
**THE PRIORITY OF FIRM COMPETENCE DEVELOPING FOR
TAIWANESE FLAT PANEL DISPLAY: BASED ON RBT AND
EXTENDED CASE STUDY PERSPECTIVE**

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ABSTRACT

Previous studies have illustrated that corporate competence types should be developed sequentially; however, few studies have clearly indicated which type of competence a firm should first develop to facilitate attaining other follow-up competence types. This study explored whether a firm with limited resources should first develop technological competence. By longitudinally the extended case study method tracking two Taiwan panel equipment manufacturers for 8 years, the ideal competence development path for manufacturers was determined: to first exploit technological competence and subsequently apply it to facilitate attaining market competence. This study indicated that corporate competence development was determined by resource characteristics, learning mechanisms, and development paths. If firms possess improvement resources, then they should apply an internal to external development path; in other words, these firms should first exploit technological competence and then apply the intraorganizational learning mechanisms to facilitate attaining market competence.

Keywords: technological competence, market competence, competence development path

I. Introduction

In a dynamic environment, developing new types of corporate competence to maintain corporate survival is a critical topic (Helfat and Winter, 2011; McGrath, 2001). Specifically, firms with limited resources must commit to first developing their most urgently required types of competence and applying these competence types to facilitate attaining other competence types. Previous studies on corporate competence development have mostly focused on competence development processes. For example, Wernerfelt (1984, 2011) proposed that the key factor influencing corporate diversification and growth is the resource development sequence rather than product development sequence. Danneels (2002) recommended that firms first attain technological competence and subsequently apply it to develop new products, thereby attracting new customers, creating novel markets, and harnessing customer competence. Levinthal and March (1993) reported that firms should first exploit their existing resources because doing so is more time- and cost-efficient than developing new resources. Thus, developing resources sequentially is critical for firms. Danneels (2002) briefly mentioned the sequence of developing technological and customer competence; however, most scholars have failed to illustrate competence development sequences. Firms with limited resources are urgently required to establish strategies for sequential competence development. Therefore, which type of

competence should be first developed to facilitate attaining other types of competence merits exploration because it is crucial to corporate sustainability and growth.

This study employed the longitudinal and extended case study methods (Burawoy, 1991; Danneels, 2007) to explore the competence development path of ARET Company, a Taiwan panel equipment manufacturer. By longitudinally tracking this equipment manufacturer for 8 years, the ideal competence development path for the manufacturers was determined: to first exploit technological competence and subsequently apply it to facilitate attaining market competence. This development strategy was based on the concept of applying technological competence to support customer competence, as proposed by Danneels (2002).

The key to successfully developing new types of corporate competence on the basis of existing competence types are competence learning mechanisms, two of which, namely intraorganizational and interorganizational learning mechanisms, are critical to corporate competence development (Levinthal and March, 1993). Therefore, how to assist firms in applying existing competence types to develop new competence types through interdepartmental interaction within organizations or close connections with external organizations is critical for competence development paths (Easterby-Smith, Marjorie, and Tsang, 2008). The resource-based theory (RBT) indicates that the essence of competence is resource heterogeneity and the competitive advantages it produces (Rumelt, 1984). Additionally, the dynamic resource-based view indicates that, because of organizational learning, organizational resource characteristics influence competence development paths (Tece, 1986, 2014). Furthermore, organizational learning theory (OLT) also emphasizes that knowledge exploitation and exploration should be related to resource characteristics and corporate competence development (March, 1991). Thus, we incorporated OLT into the concepts of intraorganizational learning (e.g., Levinthal and March, 1993) and interorganizational learning (e.g., Crossan, Lane, and White, 1999). Moreover, we incorporated the RBT into the concept of resource characteristics to investigate how different corporate resource characteristics, learning mechanisms, and development paths influence the manner firms first exploit technological competence, and inhibit or prioritize market competence.

The results determined that, if firms are similar to ARET Company because they also possess improvement resources, then these firms possess the resources for competence adjustment. We recommend that these firms apply an internal to external development path; in other words, these firms should first exploit technological competence and then apply the intraorganizational learning mechanisms to facilitate attaining market competence.

Finally, we offer suggestions for academic and practical applications as well as explain the research limitations and directions for future research.

II. Literature review

1. Definition of the resource-based theory

Penrose (1959) stated that only resources with unique characteristics can assist firms in generating profits. Additionally, Mahoney and Pandian (1992) reported that both tangible and intangible resources are corporate assets. Furthermore, Wernerfelt (1984, 2014) indicated that resources are the key to developing resource position barriers because they can assist firms in gaining relatively advantageous positions. Moreover, Barney (1991) asserted that corporate resources should possess the following characteristics to enable firms to generate sustained competitive advantages: value, rareness, inimitability, and nonsubstitutability. These scholars have emphasized that resource heterogeneity facilitates building a corporate competitive advantage. Regarding resource types, Noda and Bower (1996) proposed the concept of universal resources and indicated that their high adaptability and alternativity assist firms in continuously modularizing resources for competence development. Tsai and Ghoshal (1998) as well as Nahapiet and Ghoshal (1998) proposed the concept of social resources, which can produce social connectivity with external and internal organizational relationships to enable collaborations and generate opportunities.

2. Relationship between resources and competence

Scholars following the RBT have varying opinions regarding methods of using resources to develop competence. Wernerfelt (2014) stated that firms should leverage their existing resources to establish resource position barriers, thereby developing new types of competence, placing firms in advantageous positions, and generating corporate competitive advantages. Danneels (2002) reported that applying existing corporate resources to develop new types of competence involves resource exploitation and greatly influences corporate competence development; Danneels (2007) also emphasized leveraging internal corporate resources to develop new types of competence; and March (1991) asserted that two types of resource exploitation, namely, internal and external resource exploitation, are involved in exploiting corporate resources to develop competence. Internal resource exploitation is more beneficial to corporate competence development because less time and fewer resources are used for internal resource exploitation than for external resource exploitation. Helfat and Peteraf (2003) emphasized a dynamic resource-based view and indicated that corporate competence development should focus on the evolving dynamic essence of resources over time and that the evolution of internal resources determines the direction of corporate competence development. Teece, Pisano, and Shuen (1997) reported that, to respond to external and internal environmental changes, firms should achieve business prosperity by creating, integrating, combining, and allocating resources. These scholars have stressed that developing internal and existing corporate resources is the key to developing corporate competence, thereby suggesting that the RBT is critical to the development of corporate competence.

3. Competence development

According to the concept of developing competence through resources, previous studies have mostly focused on applying existing competence types to develop new competence types. For

example, McGrath (2001) reported that a firm should increase its existing competence to enrich its corporate resource database and develop new competence types, thereby enhancing the firm's survival in a dynamic environment. Danneels (2002) emphasized that a firm should apply its existing internal resources to develop first-order competence, which can facilitate attaining second-order competence. Henderson and Cockburn (1994) divided competence into two levels: (1) component competence, which is generated by applying and combining existing competence types and (2) architectural competence, which further modularizes component competence to a higher level, thereby gradually developing corporate competence.

4. Learning mechanism and competence development

Sinkula (1994) as well as Slater and Narver (1995) emphasized the three steps of organizational learning: knowledge acquisition, knowledge transfer, and knowledge interpretation. Specifically, knowledge Acquisition (KA) refers to the process of acquiring knowledge; knowledge Transfer (KT) refers to the process by which knowledge is communicated using various channels, which promotes knowledge acquisition for organizations; and knowledge Interpretation (KI) refers to the process by which one or more types of knowledge or applications are generated after knowledge transfer.

Regarding the question of how to apply existing corporate resources to develop new types of corporate competence, scholars following OLT have proposed numerous benefits of organizational learning for corporate competence development. March (1991) emphasized exploitative learning, a concept that focuses on the reuse of existing and internal corporate resources and competence. Additionally, Danneels (2007) concluded that underused and existing corporate resources should be applied for executing exploitative learning to develop corporate competence. Furthermore, Barney (1991) indicated that efficient and effective corporate competence can be produced when firms apply controllable resources and competence to develop new types of competence. These scholars have emphasized that firms should execute organizational learning and develop corporate competence by using their existing corporate resources.

However, numerous other scholars adhering to OLT have indicated that learning is not restricted to internal corporate learning; instead, external resources can be integrated to achieve interorganizational learning. For example, Yannopoulos, Auh, and Menguc (2012) emphasized applying various learning types to improve and expand existing resources for corporate competence development. Explorative learning is an innovative and entrepreneurial perspective and approach that challenges corporate conventions (March, 1991). Inkpen and Dinur (1998) proposed that firms should effectively employ interorganizational learning from external corporate channels to explore innovation options. Additionally, Holmqvist (2003) reported that firms should no longer apply their internal corporate experience and knowledge as sources for learning; instead, firms should learn according to new approaches and concepts that are external to corporations. The aforementioned scholars have stressed using innovative approaches to explore learning opportunities as well as applying external corporate resources to engage in interorganizational learning and develop corporate competence.

III. Research methods

This study employed the extended case study method for qualitative research to conduct in-depth interviews, observations, and a practical literature review of Taiwan panel equipment manufacturers. The two cases, ARET and MPG (pseudonym), that served as dichotic samples facilitated conducting comparative analyses and extensive theoretical development (Glaser and Strauss, 1967; Strauss and Corbin, 1990). Additionally, the processes of corporate competence development were longitudinally tracked for 8 years to explore how this type of development was influenced by corporate resource characteristics, learning mechanisms, and development paths. This case study involving long-term comparative analyses offered abundant and detailed survey results and findings (Rouse and Daellenbach, 1999).

Triangulation of various types of data collected through different methods can overcome the limitations of one method by counter-balancing the weaknesses of one method with the strengths of another (Jick, 1979). I used various types and sources of data to provide a rich and solid foundation for the theory development. I conducted the interview period of the present study was 8 years (from March 1, 2006 to April 30, 2014), during which 47 interviews were conducted (see Table 1 for details). The presented interview information was retrieved from the interviews with those in charge of the company; the interviewed executives were from different departments (such as, departments of Manufacturing, R&D, Marketing, Quality control, Design, Materials, and Management), and various entities and people were also interviewed (authorities, research institutes, and clients). With organizational members involved in existing resources and competence development to assess their perspectives on and experiences with new resources and competence development. Data about development processes and projects were compared and integrated across informants.

Table 1. Case company

| Firm pseudonym | Areas of activity | Age | Size: # employees/ annual sales in \$ billion | Number of interviews/ observations conducted | Multiple functional areas |
|----------------|--|------------|---|--|---|
| ARET | Automation equipment, micro-drill the entire factory equipment, micro-drill | Since 1982 | 489/ 2.25 | 25 interviews 4 interviewee | Manufacturing, R&D, Marketing, Quality Control, Design and Develop, Materials, and Management |
| MPG | Robot design, Robot application, Automation skill, Moving system, Processing machinery, Cleanroom equipment design, Pack/unpack system, Control system application | Since 1978 | 475/ 3.1 | 22 interviews 3 interviewee | |

The present study employed the extended case study method (Burawoy, 1991, 2014). Danneels (2002) asserted that adopting this method for collecting empirical data facilitates integrating, reconceptualizing, and extending theories, rather than creating theories. Burawoy (2014) also indicated that, because the extended case study method is used to compare theories and interview data and subsequently to compare concepts and theories, the two-cycle exchanges and intensive analyses thereby enhance data interpretation. The interview lasted from approximately 45 minutes to 2 hours; numerous interviewees consented to the interviews being recorded, and those who provided key information were subsequently invited to confirm the correctness of the relevant interview information (Miller, Cardinal, and Glick, 1997). Jick (1979) reported that the restrictions of employing only one research method can be overcome by adopting various approaches to collecting different types of data. Thus, in addition to the interview data, corporate documents and files also served as abundant and diverse bases for theoretical development.

IV. Technological and market competence

To theoretically interpret the technological and market competence of the research case companies, we extended the concepts of component and architectural competence proposed by Henderson and Cockburn (1994) and defined competence as a competence group formed by resources that can be continuously exploited or developed, in which a layer called composite competence is incorporated. The first layer, called component competence, refers to existing corporate competence. Additionally, the second layer, composite competence, is a group’s unique composite competence developed by applying and combining existing types of corporate competence. Moreover, the third layer, architectural competence, refers to high-end architectural competence formed by further modularizing different types of composite competence. Thus, technological competence can be divided into three layers. The first layer, component competence, refers to existing corporate manufacturing skills (T₁) (Danneels, 2002). Furthermore, the second layer, composite competence, represents the research and designs (T₂) executed by applying and combining the various types of existing corporate manufacturing skills. Finally, the third layer, architectural competence, refers to the breakthrough innovations in the processes and materials (T₃) formed by further modularizing the research and designs derived from composite competence in Table 2.

Table 2. Hierarchy of TC and MC

| Categories Items | Technological Competence | Market Competence |
|------------------------------|---|--------------------------------------|
| Component competence | Manufacturing Skills | Personal Relationship Connections |
| Composite competence, | Research and Designs | Competitor Relationships |
| Architectural Competences | Innovations in The Processes and Materials | Customer Relationships |

Market competence can also be divided into three layers of competence. The first layer, i.e., component competence, refers to personal relationship connections (M₁), which indicate the existing and external social connections possessed by corporate executives. Additionally, the

second layer, composite competence, refers to competitor relationships (M_2) formed by combining the existing and external social connections possessed by corporate executives in order to establish collaborative relationships with competitors. Finally, the third layer, architectural competence, refers to customer relationships (M_3), which modularize the various competitor relationships into connections that extend beyond competitors to crucial clients.

V. Hierarchical technological competence relationship

The corporate culture of ARET Company focuses on fostering technology and relevant competence types; thus, this company has gradually progressed from developing technological competence by coordinating existing corporate resources to enhance manufacturing skills, research design, and breakthrough innovation in processes and materials. The manufacturing skills were applied for research and design, a process of learning through experience, in an attempt to accumulate knowledge and experience from practice; in addition, the previously used storage bins, which contained personal and corporate and conventions (Argote, 2012), were applied as a basis for follow-up research and design development (Walsh and Ungson, 1991).

1. T_1 enabled the T_2 development

In ARET Company, the manufacturing skills (T_1) enabled the research and design (T_2) development, for which the slack resources from the manufacturing skills (Danneels, 2002, 2007) were applied and combined to develop a unique composite competence group (Henderson and Cockburn, 1994). Manager Chang of the Department of Materials explained the application of manufacturing skills to enable research and design (November 6, 2009):

“We wanted to develop new products and came up with the idea of using random materials to develop new products, a concept called “combining the bamboo with a kitchen knife” (in Taiwanese). For example, we developed a CRT [cathode ray tube] with a flexible manufacturing system through a combination of an FMS [functional movement system] and a CRT. At that time, our progress from developing a CRT to developing LCDs [liquid crystal displays] was very smooth. Moreover, to manufacture a hook-forming machine, we employed stainless steel and nylon coatings; that is, we produced an anticorrosive hook-forming machine with stainless steel and nylon coatings, thereby offering more choices to our clients.”

2. T_2 enabled the T_3 development

To further evolve research and design, various conventions were integrated through design to generate manufacturing process and material innovation (Obloj and Sengul, 2012). For example, we integrated several types of manufacturing technology to further modularize them into resources with high adaptability (Marino and Maritan, 2001), thereby developing new types of process technology to facilitate breakthrough innovations in processes and materials. ARET Company employed research and design to further facilitate process and material innovations; numerous examples of this can be offered. Manager Chi (June 1, 2010) indicated the following:

“...from order acceptance, we had to develop new procedures or processes to deliver our orders more smoothly; subsequently, we even improved the materials provided by our clients. Our company would not have been able to survive if we did not develop these new processes and offer these improved materials.”

General Manager Tsai also mentioned (January 12, 2007) that

“When we started to manufacture the 10th-generation panels, we served as the supplementary manufacturer for Japanese companies, during which the major Japanese manufacturers managed the entire floor design and we were only able to manage the design layout. However, by the next cycle, Taiwan companies could manage the entire floor design. The amount of capacity provided by two Taiwan manufacturing units is equivalent to that provided by three Japanese manufacturing units. We defeated them in just 4 months because we redeveloped many materials and methods.”

The paths by which ARET progressed from developing T_1 to T_2 and subsequently to developing T_3 were determined after referencing several of the interviews from this study.

VI. Hierarchical relationship of market competence

The competence development of MPG Company reflected the hierarchical relationship of market competence. Chairperson Lee (December 19, 2008) stated:

“I began working as an apprentice when I was 7 years old. Gradually, my boss’s friends also became my friends. If it wasn’t for these people who introduced businesses to me, I couldn’t have survived. The key to success is to have the competence to accept any order!”

1. M_1 to facilitate M_2

At MPG Company, the personal relationships of the chairperson enhanced the competitor relationships, and the path was developed by executives through their existing and external social connections. Subsequently, these connections could be linked to the competitive partners that were accepting joint orders, for which bilateral resources could be employed to execute cooperation regarding resources (Nahapiet and Ghoshal, 1998). Joint-order acceptance and product manufacturing can drive cooperation. In an interview, Chairperson Lee (December 19, 2008) explained the idea of using M_1 to facilitate M_2 :

“I’m really suited for working in this industry. In general, people with electrical engineering backgrounds lack knowledge of mechanical engineering, and people with mechanical engineering backgrounds lack knowledge of electrical engineering. However, I have knowledge of these two domains, and I have made many friends because of this advantage....For example, our company is collaborating well with Good Chief Industrial Co., Ltd. and Hung Hsing Electric Co., Ltd. We can complete work faster through collaboration. We tell one another about the relevant news, information, and orders, so we sometimes compete with one another and sometimes collaborate.”

Through the social networks of executives, companies can maintain normal social contact with their competitors (Kleinbaum, 2012) and thereby form competitor relationships with these competitors. Manager Chen of the Department of Design and Development indicated the following (May 13, 2010):

“...after long-term competitions, we decided to collaborate with our competitors to enhance our technology and competence....For example, Sony and Samsung were once fierce competitors, but they later joint ventured the S-LCD Corporation (2003–2009) and collaborated to produce the seventh-generation panels.”

1. M₂ to facilitate M₃

Cooperation among business competitors facilitates integrating resources and technology, thereby assisting firms in collaborating with major integrated clients (Gnyawali and Park, 2011). In an interview, Manager Chang (January 30, 2009) reported that effectively using competitor relationships can enhance customer relationships; hence, collaborations with competitors enable firms to attract more crucial customers:

“Our company released the automated warehousing system for the eighth-generation panel in 2008. Because this set of systems was approximately 30% cheaper than the system imported from foreign countries, it thus drew the attentions of AU Optronics and a Japanese competitor, and AU Optronics ordered five sets of our system and the Japanese competitor also collaborated with us.

Chairperson Lee (January 13, 2014) also stated the following:

“In the early period, we learned the technique for manufacturing electron guns from the Kaohsiung factory owned by our competitor Hitachi; subsequently, we focused on the research and development and became capable of delivering orders within 3 months. In addition, because our product price was cheaper than that of other companies, our competitor Hitachi asked us to manufacture the cathode laser welding machine for electron guns.”

To address the hierarchical relationship of the competence of the researched case companies, the development of technological and market competence stressed by the two case companies revealed that applying and combining the first-layer, component competence, enabled the development of a unique type of composite competence; subsequently, modularizing various types of composite competence could have eventually resulted in the development of high-end architectural competence (see Figure 1 for details).

VII. Prioritized technological competence development and intraorganizational learning mechanism

ARET Company applied its technological competence to develop market competence and stressed prioritizing the development of the following factors for enhancing technological competence: manufacturing skills, research and design, and breakthrough innovations in processes and materials. In addition, through the intraorganizational and interpersonal exploitative learning (March, 1991), the personal, competitor, and customer relationships that were critical for market competence could be further developed (Helfat, 2000). The fact that manufacturing skills (T_1) enhance personal relationships (M_1) is based on the reasoning that technology is linked with market information (Ployhart and Moliterno, 2011), for which the importance of technological elements in client management is emphasized. Specifically, the existing technological competence was applied to strengthen client services, thereby earning client trust (Eggers, 2012) and building in-depth professional and personal relationships with the clients.

1. T₁ to enhance M₁

The key for T_1 to enhance M_1 is the organizational learning atmosphere and mechanism within the company, in which intradepartmental, interdepartmental, and personal knowledge should be

employed to distribute technological knowledge to other departments, including the department of sales (Harvey, Palmer, and Speier, 1998). The aim was to employ the concept of exploitative learning to transfer the existing and internal corporate technological skills to the professionals and executives of all departments (*kA*), thereby enabling these personnel to learn to provide in-depth services to clients (*kI*).

The learning network at ARET involved weekly formal departmental meetings, monthly cross-departmental meetings, intradepartmental apprenticeships, informal chats during meal times, and activities held during voluntary overtime working periods. Employees were encouraged to participate in these diverse meetings and activities to transfer interdepartmental professional technological knowledge (*kT*). Subsequently, the knowledge could be transferred to clients outside the company, and the professional executive–client relationship could also be established. The executives' personal technological competence was sufficient to enable them to professionally interact with the technology licensors from the major foreign companies; specifically, professional technological competence was crucial for clients in engaging in long-term collaboration with the company.

2. T_2 to enhance M_2

When the manufacturing skills supported the corporate competence in research and design, competitors naturally pursued a horizontal alliance and collaboration, thereby engaging in cooperation with the market competitors (Badaracco, 1991). In Taiwan, the common method applied for research and design (T_2) to enhance competitor relationships (M_2) is using strategic alliances derived from joint research and development (R&D) or capacity sharing. The premise of strategic alliances in joint R&D is that firms are required to possess design, research, and development competence to integrate various systems (Wernerfelt, 2011), thereby enabling further social interaction with competitors and facilitating competitor relationships.

The following is a classic example of an intraorganizational learning mechanism in which T_2 enhance M_2 : The department of precision machinery at ARET Company transferred relevant knowledge on injection molding and laser marking technology to the departments of integrated circuit and precision machinery (*KA*), and the technical staff members at different levels from these departments jointly developed various types of systems (e.g., plastic injection mold components, automated semiconductor punching machines, and automated semiconductor laser marking machines) through the following interaction and joint learning channels (*KT*): weekly meetings, monthly meetings, gatherings after work, and during free time when socializing with clients. These types of technology involved in new R&D (*KI*) attracted the attention of ARET's Japanese competitor Shibaura Mechatronics Corporation, which invited ARET to jointly develop new products.

3. T_3 to enhance M_3

Taiwanese equipment suppliers must be cost-effective and innovative in manufacturing processes and materials to be recognized in the global equipment supply chain, a process that may require a long-term commitment (Lin, Chen, Sher, and Mei, 2010). Using the strategy of

applying breakthrough process and material innovations (T_3) to facilitate forming customer relationships (M_3), ARET satisfied its customers and reduced costs through modular innovations in manufacturing processes and materials (Danneels, 2002), thereby developing connections with its crucial customers.

To create an intraorganizational learning mechanism in which T_3 enhances M_3 , ARET management led innovative learning sessions. This innovative learning was developed on the basis of the existing LCD manufacturing technology as well as the hardware and software control technology (*KA*). Specifically, General Manager Tsai, who is an innovator, led the departments of LCD, electromechanical engineering, and materials in person to encourage brainstorming among the staff in these departments (*KT*), and the corporate war room gradually developed diverse process innovations such as the automatic optical and automatic test equipment (*KI*). For example, ARET Company collaborated with major companies such as Statinc Company.

VIII. Resource characteristics and selection of a competence development path

When addressing the influence of resource characteristics on the selection of a competence development path, scholars following the RBT have all emphasized applying static resources to develop dynamic competence (Wernerfelt, 1984; Danneels, 2002; Helfat, 2000). The key to competence development is to first examine the existing resource characteristics and subsequently select the paths for corporate competence development. The corporate culture of ARET Company is focused on technological research, development, and innovation; in addition, its improvement resources can serve as a basis for developing an internal to external path for corporate competence development. Through intraorganizational learning and exchange, various levels of technological competence can be attained and subsequently applied to facilitate developing different levels of market competence. Director Shi of the automation business division (January 31, 2012) stated the following:

“The founder of our company developed the first robot in Taiwan, and thus we can say that engineering is in our company’s DNA. The reason why our company is able to continuously develop to this day is greatly related to our initial mission: to compete with Japanese companies in automation technology!”

VIII. Conclusion and suggestions

Through the cases, we identified the sequence and mechanism for competence development. The priority for corporate competence development was determined by corporate resource characteristics. If a firm possesses improvement resources, then it should follow the path of internal to external development. Specifically, technological competence should first be attained and then elevated through the intraorganizational learning mechanism to create innovative products and new product markets, thereby driving the development of corporate market competence. If a firm possesses social resources, then it should follow the path of external to internal development. Particularly, market competence should first be attained and then enhanced through an interorganizational learning mechanism to develop innovative resources and new types of product technology, thereby facilitating attaining corporate technological competence.

1. Academic implications

Scholars following the RBT have emphasized examining the course of corporate growth from a resource-based rather than a competence-based perspective. On this basis, the present study offered a new perspective for research in the field of strategic selection that can especially benefit companies with limited resources. The concept of sequentially developing resources forwarded in this study was similar to the concept of resource allocation proposed in previous studies. Similarly, this study can serve as a reference for firms during corporate strategic development. When existing types of competence are applied to sequentially develop other competence types, including second-order competence, (Danneels, 2002), decision-makers can select various paths and mechanisms for corporate competence development on the basis of the different paths derived from organizational learning mechanisms.

Scholars adhering to the RBT have indicated that, in general, corporate resources are not fully utilized (Penrose, 1959). The present study investigated an approach to maximizing the use of corporate resources: viewing corporate competence as a surplus for developing other types of competence. However, this approach has not been seriously considered in previous studies, and, by using the paths of competence development, the present study was the first to evaluate this approach. Statements from a few other studies (Wernerfelt, 1984; Danneel, 2002, 2007; Noda and Collis, 2001) related to the present study found a correlation among different types of competence development; nevertheless, the development mechanisms indicated in these previous studies have never been explored in detail. We integrated the RBT and OLT to investigate the corporate experience value derived from the various mechanisms on which different paths of competence development ultimately depend. Moreover, the RBT and OLT are correlated regarding resource allocation and competence transfer; specifically, a lack of component resources may restrict competence development. Critical mechanisms and influences are also involved in the processes of resource allocation and competence transfer.

We also indicated the lack of literature on the mechanisms of competence development. The concept of resource allocation, which includes a transition from general resources to specific types of competence, was addressed to explore cases involving competence development. We supported the OLT-proposed concept of internal and external learning because only an appropriate knowledge learning path can facilitate competence development, and the research results corresponded with those of March (1991). In addition to this concept, we also emphasized the importance of the mechanism for competence development, for which the connection between resources and competence was not necessary but sufficient and for which the relevant mechanism was necessary and sufficient. In addition, competence was not completely developed on the basis of endogenous variables; numerous paths required external environmental stimuli. With regard to knowledge management, this study also revealed the segmentation between knowledge exploration and application. To address the importance of knowledge management in strategy studies, future researchers should consider viewing a firm as a bundle of capabilities or knowledge as a critical perspective for developing the following, all of which are crucial for corporate growth: cross-departmental or cross-organizational strategic knowledge management,

competence development groups, and interdisciplinary platforms for competence and knowledge enhancement.

Firms possessing improvement resources should employ the path from internal to external development; specifically, these firms should first develop intrafirm technological competence to promote the continuous exploitation of internal corporate resources and development of new types of competence, thereby facilitating the attainment of external market competence. Leonard-Barton (1995) and Conner (1991) reached similar conclusions, emphasizing that a firm should first develop its existing corporate technological resources and then develop its new product markets; in other words, a firm should develop sequentially: It should first invest technological resources to attain market resources and then follow an inside-out corporate development path. Danneels (2002) indicated that a firm should employ its existing technological competence to service its new customers and markets, a process that symbolizes the following: internal to external development, sequential competence development from technological to customer competence, and application of technological competence to facilitate attaining customer competence. Rothaermel and Deeds (2004) reported that a firm with superior technological competence should commit to exploiting its manufacturing and marketing resources to benefit its promotion of commercialized products and new market development. This finding is similar to that proposed in the present study: technological competence should be applied to facilitate market competence development.

Danneels (2002, 2007) regarded using corporate resources as critical for attaining corporate competence. The present study concluded that leveraging and utilizing internal corporate resources are the key to corporate competence development and indicated that connecting external corporate resources is another option for developing corporate competence.

2. Management implications

We determined that firms with limited resources and are constrained by factors such as resources, costs, and limited efficiency should develop their most urgent and necessary types of corporate competence; subsequently, these types of competence can be applied to facilitate the development of follow-up competence types. ARET Company first developed its technological competence and utilized its intraorganizational learning mechanism to enhance corporate technological resources and competence; subsequently, this company researched and developed new manufacturing strategies as well as innovative products and equipment in order to develop new product markets and facilitate market competence attainment. By contrast, MPG Company first developed its market competence and employed an interorganizational learning mechanism to capitalize on the market synergy and synergy effects derived from other firms, thereby benefitting from the technology and knowledge of other firms and promoting the development of corporate technological competence.

We regarded resource characteristics as the key influence on the sequence of corporate competence development; thus, this study can serve as a reference for firms in deciding on directions for corporate development. To avoid misallocating and wasting resources (Schilling,

1998), firms with limited resources can fully use and integrate its resources, invest them in developing the most urgent and necessary type of corporate competence, and subsequently employ this type of developed competence to facilitate attaining other follow-up competence types. Exploiting existing resources or exploring external resources are all applicable to competence development; the key is whether learning mechanisms internal or external to organizations can enable the attained competence types to assist in developing other competence types in the future. Thus, managers should not focus on whether corporate resources are derived internally or externally; instead, they should consider resource coordination, the mechanism of resource development, and resource characteristics required for competence convergence to appropriately and effectively distribute the most valuable corporate resources.

3. Research limitations and suggestions for follow-up research

Researchers and firms intending to apply the results of this study should note that the resources were only divided into two categories according to the characteristics of the cases and that the research on competence path development merely explored technological and market competence. The relationships among other types of resource competence as well as other development paths and mechanisms can be discussed in follow-up research. Future studies can also consider extending the research on firm competence development to corporate alliances (Lane and Lubatkin, 1998) as well as to corporate mergers and acquisitions (Eisenhardt and Martin, 2000; Karim and Mitchell, 2000). To date, the confirmable research on corporate growth suggests that the key to this growth is balanced development and connections between existing and new competence types (Floyd and Lane, 2000; Holmqvist, 2003). This study constitutes preliminary research in the strategic research domain, and follow-up studies can conduct in-depth investigations on the applicability of different competence development paths and correlations among resources. Identifying existing competence types (resources) is an unpredictable process. In addition, various types of situational constraints are involved in the paths and mechanisms of competence development, and implementing relevant systems and coordinating organizational structures and cultures are challenging; all of these problems merit investigation in future research. The results of this study were limited by the strong intuitive and conceptual ideas involved in the cases; thus, future researchers may consider employing quantitative methods to verify the research results.

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