the daily operation while all decisions being integrated and consistent (Fredrickson 1986). As Miller (1987) argues that this narrows the perception and communication channels while the different tasks becoming routine and repetitive. Hence, centralized organizations have strong inertia that is likely to exploit existing knowledge and capacities. However, several literatures indicate that centralized decisions-making process is only effective in simple and stable environment. Under the dynamic and hostile environment, work requires detailed and diversified knowledge and capabilities which results in structures that are horizontally complex and differentiated.

Conversely, several literatures highlight that uncertainty and unpredictability of change in the hostile environment is to have important implications especially in different organizational structures. Burns and Stalker (1961) and Thompson (1967) argue that volatility and instability require an organic structure rather than a mechanistic structure. In other words, it requires non-centralized decisions-making process with more

diversified expertise. Similarly, Lawrence and Lorsch (1967) have argued that uncertainty requires a differentiated organization structure with a broad arrange of managers. Structural complexity is able to alter heavy decision problems to into smaller independent problems that reduce cognitive limitations and coordination (Siggelkow & Levinthal 2003). However, structural complexity are imposed with coordination and control problems in which more and more individuals become involve while creating inter-stratum conflicts based on political bargaining (Mintzberg 1989; Mintzberg 1978; Fredrickson 1986). In order to implement such decisions centralized decisions-making process eliminates these conflicts while providing a faster route to final approval based on diversified options.

In sum, a centralized decision-making process with a structural complexity has synergic characteristics that can balance exploitation and explorations within the attribute domain. Under dynamic environment, structural complexity will able to identify different problems and opportunities while making appropriate interpretations followed by actions that enables them to adapt to the changing environment. The adoption increases the variances of different attributes that enables to adopt new ones. As absorptive capacity being the ability to value, assimilate and apply external knowledge, structural complexity will encouraged to form alliance with new partners that possess new knowledge or different attributes compared to the pervious partners (Lavie & Rosenkopf 2006).

However, in order to respond to the environment, the inter-stratum conflicts are likely cause significant difficulties and delays in implementing such alliance formation

while maintaining high uncertainty with extensive learning costs that occurs by the alliance formation. Hence, various decisions must be centralized to respond rapidly and collectively. Past accumulated experience is able to provide such guidance in which decisions-making process is can be based on efficiency and desired outcome (Lavie & Rosenkopf 2006). Strong inertia will likely facilitate exploitation that promotes partners with predictability, stableness and most importantly reliability (i.e., trust and awareness) (Lavie & Rosenkopf 2006; Lavie et al. 2010). The conflicting characteristics of the two structural dimensions provide an opportunity to balance exploration and exploitation.

Organizations under competitive and dynamic environment require a structure and decision-making processes that do two conflicting things. It requires to high accessibility to diversified knowledge and perceptions with absorptive capacity that enables an organization to explore various alliances that differs from prior partnerships, while maintaining a centralized decisions-making process that is able to form alliances based on accumulated experiences that ensures stability and predictability while reducing extensive learning cost. Hence, I propose the proposition 3:

Proposition 3: Organizations consisting centralized decision-making process and structural complexity is likely to balance exploitation and exploration in forming alliances within the attribute domain.

Chapter 4. Methodology

4.1 Qualitative Study

The boundary of this case study is to understand how different structural dimensions (i.e., centralization and structural complexity) are able to balance exploitation and exploration within the attribute domain. Attribute domain is based on the question of how the partner differ from the prior partner based on their attributes (e.g., size and industry focus). There are 3 propositions has been developed based on this research question. While previous literature has focused on balancing the exploitation and exploration based on either subunit-level or firm-level, there has been less focus on organizational unit-level. I intend to fill the gap by exploring three different case studies. The time period covers from 2005~2015 (10 year time-frame) within the petroleum industry. While the unit of analysis being firm-level, this qualitative research explores 3 different firms that currently possess structural dimensions that balance exploitation and exploration differently due to the hostile and dynamic environment.

The linkage between the data to the proposition is based on explanation building (Yin 2009). It is one type of pattern matching which is an analysis and study of data that builds through the explanation about the case. The explanation refers to building a description that establishes casually links with the underlying question of “how” and “why” something has occurred (Yin 2009, p.27). The explanation building is based on secondary data that was collected from numerous sources which include reports,

newspapers, and internal material provided by the different firms. The internal materials were particularly helpful in making interpretation of the history of the firm and identifying key events that occurred during 2005 to 2015.

The criteria for interpreting the finding is based the theoretical explanations. First, the two different structural dimensions were interpreted differently based on the characteristics. By definition, centralization implies decision-making is concentrated to a select few while decisions are made was a whole (Dalton et al. 1980; Fredrickson 1986). As a result, implemented decisions bring changes to the entire firm while the changes are strongly based on the interest or background of the decisions-makers (Siggelkow & Levinthal 2003; Hage & Aiken 1967; Sheremata 2000). Some examples provided in pervious literature are adoption of new policies or regulations (Hage & Aiken 1967). Multiple evidences such as newsletters and articles have confirmed such characteristics. For example, several experiences in different accidents during his tenure have made CEO of Hanwha Total Co., Ltd. to focus on “safety” issues. Structural complexity implies large size with a broad range of occupational titles. This has been reviewed based on the organizational documents such as charts that specify number of focused business areas followed by different charts (Schminke et al. 2002; Hage & Aiken 1967). For example, SK Innovation Co., Ltd. focuses on board range of fields from upstream business to downstream business that focuses on R&D, E&P and petroleum and petrochemical products.

In addition, March’s (1991) framework defines exploration as experiment with new

ideas while exploitation involves refining existing ones. Based on Lavie and Rosenkopf (2006), we focus on differentiating exploitation and exploration within the attribute domain through size and industry focus (i.e., new business) (Lavie et al. 2010; Lavie & Rosenkopf 2006). This focuses on the underlying question to what extent does the partner differ from the previous ones. For example, Hyundai Oil Bank Co., Ltd. established number of joints ventures with different firms that focus on different areas (i.e. new attributes) while acquiring a firm to enhance existing business within the petroleum industry. The firm establishes alliances based on new attributes to enter new markets while the M&A was to enhance existing business (Lavie et al. 2010; Lavie & Rosenkopf 2006). This can be considered as both exploration and exploitation. Also, establishment of number of subsidiaries has been highly visible. Subsidiaries that create new competence can be considered as exploration while subsidiaries that exploit existing competence is considered as exploitation.

Further, I address the reason for qualitative research and the limitations that follows. Empirical research is based on empirical evidence to understand a certain phenomenon which is either through observation or experience. The analysis can be based on qualitative or quantitative methods depending on the type of research. This paper is based on a qualitative research for couple of reasons. First, qualitative research is an exploratory methodology that is based upon unstructured and semi-structured techniques which includes interviews, questionnaires, small data collection, opinions, observations and etc. It is a methodology to understand an organization or an event. Unlike quantitative

research, it is not able to employ mathematical and statistical models which are in a numerical forms; however, qualitative research is able to encapsulate on the totality of the situation while providing rich details and descriptions of how human react and interact (Yin 2003). Enormous amount of substances and specific details are used to describe such situations and events.

Secondly, numbers often generalize and simplify certain situations which reduce the description and details that we can actually observe in real-life. Decisions are made through an intuitive or reasoned complex processes based on different interaction by different individuals. It is extremely difficult to see how this progresses through different stages, especially, having multiple actors involved. However, it very important to see how decisions are made in real-life as there is combinations of elements that need to be considered and addressed.

Lastly, it provides an opportunity to have more flexibility (i.e., openness) to establishing a framework. Unlike a specific data set, it is maintains the flexibility to be revised based on new findings, information and experience. Accumulation of this information provides an opportunity to make the research more compelling and persuasive. Findings can be more applicable and appropriate for different context and setting. As a result, qualitative research being an interpretative approach, it is able to provide several opportunities to future research. The description and details gained from different events are able to provide different opportunities for quantitative research (Yin 2003).

However, qualitative research is not without limitations. Despite its complements to other research areas, qualitative research is a descriptive analysis that describes a complex phenomenon (i.e., totality of the situation or event). Real-life events lead to difficulties in controlling the data collection environments while specific cases are commonly difficult for generalization. This highlights two limitations. First, cases may range from small and large cases depending on the unit of analysis from individual-level (i.e., interviews based on individuals that highlight behaviors and attributes) to firm-level (i.e., collectivity of records, interview and etc.). Individual–level data may not be applicable for firm-level data. Individual interviews do not represent the perception of the overall firm.

Despite collection of data, this still remains within an organization or a few. While the activities held within an organization are highly recorded, the sample size is relatively small with the possibilities of counter cases that may exist within the same context. Hence, this brings difficulties in generalizing the finding and results. A single or multiple cases can be viewed as a episode; however, it cannot be generalized to the overall industry or environment. As Yin (2003) states that "scientific facts are rarely based on single experiments; they are usually based on a multiple set of experiments that have replicated the same phenomenon under different conditions" (Yin 2003, p.15).

Finally, qualitative research has the possibility that may linger around bias view with equivocal evidence that can influence the process, findings and conclusions. The absence of rigor and thoroughness in the methodology part can lead to findings that are

deliberately modified depending on context of its use. Qualitative research requires a fair interpretation of all information and evidence that is able to provide a solid investigation of the case itself.

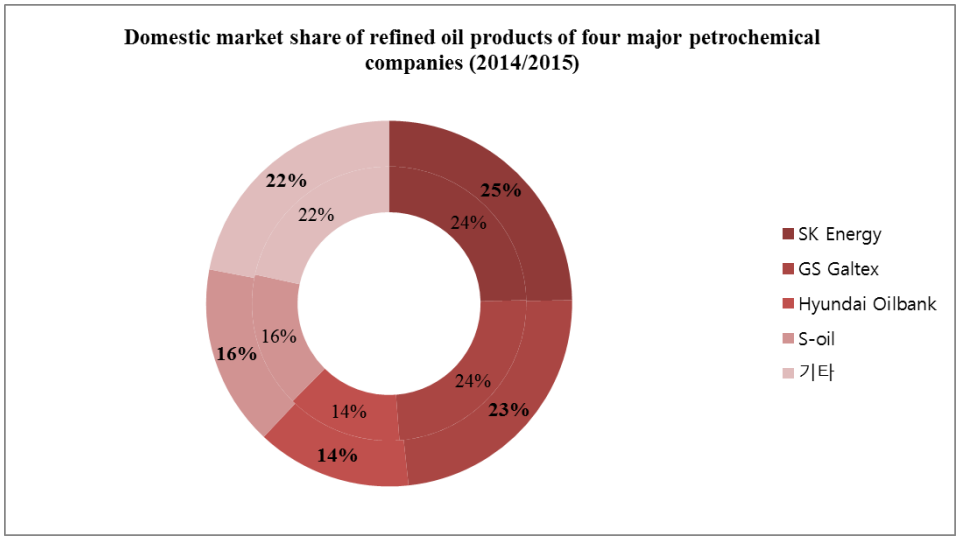
4.2 Site Firms and the Petroleum Industry

Organizations change due to the hostile and dynamic environment. As Tushman and Anderson (1986) indicate, the outcome or performance of an organization is critically influenced by the context in which it occurs. Environments are shaped by variety of reasons such as "competitive, legal, political, and technological factors" (Tushman & Anderson 1986, p.439). These elements are important in shaping the environmental context where different firms faced with the need to change through different organizational learning activities. The particular context was highly visible in the petroleum industry where the fluctuation of crude oil prices created a hostile and dynamic environment.

In order to test the postpositions, I have conducted a qualitative research based on the petroleum industry. The conditions for testing the proposition was to identify a hostile and dynamic environment with organizations that are actively engage with organizational learning through absorbing external knowledge and resources. As South Korea being a major importer, organizations with different structural dimensions responded differently to changing environment. I have chosen three particular organizations that consists different structural dimensions (i.e., centralization and structural complexity). The three

firms include Hanwha Total Co., Ltd., SK Innovation Co. Ltd. and Hyundai Oil Bank Co., Ltd. which consists the largest market shares within the petroleum market. These organizations have engaged in organizational learning differently due to the different structural dimensions. As a result, this particular industry was appropriate to test our propositions.

Table 1. Domestic market share of refined oil products of four major petrochemical companies (2014/2015) (Kim 2016)



Based on the 3 different organizations, I provide a brief background of the organization to understand the context. I further examine how the structural dimensions are appropriate for the different organizations and how this leads to being engage with organizational learning. Different structural dimensions pursue exploitation and exploration differently.

4.3 Variables

4.3.1 Centralization and Structural Complexity

Centralization is the degree of how much the decision-making authority is concentrated to a selected few (Olson et al. 2005; Fredrickson 1986). Hence, centralization specifies the decision-making process. Hage and Akin (1967) defined centralization through measurements based on two aspects. The first aspect is how much the diverse individuals are involved in the decisions-making process (i.e., resource allocation and establishment of organizational policies) (Hage & Aiken 1967). This implies the degree of participation by individuals in various decisions-making processes which includes various activities of hiring and promoting personnel, "the adoption of new policies and institution of new services" (Hage & Aiken 1967, p.77). All decisions are only made as a whole where the decisions affect all members (Fredrickson 1986; Siggelkow & Levinthal 2003).

The other aspect is how much authority is distributed within the social positions (i.e., hierarchy of authority) (Hage & Aiken 1967). This implies whether the individuals are permitted to make their own decisions without relying on subordinates. There is a certain amount of independence and freedom with less "hierarchy of authority for social control" (Hage & Aiken 1967, p.78). However, when high hierarchy of authority exists within an organization, all decisions need approval based on the chain of command. Based on Dewar et al. (1980), the both measurement of centralization has been reassessed to examine the reliability and validity and has found to be reliable (Dewar et al. 1980). Here,

I use two key aspects to verify the qualitative study.

Complexity indicates the division of labor which implies a board range of occupational titles (Dalton et al. 1980; Fredrickson 1986). Hage and Akin (1967) indicates structural complexity based on three aspects which includes “the number of occupational specialties, the professional activity, and the professional training” (Hage & Aiken 1967, p.79).

4.3.2 Exploitation and Exploration

Based on March’s (1991) framework of exploitation and exploration, Lavie and Rosenkopf (2006) further examine the inter-firm relationships through alliance formations which includes 3 different domains (i.e., structure, function and attribute domain). Here, I focus on the function and attribute aspects. Attribute exploitation–exploration implies the variance of attributes based on different organizations. Attribute includes size and industry focus. When organizations form alliances that have similar organizational attributes, it is able to effectively assimilate external knowledge based on pervious partnering experiences (Lavie & Rosenkopf 2006). This associated with exploitative behavior, whereas, a deviation from existing alliance formation enables to gain new knowledge which is associated with exploration (Lavie & Rosenkopf 2006).

Chapter 5. Case Analysis

5.1 Brief Explanation

Based on the analysis of the case studies, the matrix (Refer to Table 1) illustrates the results. First, Hanwha Co., Ltd. has found to be an organization with a centralized decision-making process while focusing on enhancing and refining existing competence (March 1981; Levinthal & March 1998). Number of changes (i.e., adoption of new systems and regulations) were based on the decision by the decision-maker while the experiences and interests largely influenced the process.

Table 2. Two by two matrix of the three firms

Complexity ↑	**SK Innovation Co., Ltd. (Exploration)**	**Hyundai Oil Bank Co., Ltd. (Exploration and Exploitation)**
		Hanwha Total Co., Ltd. (Exploitation)

Centralizations →

While SK Innovation Co., Ltd. has found to be an organization with structural complexity. Range of occupations were visible based on a dispersed decision-making

authority through company-in–company (CIC) system. It has focused on exploration of new knowledge and capabilities. Lastly, Hyundai Oil Bank Co., Ltd. has found to be an organization with a centralized decision-making process with structural complexity. The organization was able to balance both exploration and exploitation by establishing new partners while refining and enhancing existing operations.

5.2 In-depth Analysis

5.2.1 Hanwha Co., Ltd.

5.2.1.1 Corporate Background

Hanwha Total Co., Ltd. was founded in August 1st 2003 (Hanwha-Total 2015). It focuses on producing different petrochemical products from naphtha and condensate which including polymer and BTX products, gasoline, jet fuel, kerosene and etc. produced from refining crude oil. Prior to being acquired by Hanwha group, it was originally founded by Samsung Total Petrochemicals Co., Ltd., as a 50:50 joint venture between Samsung General Chemicals and Total S.A. (Total Petrochemicals Co., Ltd.) located in Courbevoie, France (Go 2008). Total Petrochemicals Co., Ltd is one of the seven major oil and gas companies (Big Oil) in the world.

Samsung General Chemicals and Total FinaElf [2](TFE) began an informal partnership from April 2001. During this time, Total FinaElf, a subsidiary of Total Group,

[2] Total acquired a Belgium firm called Petrofina and a French firm called Elf Aquitaine in 1999 and 2000. As a result of the M&A, it was first named as Total Fina and afterwards, it was changes TotalFinaElf in 2000. During 2003, they changed the name to Total (French Ministry of Sustainable Development-DGPR / SRT / BARPI, 2013).

expressed their willingness to make investments to Samsung General Chemicals and afterwards several informal and formal meetings were held to strengthen the partnership while trying to establish a joint venture agreement (Go 2008). However, large setbacks occur during this process which includes the September 11th terrorist attack and the explosion of AZote Fertilisant (AZF) fertilizer plant[3] in Toulouse, France, that brought discontinuities in the partnership (French Ministry of Sustainable Development-DGPR / SRT / BARPI, 2013). However, MoU is established in December 2002. This is almost two years of negotiation and in May 27th 2003, both firms were able to come to an agreement to establish Samsung Atofina Co., Ltd. Finally, Samsung Atofina Co., Ltd. is founded in August 8th 2003. Afterwards, it officially changes its name to Samsung Total Petrochemicals Co., Ltd. in October 5th 2004 (Go 2008).

Since then, Samsung Total Petrochemicals Co., Ltd. establishes two subsidiaries in 2008 and 2009 which are Dongguan Hanwha Total Engineering Plastic Co., Ltd. and Hanwha Total Petrochemicals Trading (Shanghai) Co., Ltd. These particular subsidiaries were created to enter in the Chinese market (Go 2008). More recently, the firm acquires West Sea Power Co., Ltd. and West Sea Water Co., Ltd. during 2012 (Go 2008). Each firm provides services in supplying power and providing water treatments. The acquisition of both firms was able to reduce different costs managing and recycling toxic wastes while expanding the production of paraxylene (PX) (Hanwha-Total 2015).

In 2014, Samsung Group announces it departure in petrochemical industry and in

[3] Owned by Grande Paroisse Group (Branch of the TotalFinaElf) (French Ministry of Sustainable Development-DGPR / SRT / BARPI, 2013).

2015, the firm is acquired by Hanwha Group in 2015 while officially changing its name to Hanwha Total Co., Ltd. Despite the acquisition, 50:50 Joint Venture between Total Petrochemicals Co., Ltd. has remains the same to date (Hanwha-Total 2015).

5.2.1.2 Organizational Structure and Learning strategy

The degree of centralization within Samsung Total Co., Ltd. was highly visible under a particular CEO. Sukwon Son became the CEO of Samsung Total Co., Ltd. during 2010. He was one of the first CEOs to have an engineering background while being known as a technology oriented CEO (Go 2008). Prior to becoming the CEO, he has been one of longest tenured executives at both Samsung General Chemicals Co., Ltd and Samsung Total Co., Ltd. He has held numerous positions within the organization with increasing responsibility and wide range of experiences (Go 2008).

During his tenure, the CEO has experienced numerous obstacles and occurrences. One of the most important experiences was the accidents that occurred within the different petrochemical plants during the late-1990s. Here, he was able observe that number of workers were not fully equip but more importantly, there was a lack of understanding of the various tasks that brought difficulties in managing them (KTPM 2013). Based on his professional and personal experiences, as a CEO, he establishes numerous organizational changes and initiatives within the organization putting strong emphasis around the word “safety” (KTPM 2013). As Fredrickson (1986) argues, the CEO within the centralized organization dominates the decision-making process based on

intimate knowledge of the operations held within the organization while taking major departures from existing one (Fredrickson 1986).

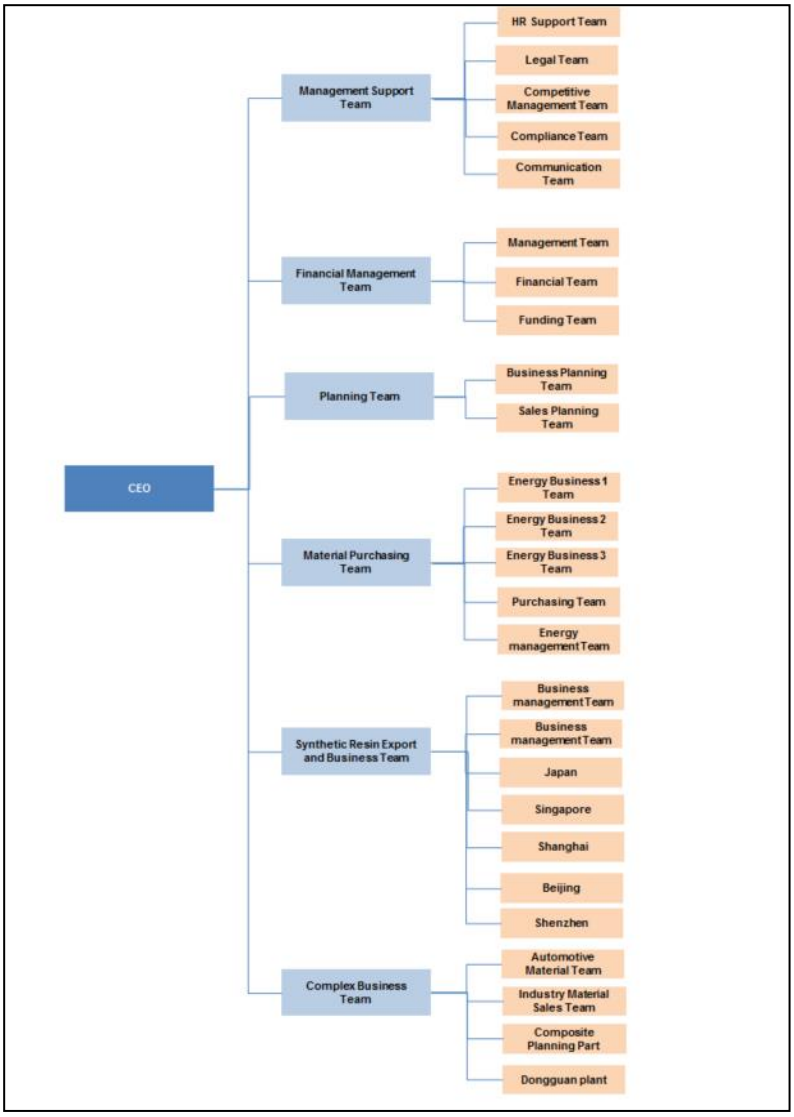


Figure 1. Organizational Structure of Hanwha Total Co., Ltd.

First, TPM (Total Productive Maintenance) was initiated under the CEO (KTPM 2013). TPM is a system that helps to maintain and enhance the quality of the production

and system through different components which includes facilities, machineries, procedures and workers (KTPM 2013). Secondly, sets up groups with different tasks and assignments to identify problems to make improvements. These activities were able to constantly identify numerous problems based on safety management, procedural improvement and energy conservations. After 5 years of continuous training process, these initiatives have significantly reduced the number of accidents compared to the previous years. Lastly, during 30th of August 2011, he makes "safety" as top priority while adopting various management programs and enhancing internal regulations (KTPM 2013).

Based on Hage and Akin (1967), the number of initiative launched by the CEO has brought significant changes within the organizations while the changes were strongly based on the interest or concerns of the decision-maker (Miller 1991; Hage & Aiken 1967). The changes initiated by the decisions-maker brought modifications to the entire organization while trying to make several improvements. The decisions were not based on discussions but rather high hierarchy of command (Miller 1987; Fredrickson 1986). Hence, Hanwha Total Co., Ltd. has shown to have a centralized structure.

One of the most notable industrial catastrophes is hazardous accidents that occur within petrochemical and chemical plants. The different plants need to be extremely cautious due to the explosive gas and chemical products. The destruction of plants and threat to the environment are two major issues, however, the most important one is the loss of lives. Despite significant reduction of these industrial accidents through different

management systems, they do occur time to time. Starting out as one of the engineers of the different chemical plants, the CEO has continuously acknowledged the importance of the incidents (KTPM 2013). Hence, the CEO has put central focus on refining and enhancing current operations (Hanwha-Total 2015). As March (1991) argues, organization that are focused on exploitation are focused towards existing resource and capabilities while focusing on improvements and efficiency. In such case, the organization is likely to make incremental departures from existing trajectory. This was especially highly visible in the strategic decisions to create subsidiaries and M&A. Subsidiaries and M&A were not to increase the scope of the business but rather to enhance the existing one.

Hanwha Total Co., Ltd. maintains an inflexible system where they are highly specialized while focusing on a specific product called condensate. Condensate (ultra-light oil) is a gas that changes to liquid as extracted through surface and it is refined based an exclusive facility referred as a “splitter” (Go 2008). It is a smaller highly specialized refinery that can process specific type of oil such as condensate. Not only does condensate produce different types of fuels, but it also produces polypropylene (PP) and par-xylene (P-Xylene or commonly referred as PX), which are synthetic polymers that has a wide range of usage including different density of plastics and textiles such as polyesters (Go 2008). Subsidiaries and M&A were established as responses to market (e.g., growing use of PP and PX in the textile industry) and enhancing the existing business lines. Dongguan Hanwha Total Engineering Plastic Co., Ltd. focuses on

composite PP, which are materials used for automobile part and household appliances and Hanwha Total Petrochemicals Trading (Shanghai) Co., Ltd. was established to import and export the produced petrochemical products to China. While West Sea Water Co., Ltd. provide stable power source while managing and recycling different toxics waste that is created by existing plants.

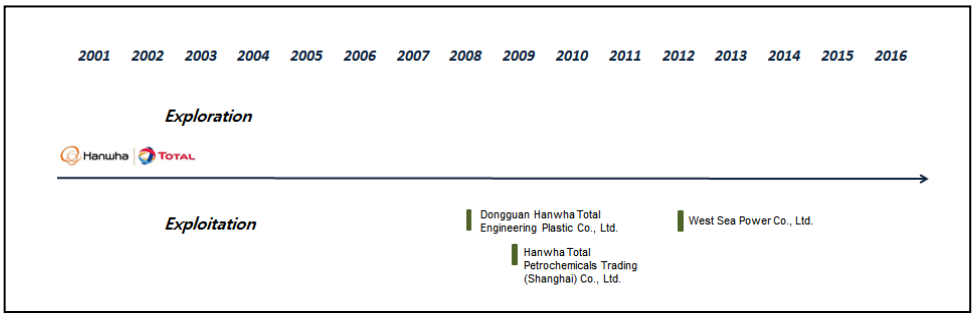


Figure 2. Hanwha Total Co., Ltd. balance of exploration and exploitation

In sum, centralized organizations have a centralized decision-making process which is based upon selected few. As Miller (1987) indicates, the decisions-making process is dominated by the decision-maker while being largely influenced by the perception and interest. In this case, the prior experience of the CEO has largely influenced the organization through initiatives and changes while enhancing and improving existing daily operations. Hence, this case shows support for the proposition 2 which states that centralized organizations are likely to be engaged with exploitation.

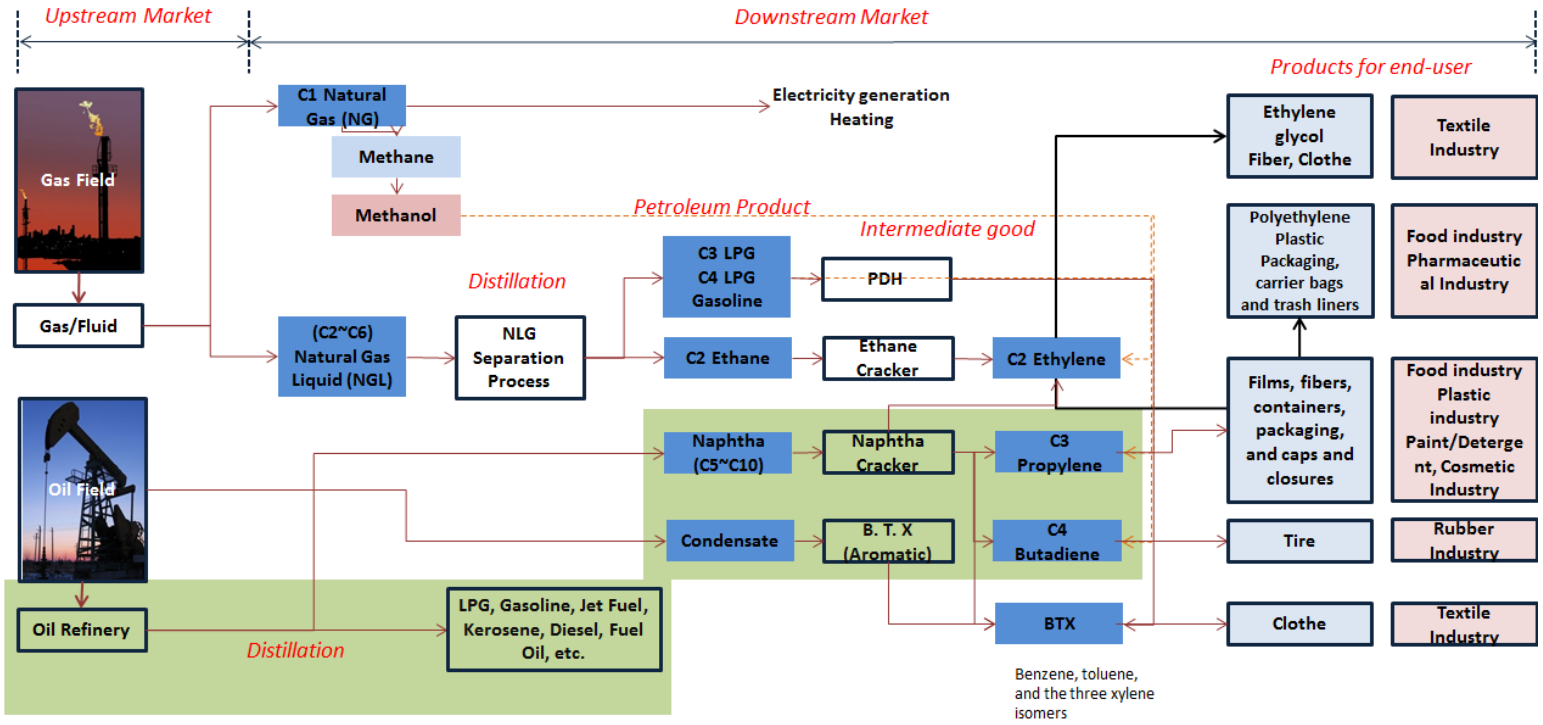


Figure 3. Focused business area of Hanwha Total Co., Ltd.

5.2.2 SK Innovation Co., Ltd.

5.2.2.1 Corporate Background

SK Innovation Co., Ltd. was originally established as Korea Oil Co., Ltd. in October 13th, 1962. Beginning of 1960's, SK innovation Co., Ltd. only began with 34 while rapidly developing into one of the largest energy firm in Korea. In 2011, SK Innovation (including the main subsidiaries) has one of the largest numbers of employee with the largest net sales approximately equivalent to 68 trillion won (Seungil 2012). It continues to maintain large sales and profits while remaining as a top petrochemical firm.

Entering the late 1990's to early 2000s, incidents including the International Monetary Fund (IMF) crisis and in the wake of the September 11th terrorists attack, the Korean economy was entering into a recession period while the business environment being highly unstable, volatile and uncertainty. SK Corporation Co., Ltd. still managed its business effectively and efficiently while seeking different opportunities to grow its business (Seungil 2012).

In 2001, like many other firms, one of the top petrochemical firms called Incheon Petrochemical filed bankruptcy due to poor performances. Over the next 4 years, the firm enters into a restructuring period until 2005. In August 19th of 2005, 12 petrochemical firms submitted a bidding proposal and entered the bid to acquire Inchon Oil Refinery Co., Ltd. (Seungil 2012). The 12 petrochemical firms include SK Co., Ltd., GS Caltex Co., Ltd., S-Oil Co., Ltd. and other major firms at the time. 4 months later (December 16th of 2005), SK Co., Ltd. wins the bid and signed the acquisition agreement (Seungil

2012). As of March 2006, Incheon Oil Co., Ltd. officially commences its business while renaming the firm as SK Incheon Oil Co., Ltd. It has become one the main subsidiaries of SK Co., Ltd and focusing a refining and advertising different petroleum and petrochemical product.

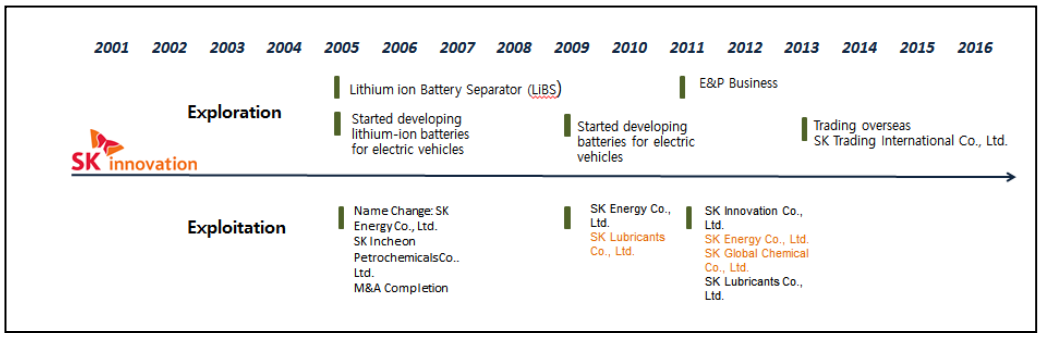


Figure 4. SK Innovation Co., Ltd. balance of exploration and exploitation

Since then, the successful merger and acquisition (M&A) led to number of corporate-level changes within the organization. First, in 2007, a holding company, SK Corporation Co., Ltd. separates its energy business by establishing SK Energy Co., Ltd. while acquiring SK Incheon Oil Co., Ltd. in February 1st of 2008 (Seungil 2012).. Once the energy firms were consolidated under one organizational structure, the firms begins to create different subsidiaries. During October 1st of 2009, SK Energy Co., Ltd establishes its first subsidiary name SK Lubricants Co., Ltd. This subsidiary specializes in producing base and lubricant oil that develops vehicle motor oil, diesel engine and etc. Further, based on a shareholder meeting held in November 26th of 2010, there was a general consensus to separate petroleum and chemical business (Seungil 2012). While changing

the holding company from SK Energy Co., Ltd. to SK Innovation Co. Ltd., the petroleum and chemical business was separated by establishing two new subsidiaries which are SK Energy Co., Ltd. and SK Global Chemical Co., Ltd.

Finally in 2013, SK Innovation Co. Ltd. establishes two additional subsidiaries which include SK Incheon Petrochemical Co., Ltd. and SK International Trading Co., Ltd. SK Incheon Petrochemical Co., Ltd. continues to refine and market different petroleum and petrochemical products while SK International Trading Co., Ltd. imports naphtha and crude oil while exporting petroleum and petrochemical products produced by SK Energy Co., Ltd. and SK Incheon Petrochemical Co., Ltd. to global consumers (Seungil 2012). Currently, SK Innovation Co., Ltd. operates with 5 main subsidiaries that are highly specialized within their own domain.

5.2.2.2 Organizational Structure and Learning strategy

SK Innovation Co., Ltd. participates in wide range of specialized areas within the petrochemical industry. SK Energy Co., Ltd. and SK Incheon Petrochemical Co., Ltd. focuses on petroleum businesses while SK Global Chemical Co., Ltd., SK Lubricants Co., Ltd. SK Incheon Petrochemical Co., Ltd. focuses on the chemical business. More importantly, this was highly visible especially within the SK innovation Global Technology (SKIGT) within SK Innovation Co., Ltd. The research field ranged from oil refinery technologies, diversified petroleum products, automobile lubricants, to chemical products, battery and industrial engineering materials (Seungil 2012). The occupational

titles range from engineers, technician, chemists, consultants and researchers which most of the jobs require a college level degree, however, masters and Ph.D. degrees in specific fields are required especially for the research and development (R&D) divisions. However, as Hall and Haas (1967) argue that this is one aspect of complexity where it should also encompasses segmentation of the organizational structure.

As size of the organization increases, "the structure of the organization becomes much more complex" where the organization becomes highly differentiated (Hall et al. 1967, p.905). While SK Innovation Co., Ltd. increased in size, the numbers of decisions were difficult coordinate and control. As Minzberg (1987) and Fredrickson (1986) indicate, decision-makers face extreme difficulties comprehending all relevant information which leads to information overloads. As a result, SK Innovation Co., Ltd. initiates the company-in-company (CIC) system establishing 5 different subsidiaries through organizational restructuring realigning the business system. CIC system enables to increase independence and competitiveness of the individual business areas. Hence, SK Innovation Co., Ltd. is structurally complex with number of divisions with broad range of occupational titles and expertise (Seungil 2012).

Structural complexity consist high absorptive capacity that enables an organization to be effective in exploration. Integration and applying external knowledge enables to identify future opportunities (Tushman & Anderson 1986). Since the initiatives of the CIC system, SK innovation Co., Ltd. has entered number of new businesses which includes exploration and production (E&P), electronics materials and batteries and

information (B&I). As Sheremata (2002) argues, the various sources of knowledge and capabilities are able to increase the likelihood to identify various opportunities. First, E&P focus one exploration to secure major source of oils and gas as Korea being a major importer which covers the upstream market. Secondly, the R&D department identifies opportunities in advanced battier for HEV (Hybrid Electric Vehicles), lithium ion battery separator (LiBS), TAC (Tricetyl Cellulose) films for LCD, TV, LCD monitor and FCCL (Flexible Copper Clas laminate) (Seungil 2012). These are new businesses that are expected to enhance the business portfolio and sustainability for the future market (Seungil 2012).

In sum, SK Innovation Co., Ltd. has proven to be an organization with structural complexity. Increase in size of the firm has let to initiating the CIC system which separates the decisions-making process while enhancing their business areas. The diversified knowledge and expertise through structural complexity is able to identify different problems and future opportunities while enhancing the effectiveness of exploration. This has led SK Innovation Co., Ltd. into different industries and business areas based on exploration. Hence, this case shows support for the proposition 2 which states that structurally complex organizations are likely to be engaged with exploration.

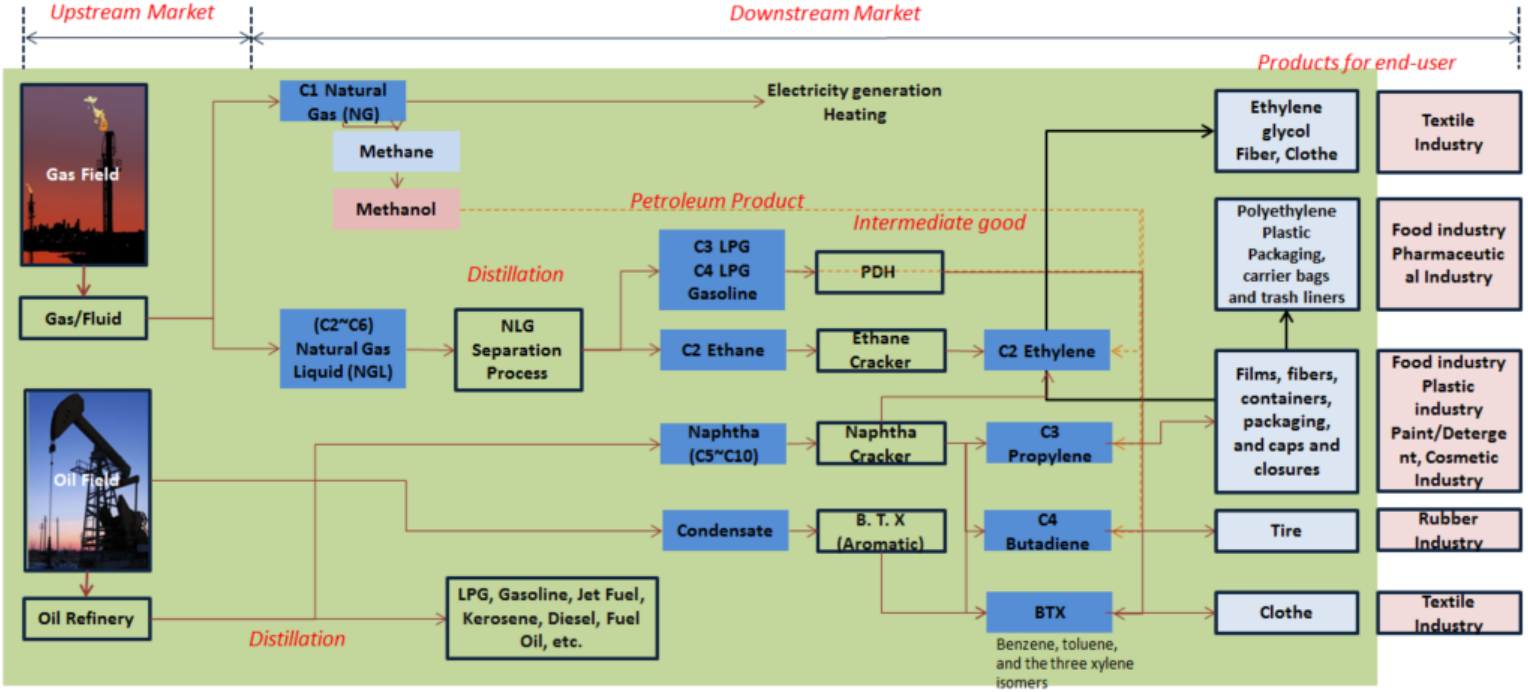


Figure 5. Focused business area of SK Innovation Co., Ltd.

5.2.3 Hyundai Oil Bank CO., Ltd.

5.2.3.1 Corporate Background

Hyundai Oil Bank Co., Ltd. was originally established as Kukdong Shell Oil Co., Ltd. in November 19th of 1964. In 1993, Kukdong Shell Oil Co., Ltd. was acquired by Hyundai Co., Ltd and changed their official name to Hyundai Oil Bank Co., Ltd. Currently, the firm operates under a parent company called Hyundai Heavy Industries Co., Ltd. (HHI) (HyundaiOilbank 2015). Hyundai Oil Bank Co., Ltd. is also one of the 4 major petrochemical firms based in South Korea.

Hyundai Oil Bank Co., Ltd focuses on wide range of petroleum and chemical products ranging from petroleum refining business and petrochemical business to marketing. The organization covers partial upstream and downstream business which requires wide range of specialist and technicians. Hyundai Oil Bank Co., Ltd. makes number of joint ventures with global firms and entering a new business from 2005 to 2015. First joint venture was initiated during November 2009. Hyundai Oil Bank Co., Ltd. establishes a Memorandum of Understanding (MoU) with a firm called Cosmo Oil Co., Ltd. located in Japan. After 5 months of close partnership, both firms established a 50:50 Joint Venture by establishing HC Petrochem Co., Ltd. and in November 2011, they rename the firm to Hyundai Cosmo Petrochemical Co., Ltd (HyundaiOilbank 2015). The joint venture is focused on benzene, toluene, and the three xylene isomers (BTX) produced by naphtha within the petroleum refining process. During 2012, a second joint venture was initiated with a firm called Shell Base Oil Co., Ltd in February 7th, along

with a new business in February 24th . A 60:40 Joint Venture agreement was signed and in April of 2012, Hyundai and Shell Base Oil Co., Ltd. was founded. Hyundai and Shell Base Oil Co., Ltd. focuses on producing base oil lubricants. In addition to this, Hyundai Oil Bank Co., Ltd. established a subsidiary, Hyundai Oil Terminal Co., Ltd., to enter business of storage systems (HyundaiOilbank 2015). It was established at February 14th 2012 while particularly focusing on storage systems of petroleum and petrochemical products, but also sells and purchases products as well. The products range from kerosene, fuel oil to aromatics including BTX (HyundaiOilbank 2015).

The most recent joint venture was initiated with Lotte Chemical Co., Ltd. Both firms establish a partnership by signing a MoU in July 2013. After 6 months of close partnership, both firms formed a 60:40 Joint Venture and established Hyundai Chemical Co., Ltd in January 2014. This firm focuses on numerous chemical products refined from condensate. Wide range of chemical products includes nylon, polyester synthetic textiles, pesticide, solvents for paint and coating and etc.

5.2.3.2 Organizational Structure and Learning strategy

During his tenure, he highlights that “when companies go out of business, innovation is crucial increasing the sustainability of the company." He further mentions that "We need to collect accurate information on internal human resources and external environment while maintaining continuous communication, transparency, integrity and sense of ethics is a key for leadership that CEOs must maintain for the corporation and

managing innovation" (Kim 2012). As Sheremata (2000) argues that transmission of information is often based on distortion, hence, centralized decision-makers often face difficulties not just in quantity of information but the quality itself (Sheremata 2000).

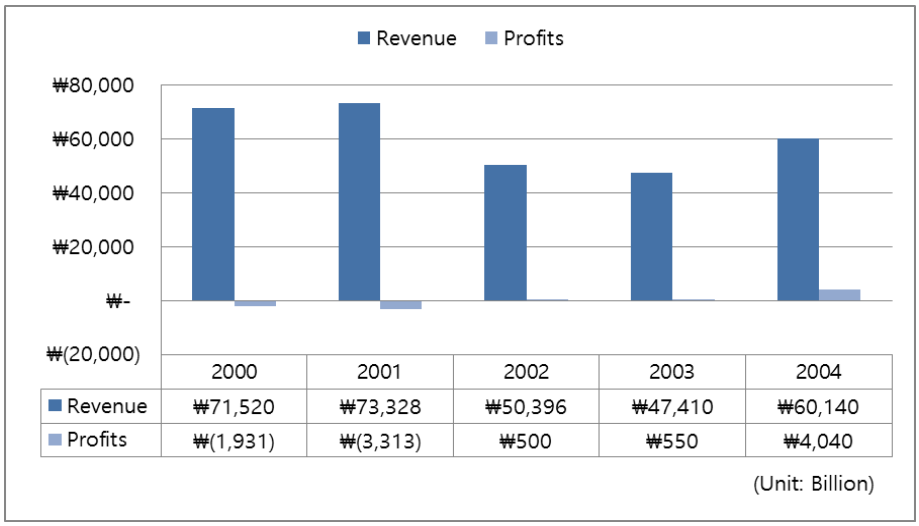


Figure 6. Profits and Revenue of Hyundai Oil Bank Co., Ltd. from 2000~2004

Hyundai Oil Bank Co., Ltd. has proven to have a centralized decision –making process. Number of decisions was solely based on the CEO where number of radical changes (i.e., Lay-offs) was brought to the organization (Hage & Aiken 1967). The changes were to overcome the strong inertial behavior where structures and decision-making process has been rigidified over time (Miller 1991). CEO's participation in every step has brought number of modifications to the entire organizational structure where decisions were made as a whole (Kim 2012).

Since then the performance largely increases from 2004. Number of changes was highly visible based on both exploration and exploration. Hyundai Oil Bank Co., Ltd.

makes number of joint ventures with global firms and entering a new business from 2005 to 2015 through exploration. As March (1991) indicates exploration is engagement in exploring new knowledge and competency.

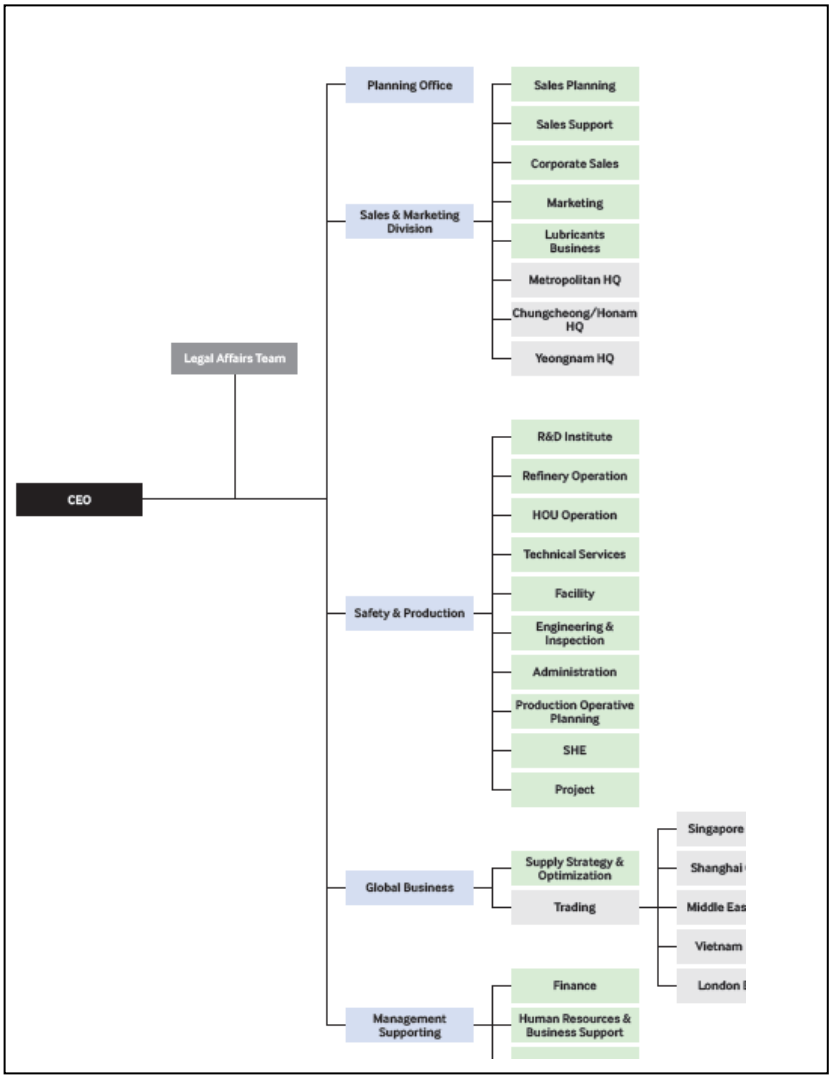


Figure 7. Organizational Structure of Hyundai Oil Bank Co., Ltd.

First joint venture was initiated during November 2009. Hyundai Oil Bank Co., Ltd.

establishes a Memorandum of Understanding (MoU) with a firm called Cosmo Oil Co., Ltd. located in Japan (HyundaiOilbank 2015). After 5 months of close partnership, both firms established a 50:50 Joint Venture by establishing HC Petrochem Co., Ltd. and in November 2011, they rename the firm to Hyundai Cosmo Petrochemical Co., Ltd. The joint venture is focused on benzene, toluene, and the three xylene isomers (BTX) produced by naphtha within the petroleum refining process (HyundaiOilbank 2015). During 2012, a second joint venture was initiated with a firm called Shell Base Oil Co., Ltd in February 7th, along with a new business in February 24th . A 60:40 Joint Venture agreement was signed and in April of 2012, Hyundai and Shell Base Oil Co., Ltd. was founded. Hyundai and Shell Base Oil Co., Ltd. focuses on producing base oil lubricants. The most recent joint venture was initiated with Lotte Chemical Co., Ltd. Both firms establish a partnership by signing a MoU in July 2013 (HyundaiOilbank 2015). After 6 months of close partnership, both firms formed a 60:40 Joint Venture and established Hyundai Chemical Co., Ltd in January 2014. This firm focuses on numerous chemical products refined from condensate. Wide range of chemical products includes nylon, polyester synthetic textiles, pesticide, solvents for paint and coating and etc. (HyundaiOilbank 2015).

In addition to this, Hyundai Oil Bank Co., Ltd. established a new subsidiary, Hyundai Oil Terminal Co., Ltd., to enhance their storage systems. It was established at February 14th 2012 while particularly focusing on storage systems of petroleum and petrochemical products, but also sells and purchases products as well. The products range

from kerosene, fuel oil to aromatics including BTX (HyundaiOilbank 2015).

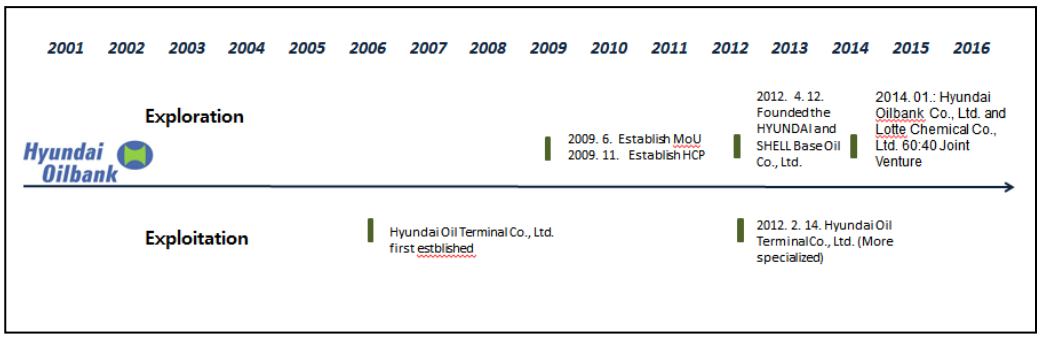


Figure 8. Hyundai Oil Bank. Co., Ltd. balance of exploration and exploitation

Hence, Hyundai Oil bank Co., Ltd. maintains a centralized decision-making process with structural complexity. Based on this organizational structure (Kim 2012), Hyundai Oil Bank Co., Ltd. is associated with exploration in the structure and attribute domain as the joint ventures are based relatively new partnerships while having diversified attributes in terms of size and industry focus. This is evident through the new businesses that they have entered. Conversely, Hyundai Oil bank Co., Ltd. also exploits exiting businesses such as the storage system of petroleum and petrochemical products. Hence, this case shows support for the proposition 3 which states that centralized decision-making process with a structural complexity is likely to balance exploitation and exploration.

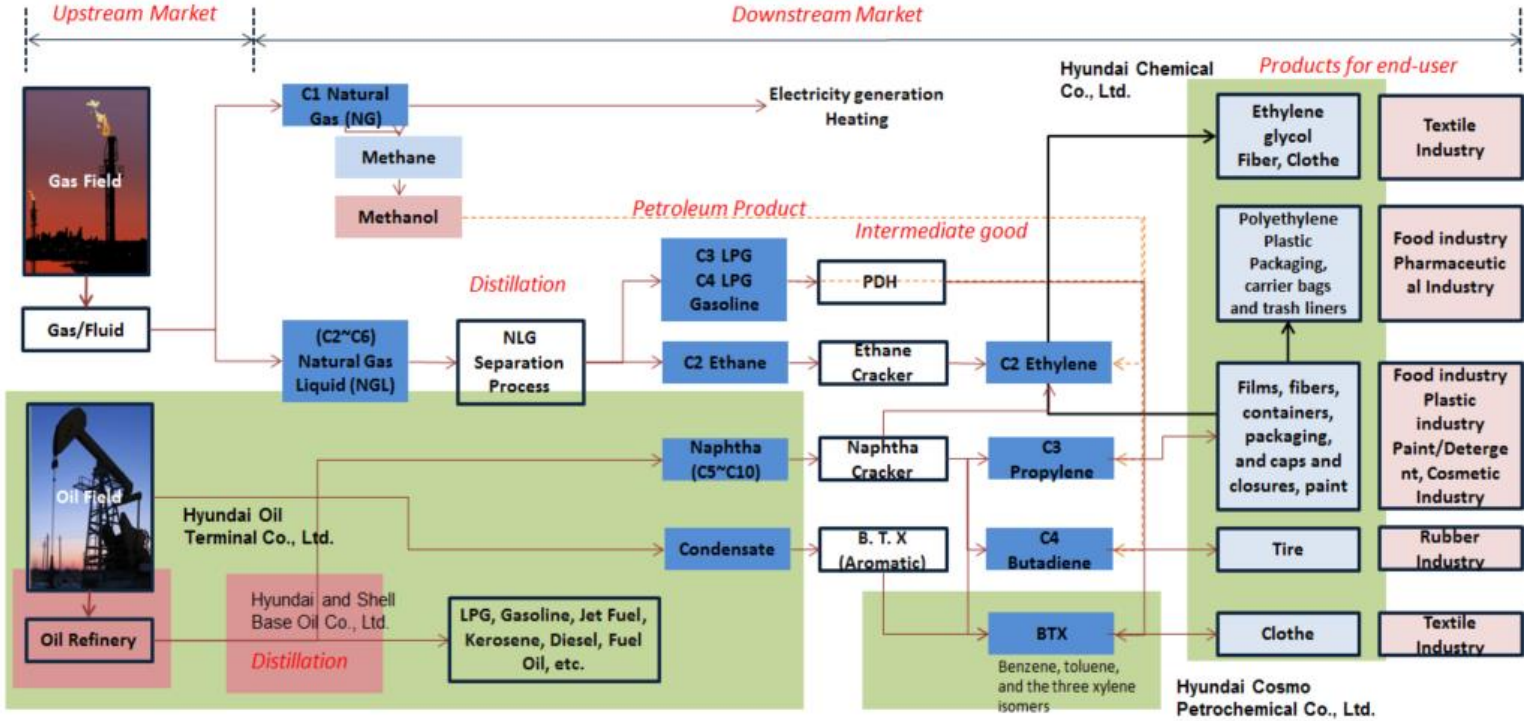


Figure 9. Focused business area of Hyundai Oil Bank Co., Ltd.

Chapter 6. Results and Conclusion

6.1 Analysis and Results

Focusing on organizational unit level of analysis, this research explores the relationship of between the different structural dimensions and organizational learning. Although prior research has explored firm level and unit level of analysis, it has yet to explore the difference structural dimensions. Based on the qualitative study, the results suggest a significant relationship between the structural dimensions and organizational learning. It has highlighted the importance of structural dimensions and how it pursuits exploitation and exploration based on the different characteristics.

Organizations that are structurally centralized imply that the decision-making authority is concentrated to a select few. The decision-maker has intimate knowledge of the daily operations while ensuring that all decisions are tightly integrated (Fredrickson 1986). As a result, there is a complete dependence to the decision-maker where the decision-making process is shaped around the decision-makers preference and interests (Miller 1987). Hence, the results demonstrate that organizations with a centralized decisions-making process are likely to be engaged with exploitation.

Structurally complex organizations are highly differentiated with number of occupations and specialists. Diversified specialists are able to provide broad range of knowledge and capabilities. Despite inter-stratum conflicts, organizations with structural complexity are able to identify different opportunities and problems while being capable

of problem-solving innovation (Sheremata 2000). Hence, the results demonstrate that organizations with a structural complexity are likely to be engaged with exploration.

Both characteristic of structural dimensions have shown opposing, yet, synergic characteristics. Under dynamic and hostile environment, organizations require structures that are horizontally complex as work requires diversified knowledge and capabilities. However, to avoid inter-stratum conflicts that results in significant delay, it is important to respond rapidly and collectively to the changing environment. The results demonstrate that organizations with a centralized decision-making authority and structural complexity are likely to balance exploration and exploitation. Overall, there was general support of the three propositions.

	Centralization	Structural Complexity (i.e., Specialization)	Organizational Learning	Attribute Domain (i.e., industry focus)
Hanwha Total Co., Ltd.	*Centralized*	*Low (Focused on single business)*	*Exploitation*	*Exploitation: Created 2 subsidiaries and 1M&A to enhance existing business line (Attributes similar)*
Hyundai Oil Bank Co., Ltd.	*Centralized*	*High (Number of business and occupational titles)*	*Exploitation and Exploration*	*Exploitation:1 M&A and 1 subsidiaries Exploration: 3 Joint venture (Completely different attributes)*
SK Innovation Co., Ltd.	*Decentralized (CIC system)*	*High (Number of business and occupational titles)*	*Exploration*	*Exploration:2 New Subsidiaries with 4 new business line*

Figure 10. Structural dimensions and organizational learning through the attribute domains of the three firms

6.2 Contributions

Several literatures have put large emphasis on balancing the tension between exploitation and exploration. More importantly, several studies have focused on either firm-level or subunit-level. Some scholars have argued that separation or decentralization of the small units enables the balance between exploitation and exploration. Smaller units that are more flexible are likely to be engaged with exploration while larger units with a set of specific focus are engaged with exploitation (Tushman & O'Reilly 1996). Other scholars have argued that providing individual freedom and own judgement to participate in different activities (i.e., alignment or adaptive activities) enables to balance exploitation and exploration. While the unit of analysis being firm-level or unit-level, less attention has been put on organizational unit-level.

As organizational structures play an important role in coordinating and controlling different activities based on the different units, it is important to analyze at an organizational unit level (i.e., Multi-unit level). This research provides substantial support of importance of the different structural dimensions (i.e., centralization and structural complexity). This research is able to provide implications as to how different structural dimensions are able to cope with the external environment. Characteristics of the different structural dimensions are likely to respond differently while it is important to acknowledge the different characteristics which largely influence organizational learning.

6.3 Limitations and Future Studies

This qualitative study suggests different meaningful directions for future research based on the limitations of this study. First, within the theoretical section, the environmental changes have not been taken into consideration. Tushman and Anderson (1986) argue that organizations are significantly influenced by the context that they are embedded in. However, this research only focuses on one aspect of the supply side (i.e., organizational structure). Environmental changes may vary from small environmental changes to large environmental changes where different organizations learning activities may range from small and incremental exploitation to large and radical exploration. Environmental changes consist various elements including competitive, political, and technological factors which is likely shape the environment differently (Tushman & Anderson 1986). These changes may fluctuate over time while different factors emerge at different time periods. In real-life, it is likely to be extremely complex. While exploration is based on long-term benefits, it is also based on high uncertainty and instability. Organizations require a certain amount of stability while simultaneously engaging in explorative activities to survive the hostile environment. This requires adopting different structural features within the organization over time. Hence, focusing only on the structural dimensions without the consideration of the environment brings certain limitations to this research.

Secondly, the type of structural dimensions only consist centralization and structural complexity; however, formalization is also one of the most important structural

dimensions that coordinate different activities within a firm (Damanpour 1991). Formalization is referred as regulations, processes and guidelines that provide guidance of different activities while acting as a frame of reference (Hage & Aiken 1967). Such guidelines are able to reduce deviations or variance from systematic approach. Hence, it is likely to affect the balance between exploitation and exploration. For example, the different rules and regulations are likely to affect the variance or explorative behaviors while putting large emphasis on incremental improvements of existing resource and capabilities that has been codified for efficiency (Fredrickson 1986) .

Further, as formalized organizations grow in size, it can either evolve towards to an organization with structural complexity or centralization. While formalization being extremely important, there are strong connections between the different structural dimensions. As Hage and Aiken (1967) argue that less and less people are involved in decision-making process while very few people are likely to make more decisions. As a result, decisions are codified into routine procedures that guide the behavior of different individuals to perform a certain task. Conversely, less formalized rules and regulations can facilitate decentralization. Hence, formalization is a very important structural dimension that has an effect on the different structural dimensions. Further research should focus on all three structural dimensions. Some organizational may consist all three characteristics of the structural dimensions while some organizations may be formed towards one of the characteristics. It is very important in clearly distinguishing their relationships with one another based on previous research.

Thirdly, this research focuses on distinctive organizational structures which are at the organizational unit-level. Ambidexterity requires managing the tensions that is created through exploitation and exploration (He & Wong 2004). The existing environment conditions foster structural inertia while experimentation of new alternatives brings high uncertainty that reduces the focus on existing competence. To understand how organizations manage these tensions and trade-off may require a multi-level unit analysis as different firms have different attributes (i.e., size, subunits, industry focus and etc.). As organizational structures reconfigure to match the changing environment, organizations may balance exploitation and exploration differently in terms of unit, firm, intra-firm and inter-firm level. Reconfiguration of the organizational structure may require a modification of a single unit or the entire organization to balance exploitation and exploration. The interrelated structural units consisting different individuals are likely to respond differently. While organizations are faced with the need to change, it is important to see how changes are initiated and implemented within the organization to balance exploitation and exploration. As decisions are implemented based on a power structure, it is important to examine how CEO, top management team (TMT) and board of directors (BoD) influence the strategic decision process. The success and failure may be determined within the process.

Further, while this research is limited to attribute domain, there are different domains that should be considered which includes functional and structural domain. More importantly, organizational learning can be explored in multiple dimensions and domains

with longer sequence in time. Future research should examine longer timeframes which firms interchange from exploration to exploitation and how this affects long-term and short-term performance (Klarner & Raisch 2013; Farjoun 2010). Accumulated organizational changes may evolve over time that may influence in modifying the organizational structure and the overall performance.

Lastly, there are number of limitations within the methodology and case analysis section. First, this research is based on a qualitative study with only 3 different cases in a single industry (i.e., petroleum industry). Secondly, the qualitative research is based on a descriptive model that provides detail descriptions based on interviews, small data, observations and etc. Unlike quantitative research where large data set enables to formulate mathematical and statistical models in a numerical form, qualitative research is based on small data set that provides detail description where it provides difficulties for generalization. For examples, interviews at individual-level may provide valuable insights and perspectives; however, this might not necessarily represent the view of the organization as various individuals consists different perspectives and opinions. Also, various industries have different characteristics that may have completely different results.

Further, the criteria for interpreting the study findings require robustness. While 2-3 cases would be a literal replication, more cases should be added as an aggregated form which is likely to be more compelling and robust. This research is limited to only 3 cases which are difficult for generalization. Overall, future study should have more cases to enhance its robustness while possibly using different sets that can verify and revise the

theoretical framework. Finally, elaborating on the robustness, qualitative research remains a possibility of having bias views. Equivocal evidence can significantly influence the process of developing the qualitative research. Absence of thoroughness and rigor in the methodology part can lead to deliberate modifications or bias views. Hence, as a limitation, a solid criteria or interpretation still lacks in this qualitative research.

Reference

Adler, P.S., 2012. The Sociological Ambivalence of Bureaucracy : From Weber via Gouldner to Marx. *Organization Science*, 23(1), pp.244–266.

Aldrich, H. & Herker, D., 1977. Boundary Spanning Roles and Organization Structure. *Academy of Management Review*, 2(2), p.217.

Amis, J., Slack, T. & Hinings, C.R., 2004. The pace, sequence, and linearity of radical change. *Academy of Management Journal*, 47(1), pp.15–39.

Argyres, N.S. & Silverman, B.S., 2004. R&D, Organization structure, and the development of corporate technological knowledge. *Strategic Management Journal*, 25(8), pp.929–958.

Bae, J., 2012. The Hazards of Leapfrog : Search Routines for Alliance Partner and Evolution of. *Seoul Journal of Business*, 18(2), pp.147–175.

Beckman, C.M., 2006. The influence of founding team company affiliations on firm behavior. *Academy of Management Journal*, 49(4), pp.741–758.

Bower, J.L. & Christensen, C.M., 1996. Disruptive technologies: Catching the wave Joseph L. Bower and Clayton M. Christensen, Harvard Business Review (January–February 1995), pp. 43–53. *Journal of Product Innovation Management*, 13, pp.75–76.

Brown, S.L. & Eisenhardt, K.M., 1997. The Art of Continuous Change: Linking Complexity Theory and Time-paced Evolution in Relentlessly Shifting Organizations. *Administrative Science Quarterly*, 42(1), pp.1–34.

Chandler, a D., 1962. Strategy and structure: Chapters in the history of American enterprise. *Massachusetts Institute of Technology Cambridge*, pp.349–407.

Cohen, M.D., March, J.G. & Olsen, J.P., 1972. A Garbage Can Model of Organizational Change. *Administrative Science QuarterlyResearch Policy*, 17(1), pp.1–25.

Dalton, D.R. et al., 1980. Organization structure and performance: A critical review. *Academy of Management Review*, 5(1), pp.49–64.

Damanpour, F., 1991. Organizational Innovation: a Meta-Analysis of Effects of Determinants and Moderators. *Academy of Management Journal*, 34(3), pp.555–590.

Dewar, R.D., Whetten, D. a & Boje, D., 1980. An Examination of the Reliability and Validity of the Aiken and Hage Scales of Centralization, Formalization, and Task Routineness. *Administrative Science Quarterly*, 25(1), pp.120–128.

Eisenhardt, K.M. & Martin, J.A., 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, 21(10–11), pp.1105–1121.

Farjoun, M., 2010. Beyond dualism: Stability and change as a duality. In *Academy of Management Review*. pp. 202–225.

Floyd, S.W. & Lane, P.J., 2000. Strategizing throughout the organization: Managing role conflict in strategic renewal. *Academy of Management Review*, 25(1), pp.154–177.

Fredrickson, J.W., 1986. The Strategic Decision Process and Organizational Structure. *Academy of Management Review*, 11(2), pp.280–297.

Gibson, C.B. & Birkinshaw, J., 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *The Academy of Management Journal*, 47(2),

pp.209–226.

Hage, J. & Aiken, M., 1967. Relationship of Centralization to Other Structural Properties. *Administrative Science Quarterly*, 12(1), pp.72–92.

Hall, R.H., Johnson, N.J. & Haas, J.E., 1967. Organizational Size, Complexity, and Formalization. *American Sociological Review*, 32(6), pp.903–912.

Hannan, M.T. & Freeman, J., 1984. Structural Inertia and Organizational Change. *American Sociological Review*, 49(2), pp.149–164.

He, Z.-L. & Wong, P.-K., 2004. Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *Organization Science*, 15(4), pp.481–494.

Henderson, R.M. & Clark, K.B., 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative science quarterly*, 35(1), pp.9–30.

Huy, Q.N. & Mintzberg, H., 2003. The Rhythm of Change. *MIT Sloan Management Review*, 44(4), pp.77–84.

HyundaiOilbank. (2015). *HyundaiOilbank*. [online] Available at: https://www.oilbank.co.kr/oil2013/main.do?action=eng .

Kimberly, J.R. & Evanisko, M.J., 1981. Organizational Innovation : The Influence of Individual , and Contextual A doption Factors on Hospital of Technological and Andministrative. *The Academy of Management Journal*, 24(4), pp.689–713.

Kim, N. (2012). *Radical organizational change is more likely to succeed*. [online] Dongabiz. Available at: http://dongabiz.com/article/pop_print/1201/article_no/1350

Kim, H. (2016). Domestic market share of refined oil products of four major petrochemical companies. [online] etoday. Available at: http://www.etoday.co.kr/news/section/newsview.php?idxno=1300076 .

Klarner, P. & Raisch, S., 2013. Move to the beat-Rhythms of change and firm performance. *Academy of Management Journal*, 56(1), pp.160–184.

Kotter, J.P., 2007. Leading change: Why transformation efforts fail. *Harvard Business Review*, 85(1), pp.96–103.

KTPM (2013). *KTPM WORLD*. [online] Available at: http://www.ktpm.co.kr/tpmworld/202/c02.html.

Lavie, D. & Rosenkopf, L., 2006. Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49(4), pp.797–818.

Lavie, D., Stettner, U. & Tushman, M.L., 2010. Exploration and Exploitation Within and Across Organizations. *Academy of Management Annals*, 4(1), pp.109–155.

Levinthal, D.A. & March, J.G., 1998. the Myopia of Learning. *Strategic Management Journal*, 14, pp.95–112.

Levitt, B. & March, J.G., 1988. Organizational Learning Barbara Levitt ; James G . March. *Annual Review of Sociology*, 14(1988), pp.319–340.

Louçã, F. & Mendonça, S., 2002. Steady change : the 200 largest US manufacturing firms throughout the 20th century. *Industrial and Corporate Change*, 11(4), pp.817–845.

March, J.G., 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2(1), pp.71–87.

March, J.G., 1981. Footnotes to Organizational Change. *Administrative Science Quarterly*, 26(4), pp.563–577.

Miller, D., 1991. Stale in the Saddle: CEO Tenure and the Match Between Organization and Environment. *Management Science*, 37(1), pp.34–52.

Miller, D., 1987. Strategy Making and Structure: Analysis and Implications for Performance. *The Academy of Management Journal*, 30(1), pp.7–32.

Mintzberg, H., 1978. Patterns in strategic formation. *Management Science*, 24(9), pp.934–948.

Mintzberg, H., 1990. The Manager's Job: Folklore and Fact. *Harvard Business Review*, 68(2), pp.163–176.

Mintzberg, H., 1989. The structuring of organizations. In *Readings in Strategic Management*. pp. 322–352.

Mintzberg, H., Raisinghani, D. & Theoret, A., 1976. The structure of "unstructured" decision processes. *Administrative science quarterly*, pp.246–275.

Olson, E.M. et al., 1995. Organizing for Effective New Product Development: The Moderating Role of Product Innovativeness. *Journal of Marketing*, 59(1), p.48.

Olson, E.M., Slater, S.F. & Hult, G.T.M., 2005. The Performance Implications of Fit Among Business Strategy, Marketing Organization Structure, and Strategic Behavior. *Journal of Marketing*, 69(3), pp.49–65.

Pertusa-Ortega, E.M., Zaragoza-Sáez, P. & Claver-Cortés, E., 2010. Can formalization, complexity, and centralization influence knowledge performance? *Journal of*

Business Research, 63(3), pp.310–320.

Pierce, J.L. & Delbecq, A.L., 1977. Organization Structure, Individual Attitudes and Innovation. *Academy of Management Review*, 2(1), pp.27–37.

Raisch, S. et al., 2009. Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance. *Organization Science*, 20(4), pp.685–695.

Raisch, S. & Birkinshaw, J., 2008. Organizational ambidexterity: antecedents, outcomes, and moderators. *Journal of Management*, 34(3), pp.375–409.

Rosenkopf, L. & Almeida, P., 2003. Overcoming Local Search Through Alliances and Mobility. *Management Science*, 49(6), pp.751–766.

Rosenkopf, L. & Nerkar, A., 2001. Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, 22(4), pp.287–306.

Ruekert, R.W., Walker, O.C. & Roering, K.J., 1985. The organization of marketing activities: A contingency theory of structure and performance. *Journal of Marketing*, 49(Winter), pp.13–25.

Schminke, M., Cropanzano, R. & Rupp, D.E., 2002. Organization structure and fairness perceptions: The moderating effects of organizational level. *Organizational Behavior and Human Decision Processes*, 89(1), pp.881–905.

Seungil, K. (2012). *Constant Innovation 1962~2012*. 1st ed. Seoul, Korea: SK Innovation.

Sheremata, W.A., 2000. Centrifugal and centripetal forces in radical new product development under time pressure. *Academy of Management Review*, 25(2), pp.389–

408.

Siggelkow, N. & Levinthal, D. a., 2003. Temporarily Divide to Conquer: Centralized, Decentralized, and Reintegrated Organizational Approaches to Exploration and Adaptation. *Organization Science*, 14(6), pp.650–669.

Simon, H., 2007. Administrative Behavior. *Bloomsbury Business Library - Management Library*, p.2.

Tellis, G.J., Prabhu, J.C. & Chandy, R.K., 2009. Radical innovation ccross Nations: The preeminence of corporate culture. *Journal of Marketing*, 73(1), pp.3–23.

Thompson, J.D., 1967. *Organizations in action: Social science bases of administration*,

Tripsas, M., 1997. Unraveling the Process of Creative Destruction: Complementary Assets and Incumbent Survival in the Typesetter Industry. *Strategic Management Journal*, 18(6), pp.119–142.

Tushman, M.L. & Anderson, P., 1986. Technological Discon- tinuities and Organiza- tional Environments Philip Anderson. *Administrative Science Quarterly*, 31(3), pp.439–465.

Tushman, M.L. & O'Reilly, C.A., 1996. Ambidextrous Organizations: *California Management Review*, 38(4), pp.8–30.

Williamson, O., 1975. Markets and hierarchies. *New York*, pp.26–30.

Yin, R.K., 2003. Case Study Research . Design and Methods. *SAGE Publications*, 26(1), pp.93–96.

Abstract (Korean)

기술적 패러다임의 변동이 극심한 산업 환경 속에서 기업들은 보다 경쟁적인 입지를 차지하기 위해 항상 변화를 추구해야 한다. 하지만 기업 조직 내부의 지식과 기술 만으로 외부 환경변화에 모두 대응하는 것에는 한계가 있기 때문에, 기업들은 조직 밖에서 새로운 지식을 습득하는 외부 학습 전략을 실시하고 있다. 기업들은 외부의 지식 소스로부터 들여온 새로운 지식을 통해 기존에 기업이 이미 지니고 있던 지식을 활용(exploitation)하여 새로운 기술을 창출하기도 하고, 완전히 새로운 기술 분야에 대한 탐색(exploration)을 통해 기술 다각화 및 신기술 분야 진출을 시도하기도 한다. 최근 많은 선행 연구들이 이러한 기업 외부 지식에 대한 활용과 탐색 활동에 있어 어떻게 하면 두 가지 학습 활동 사이의 균형(balance)를 맞출 수 있을지에 대해 논의하고 있다. 하지만 대부분의 연구들은 이러한 학습활동의 균형을 기업 레벨이나 기업 하부 부서 레벨에서 다루고 있을 뿐, 여러 부서들 사이의 상호관계에 대해 깊게 고찰한 연구가 부족했다. 즉 기업 조직의 구조(structure)적 차원에서 활용과 탐색의 균형을 맞추는 방안에 대한 연구가 필요한 상황인 것이다. 따라서 본 논문에서는 기업 조직의 구조적 특성 중 의사결정 프로세스의 중앙집중화(centralization) 및 기업 내 부서들의 구조적 복잡성(structural complexity)과 기업의 활용 및 탐색 활동 사이의 논리적 상관관계를 기업 역량 개발을 위한 여러 수단 중 전략적 제휴의 측면에서 고찰하고, Lavie & Rosenkopf 를 따라 partner attribute

측면에서 이러한 구조적 특성들을 이용하여 활용과 탐색의 균형을 이룰 수 있는 방안에 대한 명제(propositions)를 제시한다. 이러한 명제들이 실제 기업 환경 속에서 일어나고 있는지를 확인하기 위해 본 논문에서는 한국 석유산업에 종사하고 있는 세 기업에 대한 정성적 분석을 실시했다. 2005 년부터 2015 년 사이에 세 개의 석유 기업이 겪었던 조직적 변화와 외부 학습 활동에 대해 상세하게 고찰함으로써, 기업 조직의 의사결정 프로세스와 조직 부서의 구조적인 복잡성에 따라 외부 학습 활동의 양상이 어떻게 형성될 수 있는지를 분석했다. 분석 결과 기업의 의사결정 프로세스가 중앙집중화 될수록 기업들은 탐색 보다는 활용적 외부 학습에 집중하는 전략적 제휴를 설립하는 경향을 보이며, 조직 부서의 구조적 복잡성이 클수록 탐색적 외부 학습을 선호하는 전력적 제휴를 설립 하는 경향이 있다는 것을 확인할 수 있었다. 또한 의사결정 프로세스의 중앙집중화와 부서의 구조적 복잡성을 동시에 가지고 있는 기업은 두 조직적 특성 사이의 상호 보완적 역할로 인해 활용과 탐색 활동을 균형 있게 실시 할 수 있는 전략적 제휴를 설립한다는 것을 확인할 수 있었다.

주요어 : 조직 구조; 중앙집중화; 복잡성 활용; 탐색; Ambidexterity
학 번 : 2015-21198