

Building Technological-innovation-based Strategic Capabilities in a Textile Company in China: a Dynamic Resource-based-view ¹

Ju LIU

School of Economics and Management, University of Electronic Science and Technology of China,
Chengdu, China
liuju@uestc.edu.cn

Angathevar BASKARAN

Business School, Middlesex University, London, UK
a.t.baskaran@mdx.ac.uk

Shiming LI

School of Economics and Management, University of Electronic Science and Technology of China,
Chengdu, China
lism@uestc.edu.cn

ABSTRACT

This paper focuses on the practice of mobilizing key resources to build strategic capabilities based on technological innovation in a textile company in China. We propose an analytical framework on the basis of RBV theory and value chain analysis to determine the pattern of how different bundles of the key resources contributed to the strategic capabilities in our case company. We also adopt a dynamic perspective to explore the evolutionary history of the firm's strategic-capability-building so as to see the process of how the firm's key resources contributed to its strategic capabilities. We found that the firm's technological-innovation-based strategic capabilities were broadly influenced by neither technological resources, nor innovation resources, but organisational culture, human resources and organisational structure, among whom human resources is the most dynamic one. To build strategic capabilities based on technological innovation, firms need to pay as much attention to foster, organise and mobilize their human resources, organisational culture, and organisational structure as, if not more attention than, they pay narrowly to technological resources and innovation resources.

KEY WORDS: Technological innovation, Strategic capabilities, Dynamic Resource-Based-View, Textile company

1. Introduction

To survive intensive competition, firms must be innovative. But what makes a firm innovative? What kinds of resources make significant contribution to firm's innovation capabilities? Does good technological resources and rich innovation resources result in stronger innovation capabilities? How can a firm build up technological-innovation-based strategic capabilities by fostering and mobilizing its resources? Answering these questions is of great practical and

¹ This article is based on work carried out under the project "Research on the Dynamic Relationship between the Structure of Technological Innovator Network and the Performance of Technological Innovation in Enterprises: a Comparative Case Study in China and Europe". This project is financed by Youth Science and Technology Fund from University of Electronic Science and Technology of China.

theoretical value. A common bias related to technological innovation is built upon a “self-evident” assumption that science and technology is the major if not the only source of technological innovation. This can be seen in many innovation researches and surveys in which R&D expenses and outcome was taken as the main representative of technological innovation capability. More recent work highlighted the importance of other factors to successful innovation in low and medium technology sectors where formal science and technology plays a secondary role (Gu et al, 2008). But they focus more on external factors, such as market, suppliers, and customers, with the firms remain black boxes. Another weakness in research on technological innovation is that most of the literatures focus more on high-tech firms. Take ABI/INFORM database as an example, we found 367 papers by the key words of technological innovation and high-tech, but only 5 papers by technological innovation and low-tech or mid-tech or traditional industry.

This paper focuses on practice of mobilizing key resources to build strategic capabilities based on technological innovation in a traditional textile company in China. We try to determine the mechanism of how different bundles of key resources contribute to strategic capabilities in such company. We review how the company’s strategic capabilities emerged, developed and changed through fostering and mobilizing key resources over a period of ten years. This paper’s contributions are two fold. First, we develop an analytical framework, which is formed on the basis of RBV theory and value chain analysis, to assess the effect of the company’s key resources on its strategic capabilities in order to understand the pattern of how the firm’s key resources contributed to its strategic capabilities. We employ a dynamic perspective to examine the evolutionary history of the firm’s strategic capability-building so as to see the process of how the firm’s key resources contribute to its strategic capabilities. Second we study the traditional industry in a developing country, an area which has not been the main focus of innovation researchers, so as to add new knowledge for innovation research and especially for those which are related to resource-based view (RBV) of strategic management.

This paper is organized into six sections. In the second section, we begin with a theoretical overview to discuss the development and progress of the RBV in the past decades. We explain the reason why we choose the RBV as our theoretical framework and what are the limitations of our choice. We also define the two key concepts---resource and capability---in this paper and discuss the relations between them. In the third section, we demonstrate the research methodology used in our study. In the fourth section, we introduce the general background of China’s textile industry and the brief situation of our case company. In the fifth section, we identify the company’s key resources and strategic capabilities. We adopt our framework to assess the effect of key resources on strategic capabilities. Then we analyze how the strategic capabilities of this company evolved in the past ten years. In the final section, we draw some conclusions and propose some policy suggestions.

2. Resource-based view (RBV) — Theoretical Framework: Strengths and Limitations

The resource-based view (RBV) is a strategic theory for understanding why some firms outperform others. It provides an explanation of competitive heterogeneity between firms. It is also a widely-adopted analytical tool of assessing a firm's internal strengths and weaknesses.

Classical RBV theory was contributed by Penrose (1959) almost half a century ago. She argued that a firm is more than an administrative unit. It is also a collection of productive resources. The disposal of the resources between different users over time is determined by administrative decision. Penrose contributed to our knowledge of the creation of competitive advantage, sustaining competitive advantage, isolating mechanisms, and competitive advantage and economic rents (Kor and Mahoney, 2004).

Modern RBV theory of the firm was introduced by Barney (1986, 1991), Dierickx and Cool (1989), and Peteraf (1993). Their works assumed that each firm is a collection of key resources and capabilities that determines a firm's strategy. Above-average returns are earned when the firm uses its core competencies to establish a competitive advantage over its rivals. With the progress in the research on RBV, it has become clear that the RBV extends beyond the assets of an organisation and reaches into its capabilities which have more relation with process and activities.

Recent research in the RBV focuses on the dynamic aspects of capabilities (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997; Kogut & Zander, 1992). Dynamic capabilities are conceptualized as a firm's ability to build and/or extend basic capabilities to deal with changing environments (Teece et al., 1997). A shift in focus to dynamic capabilities reduces if not eliminates the applicability of the valuable, rare, inimitable, and nonsubstitutable (VRIN) framework (Barney, 1995) because the emphasis of the strategist shifts from trying to protect sources of current competitive advantages to continuously creating resources and/or capabilities to yield future competitive advantages (Winter, 2003).

Integrated dynamic models and frameworks were developed on the basis of previous research on RBV. Helfat (2003) introduced the concept of the capability lifecycle (CLC), which articulates general patterns and paths in the evolution of organizational capabilities over time. It links together the various strands of resource-based theory (Wernerfelt, 1984; Rumelt, 1984; Teece et al. 1997), including "routine-based" (Nelson and Winter, 1982) and "knowledge-based" theories (Kogut and Zander, 1992; Winter, 1987; Grant, 1996). It provides a structure for a more comprehensive approach to dynamic resource-based theory. Mathews (2006) developed the RARE framework which is posed in a general setting of disequilibrium in contrast to the equilibrium-based assumptions of neoclassical economics. The RARE model captures the three major insights of the current views and perspectives, namely RBV (resource-based view), ABV (activity-based view), and DCP (dynamic capability perspective), in both a comparative static setting as well as a dynamic setting. It provides a context in which the existing frameworks reinforce each other and can all be utilized. All these efforts illustrates why resource-based theory

as a whole must be understood in dynamic terms.

We choose RBV as the analytical framework because the inherent logic of the RBV is compatible with the nature and character of our case study. Resources are the fundamental units of value generation. It can be specialized and bundled together in highly distinctive configurations to lend firms special competitive advantages. The resources in a real economy are in a constant state of flux accounting for observed phenomena of competitive and evolutionary dynamics (Mathews, 2002). The resource-based approach sees firms with superior systems and structures being profitable not because they engage in strategic investments that may deter entry and raise prices above long-run costs, but because they have markedly lower costs, or offer markedly higher quality of product performance (Teece et al., 1997). This approach assumes that firm's outstanding performance comes from the rents accruing to the owners of scarce firm-specific resources rather than the economic profits from product market positioning. Competitive advantage lies upstream of product markets and rests on the firm's idiosyncratic and difficult-to-imitate resources and capabilities. In the specific case of our study, the Grace Corporation is a chemical fiber manufacturer in textile industry. Its main products are semi-finished products or the materials for downstream enterprises like weaving companies and apparel manufacturers. The product and market structure did not change as quickly as those of the emerging industries in the past ten years. The most crucial factor is cost and not market positioning. Grace continually and effectively decreased the production cost by various kinds of technological innovation in the past ten years and has become one of the most competitive players in the chemical fiber industry in China. In this context, analyzing the Grace's special bundle of resources and capabilities, examining the sophisticated relationship between its resources and capabilities, exploring the evolutionary history of its strategic capabilities on the basis of RBV theory has great potential to reveal the complicated dynamics of its competitive success and to illuminate theoretical and practical implications.

The limitations of our choice of RBV are mainly in two aspects.. First, RBV alone does not capture all the essences of competitive advantage of the firms. RBV provides no perspective on why and how some firms rather than others accumulated valuable and inimitable resources, or indeed what made these resources valuable and inimitable (Lazonick, 2002a). In order to explain competitive advantage, the RBV must incorporate the evolution over time of the resources and capabilities that form the basis of competitive advantage (Helfat and Peteraf, 2003). We try to get in touch with the operating path and organisational process of Grace to better understand how the company accumulated and deployed resources for building capabilities and acquiring competitive advantage, and how their strategic capabilities emerged and developed in the light of evolutionary economics. Second, RBV focuses on the internal factors and ignores the external elements . A complete model of strategic advantage should adopt both the internal dimension which is based on periodic reviews of the fitness of the firm's current resource stock and the external dimension which is oriented towards an appraisal of the resource endowments of outsiders such as

competitors, customers, suppliers, and so on. In the case Grace, it will be interesting to investigate and analyse both internal and external dimensions. However, in this paper we restrict our focus to mainly the internal dimension. That is, we just try to explore part of the reasons (internal to the firm) why Grace is successful in terms of technological innovation and economic performance. For this goal we believe that employing the introversive perspective of RBV is an appropriate approach. We will leave the external dimension of this case study for future research.

Furthermore, it is also important and relevant to briefly discuss the concept of resource and capability. Resources in this paper are inputs into a firm's production process (Hitt, Ireland and Hoskisson, 2001). A firm's resources can be classified into two categories: tangible resources and intangible resources. Tangible resources are assets that can be seen and quantified. Intangible resources are rooted deeply in the firm's history and that have accumulated over time. Barney (1991) and Grant (1991) classified tangible resources into four forms, financial resources, organisational structure, physical resources and technological resources. Hall (1992) and Grant (1991) identified three kinds of intangible resources, human resources, innovation resources and reputation resources.

Capability in this paper is defined as the firm's capacity to deploy resources that have been purposely integrated to achieve a desired end state (Hitt, et al., 2001). Capabilities enable the firm to create and exploit external opportunities and develop sustained advantages when used with insight and adroitness (Lengnick-Hall and Wolff, 1999).

As a set of routines, capability is characterized by the nature of process, evolution, context-dependence, and path-dependence. First, capability is part of a process and an evolutionary concept. The essence of competences and capabilities is embedded in organisational processes of one kind or another (Teece et al., 1997). Capabilities bridge the resources and the activities which directly lead to performance of a company. As Penrose (1959) has pointed out that the services yielded by resources are a function of the way in which they are used. It is the process of application or use of a resource that determines the services it will yield. More recent researches on the evolution of capabilities (Helfat and Peteraf, 2003; Winter, 2000; Eisenhardt and Martin, 2000; Karim and Mitchell, 2000,) show that capabilities evolve over time through complex interactions among tangible and intangible resources by the process of learning. Second, capabilities are context-dependant. Capabilities are embedded in an organisation and its structure, and are specific to the context (Teece, Pisano and Shuen 1997; Cohen et al, 1996; Inkpen and Crossan 1995). On the one hand, capabilities emerge in a specific context, and on the other hand, the firm's capabilities must have a coherence or strategic fit in order to acquire complementarities to achieve competitive success. Third, capabilities are path-dependent. It is well recognized that routines/capabilities are path dependent and shaped by history (Nelson and Winter, 1982; Levitt and March, 1988; Dosi, Teece and Winter, 1992; Malerba and Orsenigo, 1996; Teece, Pisano and Shuen, 1997).

3. Research Methodology

We use phenomenology research methodology and the case study method to understand how resources contributed to capabilities and how the strategic capabilities evolved in the past ten years in the company. Rouse and Daellenbach (1999) suggested adopting fieldwork based or ethnographic-type approach to do a research based on RBV. Zahra and Pearce (1990) supported in-depth case studies as a promising approach for research in strategic management. In organisational research, the case study method is one of the frequently adopted research methods, and the appropriateness of the method is well documented (Eisenhardt, 1989; Pettigrew, 1990). Different sources of evidence are utilized in our research, including questionnaire, interviews, direct observation, archives and statistics.

In the data collection phase, we used one semi-structured questionnaire to identify the key resources and strategic capabilities of the company and to measure the effect of the company's key resources on its strategic capabilities. We administered 35 questionnaires among the board members, vice presidents and middle-level managers and received 18 valid responses. We conducted 15 interviews, including the President and Chair of the Board, the vice presidents, and the managers of the mid-level management team from six different sections, as well as the engineers and the workers, both at the old and new locations of Grace. Typically each interview lasted for 1 hour. The interview phases lasted 6 non-consecutive weeks from 2005 to 2006. All interviews were well recorded but not taped since the respondents were reluctant towards tape-recording. Informal discussions with the members of the organisation provided us with a better understanding of the important themes underlying the firm's practice of technological-innovation.

In the data clarification and complementation phase, we contacted Grace's managers via email and telephone for further information and data, and to clarify unclear points from the previous interviews. In 2007 we conducted three more interviews with the president and the mid-level managers to update certain information. For more complementary information, the data from another survey, which is part of the Project entitled "Investigation and Case Study of the Situation of Intellectual Property Rights in Sichuan Import & Export Enterprises", was also used. In this survey, we investigated 235 import-and-export-led companies with over US\$ 2 million annual turnover on export and received 65 valid questionnaire responses.

For data analysis, we developed an analytical framework combining the theoretical structure of the RBV with the value chain analysis to measure the effect of the company's key resources on its strategic capabilities. We adopted a dynamic perspective of RBV to examine the evolutionary history of the company's strategic capabilities.

4. Case Description and Background

China's textile industry has become an important industry with tangible competitiveness in the international market. The National Development and Reform Commission reported that China's textile production reached 2.46 trillion Yuan (US\$315 billion) in 2006, surging 229 per cent from 2002.² However, we observed that the profits of Chinese textile exporters did not rise simultaneously, and many even experienced a drop. The reasons behind this may be both external and internal.

From external perspective, increasing and diversified international trade protectionism in international market has affected and will continue to reduce the potential profits of Chinese textile enterprises. The expanding investment on textile factories has led to serious problems of oversupply as well as disorder in this industry.

From internal perspective, Chinese textile enterprises are still weak in innovation, R&D, core competencies, and brand recognition. The firms are on the lowest level of the value added chain of the global textile trade. The competencies of textile firms are based on low labor cost which no longer brings them much profit. They have to widen their profit margins to cushion their firms against future shocks from changes in global trade rules as well as international market conditions. Therefore, their survival and sustainable development depend on whether these companies can restructure their competitive strategy on the basis of innovation to acquire competitive advantages, and whether they can implement their innovation strategy according to the changes in domestic and global competition.

Our case company Yibin Grace Group Limited Corporation is located in Yibin city of Sichuan province in Southwest China. It is a state-owned-enterprise and has grown out of a small chemical fiber factory founded in 1984. Till 1997 it was still a small factory on the edge of bankruptcy with 3,000 employees and production output of 21,000 tons. Over the years, it has grown to be a group with five subsidiary companies, 12,000 employees, 60,000 tons of total production of coherent textile fiber and 70,000 tons of thick liquid dregs of cotton pulp. It is now the biggest manufacturer of viscose fiber in the world. The domestic market share of Grace's viscose fiber reached 33% and international market share is 17% in 2006. Grace has 30 economic indicators ranking first in China's chemical fiber industry, including labor-productivity, return on equity, profit margin, and growth rate of investment return. Their products are exported to 29 countries in Europe, North America, Asia, and Middle East.³ By 2006, Grace had 87 patents compared to the average of 8.5 patents for the 64 investigated import and export enterprises in Sichuan province⁴. In 2007 Grace acquired 17 new patents while its three main competitors

² Source: National Development and Reform Commission, *Analysis Report On Textile Industry Operation 2006 and Trends Prediction 2007*, http://www.sdpc.gov.cn/jjyx/gjyx/fzt20070322_122882.htm

³ Source: Publicity Department, Yibin Grace Group Co., Ltd.

⁴ Source: Soft Science Project of State Intellectual Property Office of People's Republic of China "Investigation and Case Study of The Situation of Intellectual Property Rights In Sichuan Import & Export Enterprises"

together acquired just 8. New product accounted for 50% of Grace's product categories. The annual R&D as percentage of sales has increased from 3 % to 9% from 2000 to 2007 compared with the average level of 0.2~0.5% in the industry.⁵

5. Case Data and Analysis:

5.1 Current Key Resources and Strategic Capabilities in Grace

We analyze our case company Yibin Grace Group in backward chronology. First, we assess the current resources and capabilities of Grace as a successful incumbent in the chemical fiber industry. We examine the effect of the key resources on Grace's strategic capabilities. Then, in the light of evolutionary thinking and dynamic RBV theory, we look back over the past ten years to see how Grace captured and configured its resources and how Grace built, enhanced, and renewed its capabilities to achieve today's competitive success.

First, we categorize and analyze the resources and capabilities of Grace respectively. Second, we pick out the strategically important resources and capabilities, namely key resources and strategic capabilities, from all the resources and capabilities. Then we measure the effect of key resources on strategic capabilities to see how the bundled resources contribute to capabilities with synergy.

We divide Grace's resources into two categories: tangible resources and intangible resources. We adopt Barney (1991) and Grant's (1991) typology of tangible resources to analyze Grace's tangible resources which is shown in Table 1. They classified tangible resources into four categories: financial resources, physical resources, organisational structure, and technological resources. We consult Hall (1992) and Grant's (1991) categorization of intangible resources to analyze Grace's intangible resources which can be seen in Table 2. In Hall and Grant's typology, intangible resources are classified into two main categories: people-dependent and people-independent.

We showed these tables to Grace's managers in our semi-structure interviews and asked them two questions. How is each resource important to Grace's strategy? How is the situation of each resource compared with Grace's main rivals? Then the resource which is both important to strategy and superior to rivals is considered to be Grace's key resource at present.

Table 1: Tangible Resources of Grace

Category	Content	Importance to Strategy	Compared with Rivals	Key Resources
Financial resources	Borrowing capacity and ability to generate internal funds	High	Equivalent	No
Physical resources	Sophistication and location of plants and equipment, access of raw material	Ordinary	Inferior	No
Organisational structure	Formal reporting structure, and formal controlling, planning and coordinating system	High	Superior	Yes
Technological resources	Stock of technologies, like patents, trademarks, copyrights, and trade secret	High	Superior	Yes

⁵ Resource: Science and Technological Administration Department, Publicity Department, Yibin Grace Group Co., Ltd.

Table 2: Intangible Resources of Grace

	Category	Content	Importance to Strategy	Compared with Rivals	Key Resources
People-dependent	Human resources	Knowledge, skills, ability to learn, managerial capabilities	High	Superior	Yes
	Innovation resources	Ideas, scientific capabilities, capacity of innovation	High	Superior	Yes
People-independent	Reputation resources	Reputation with customers and suppliers	High	Equivalent	No
	Organisational culture	Basic pattern of shared assumptions, values and beliefs	High	Superior	Yes

We identify two kinds of capabilities of Grace according to the value chain analysis. The value chain is a template that the firm uses to understand its cost position and to identify the multiple means that might be used to facilitate the implementation of its business level strategy (Dess, Gupta, Hennart and Hill, 1995). The reason why we introduce value chain analysis into capability analysis is that capabilities are often developed in specific functional areas or in a part of a functional area and value chain just gathers up all the functions in value-added process of a firm. In addition, capabilities are embedded in company's production process and the concept of value chain activities is a process view of the firms. A firm's value chain is segmented into primary and support activities. We classify the capabilities in accordance with these two activities of value chain. One is primary-activities-related capabilities, which are capabilities to implement a product's physical creation, its sale and distribution to buyers, and its service after the sale. The other is support-activities-related capabilities, which are capabilities to facilitate the primary activities to take place.

We set up a two-dimensional criterion for identifying Grace's strategic capabilities. First, a strategic capability should reach some minimum level of functionality that permits repeated, reliable performance of an activity. Capabilities are embedded in company's productive activities, but they are not activities themselves. At a minimum, in order for something to qualify as a capability, it must have reached some threshold level of practiced or routine activity and work in a reliable manner (Helfat, 2003). Second, a strategic capability must be honed to a user need, unique, and difficult to replicate (Teece et al. 1997).

We asked Grace's managers three questions to identify each strategic capability. What is the capability of Grace in relation to a specific activity (for example marketing)? Does the capability work in a repeated and reliable manner? Is it valuable, unique and difficult to replicate by the rivals? The responses on Grace's strategic capabilities are summarized and shown in Figure 1.

We find that most of the support-activity-related strategic capabilities in Grace are based on technological innovation. Among all the twelve strategic capabilities of Grace, eleven of them are technological-innovation-related (see Figure1). Supported by innovation-friendly tangible and intangible resources, such as organisational structure, technological resources, human resources,

innovation resources, and organisational culture, Grace's technological innovation appears to have been accumulating continuously over the past 10 years.

According to our investigation and discussion with the managers in Grace, the links between Grace's key resources and strategic capabilities are laid out in Table 3. If a resource has important contribution to a certain capability, there will be a "+" marked in the corresponding pane. We need to stress here that this mark represents just an important link between the specific resource and capability, an evident effect of resource on capability. This does not measure how important it is. That is, we do not measure the degree of the effect. We leave such measurement for future research.

It appears that organisational culture, human resources, and organisational structure are the top three resources with the most extensive effect on Grace's strategic capabilities. As shown in Table 3, among all the twelve technological-innovation-based strategic capabilities, organisational culture, human resources and organisational structure have twelve, eleven and seven links compared with one and four links that technological resources and innovation resources have. Organisational culture, which is defined as basic pattern of shared assumptions, values, and beliefs, has the widest effect twelve links on strategic capabilities in Grace. It is because organisational culture is a fundamental element which deeply influences everybody's behavior. Human resources have the second widest effect (eleven links). Many scholars support the view that knowledge possessed by the firm's human resources is among the most significant of an organisation's capabilities and may ultimately be at the root of all competitive advantages. Human resources including knowledge, skills, trust and managerial capabilities are of great importance for acquiring competitive advantages. This appear to be confirmed by this case study as human resources have the second most effect on core competence with ten links. This suggests that organisational culture has a wider effect than human resources on Grace's strategic capabilities because the former is people-independent, as it does not rely on specific personnel. Organisational structure has the third widest effect (seven links) on strategic capabilities in Grace. As Stauffer (1999) argued that the firm's challenge is to create an environment that allows people to fit their individual pieces of knowledge together so that, collectively, each employee will have command of as much organisational knowledge as possible. Organisational structure is an institutional environment for employees to create, share and apply knowledge. Grace's flexible and innovation oriented organisational structure appears to have made knowledge management more effective than its competitors.

5.2 Three Stages of Building Technological-innovation-based capability in Grace

First, we divide the evolutionary history of Grace's resource-cultivating and capability-building into three stages: the founding stage, the development stage, and the renewal stage, according to our observation as well as our discussion with the president, the VPs, and the managers in Grace.

Second, we employ the critical event technique to collect direct observations of each stage to understand and find out how Grace broke the path-dependence for building up its

technological-innovation-based strategic capabilities in the first stage, how they routinized their newly built strategic capabilities in the second stage, and how they renewed their capabilities in the third stage. The critical events are identified from those stories that were most frequently mentioned by the interviewees in Grace during our field work.

(a)The founding stage

This founding stage for Grace can be traced from 1997 to 1999. It is also the elementary stage of technological innovation in Grace. In this stage, Grace dramatically emerged from the position of low-efficiency, poor resources, and weak competitiveness which was typical to a traditional state-owned-enterprise in China at that time. Grace was founded in 1984. Till 1997, it had struggled along in chemical fiber industry for 13 years. As a small SOE at the edge of bankruptcy in a remote area of an inland province, Grace did not have much superior resources and capabilities. The out-of-date production system, the inefficient organisational structure, the self-enclosed culture, and the unsuccessful history became serious obstacles to Grace's reform.

To transform and reconfigure the firm's resources and capabilities, the most important and difficult part is to break the path-dependence which has an enduring influence. History matters. Firm's repertoire of resources and capabilities constrains future behavior. Behavioral continuity has been found by cognitive studies and business studies at both the individual and organisational levels (Nelson and Winter, 2002). Behavioral continuity can also be interpreted as path-dependency which means where a firm can go is a function of its current position and the paths ahead and current position shaped by path it has traveled (Teece et al., 1997).

There are three critical events in this stage. These events show us the effective approach of path-dependence-breaking in Grace.

- *Change of top management.*

In 1997 the current President and Chair Feng Tao was assigned at the age of 32 by the local government. No doubt this was the turning point of Grace. Since then Grace experienced a ten-year-long high growth at an annual average rate of 35%. As we will see below, Grace's strategic capabilities are mostly based on technological innovation. Technological innovation is considered to be the engine of Grace's rapid growth. The most distinctive characteristic of Grace's technological innovation is that it is a top-management-driven strategic activity at the beginning. All Grace's employees, whom we interviewed, from the vice president to the frontline worker, had one common thing to say. That is, Grace's success is to be credited to the President and Chair Feng. According to Grace's managers' comments, Feng is a far-sighted strategic designer, an enthusiastic leader, and an iron-willed doer. He is not only innovation-friendly but innovation-addictive. Innovation is always at the top of his agenda. The quality and personality of the President and Chair is unanimously considered as one of the most important resources that have contributed to Grace's ten-year-high-growth by both Grace's staff and the local government. He has been playing a vital and important role in initiating, promoting, encouraging and protecting technological innovation.

Top management change is critical to break path-dependence in the evolutionary process of strategic capabilities in Grace. As Schumpeter argued it is entrepreneurs who break with existing arrangements in order to try out new combinations of resources. One firm resource required in the implementation of almost all strategies is managerial talent (Hambrick, 1987). From a resource perspective, the entrepreneurs are the firm's resources and it is also them who are accomplishing resource recombination which is one of the most powerful factors driving competitive dynamics. In Mathew's (2006) RARE model, E represents entrepreneurial endeavor which links the resources, activities, and routines together. In this sense, during the founding stage of strategic capabilities, Grace acquired the crucial resource --- an innovative entrepreneur--- from outside. He was new to the company and was inexperienced in textile technology. But he was a great believer in innovation. This top management change set up a good foundation for the reconfiguration of resources and capabilities in Grace.

- *Invention of the historically important technology "2S".*

2S is a process innovation which doubles the production output at very low cost. It breaks with the traditional spinning technology applied in the past century in the textile industry. The typical methods to raise output of spinning machines are to lengthen the spinner or to speed up spinning. These two approaches are either costly or restricted by the technical limits of spinner. But 2S does it differently. Traditionally the spinner produces one filament with one spindle. With the 2S technology, the spinner can produce two filaments with one spindle at the same time. There is no need to lengthen the spinner or to speed up the machine, the spinner can produce double volume of filament yarns in a very simple way. 2S is a radical innovation which is described as an A-bomb in textile industry. On the technology side, it breaks with the conventional principle of spinner designing which has existed for more than one hundred years. On the market side, it may lead to an explosive growth in production once adopted by other textile manufacturers and may consequently result in a chain reaction such as price drop and unhealthy competition because of oversupply. Grace patented this invention. Based on a well formulated and implemented IPR strategy supported by local government, Grace effectively prevented violation of their patent rights and successfully benefited from this technological innovation.

The success of 2S is a path-breaking event in Grace's technological innovation history not only because of its tremendous economic contribution to the company but also because it set up a successful model for the subsequent ten-year-long continuous technological innovation in Grace. The successful R&D of 2S played an important and exemplary role for building technological-innovation-based strategic capabilities in Grace. As President Feng said the most distinctive driver of Grace's high growth was technological innovation. This was most obvious in the years when the revolutionary technology 2S were successfully developed and introduced. For individuals and organisations, learning guided by clear short-term feedback can be remarkably powerful (Nelson, 2002). Grace was inspired by its great success in 2S and realized the huge

benefit of technological innovation. More and more technological innovation projects were initiated, developed, and completed. From then on, technological innovation became routine and continuous in Grace and became the main characteristic of Grace's strategic capabilities.

- *Massive recruitment of 600 new employees.*

Grace recruited 600 new employees with university degrees from 1998 to 2000. Actually the total number of employees was just around 3000 and most of them were workers without good education. The massive recruitment directly led to a blood-infusion-like organisational change. Most of the current mid-level managers are from this group of people. Jobs were rearranged, managers were reassigned, and the organisation went through total restructuring.

The massive recruitment has profound influence on breaking old paths and building new strategic capabilities in Grace. The recruitment renewed and reconfigured Grace's human resources. In the previous analysis of the effect of resources on capabilities we found that human resources have the second most effect on Grace's strategic capabilities with ten links, just next to organisational culture. The renewal of human resource has broad influence on breaking old and building new organisational capabilities in Grace. The recruitment helped Grace get out of the old way of thinking and doing. Organisational capabilities are virtually individual capabilities and the interaction and synergy between them. Behavioral continuity makes humans to stick to old behavior patterns. It is time-and-effort-consuming to change people's thinking which guides behavior. Recruiting new people is the fastest way to break with conventional behavior. The renewal and reconfiguration of human resources also brought the company new resources with new individual capabilities including skills, ideas, knowledge, ability to learn, and so on. It is much more crucial to renew human resource than to renew physical resources. But it is also more difficult to change people than to change equipment.

(b) *The development stage*

This stage can be traced from 2000 to 2005. It is also the booming stage of technological innovation of Grace. Grace calls it the "first spring of technological innovation". The main characteristics of this stage are the rapid growth fueled by prosperous technological innovation. Grace's strategic capabilities related to operations, technological management, human resource management, and firm infrastructure have undergone major improvement during this period. In this stage, Grace needed to fix, maintain, and enhance its new capabilities which were built up in the founding stage. We try to capture the critical practices in this stage to illustrate how Grace routinized the new organisational behaviors or activities and turned them into the company's strategic capabilities.

- *Constructing an innovation-oriented organisational structure*

In 2000, two departments -- the Science and Technology Administration Department and the Intellectual Property Office -- were set up in Grace. These two departments are to take charge of management of technological innovation projects and intellectual property rights respectively.

Both of them directly report to the President and Chair Feng. The establishment of these two departments stressed the strategic intention on technological innovation, and strengthened the administration to implement this vision.

With the help of the Science and Technology Administration Department, cooperation across functional departments was forged, segmentation between different departments was to some extent avoided, and technological innovation activities and projects were administratively supported and organised. Traditionally China's textile companies either have just a small group which is affiliated with the department of production or have no specialized department for administration of technological innovation. Grace's establishment of S&T Department was unusual at that time. The highest proportion of entrepreneurial accomplishments is found in the companies that are least segmented and segmentalist, and in the companies that instead have integrative structures and cultures emphasizing pride, commitment, collaboration, and teamwork (Kanter, 1983). The S&T Department appears to have played an important role in Grace's technological innovation. According to our research on the technological innovator network of Grace, this department has been in the very center of innovator network since it was established.⁶

With IPR Office, the IPR management has been highly recognized and reflected through the process of the creation, application and protection of technological innovation. Few of the textile companies had IPR Office in 2000. At present more and more textile companies begin to recognize the importance of IPR. But IPR offices in most of the companies, if any, usually are at the third level of the companies' organisational structure. For example, IPR office is usually affiliated with the Legal Department or the Chief Engineer's Office⁷. The high position of the IPR Office in the hierarchy of the company reflects the high recognition of IPR management in Grace. Grace's excellent capability of IPR management greatly helped Grace to benefit from its technological innovation. Grace has an obvious advantage over its competitors in terms of patents (see Table4). The amount of exploitation fees from licensing agreements and compensation for the damage caused by the infringement of this patent has reached 15.91 million RMB as of the end of 2007.⁸

Table4. Comparison of the Number of Patents between Grace and its Main Competitors⁹

Competitors	Invention	Utility Model	Design
Grace	47	54	3
Baoding Swan	9	3	0
Jilin	6	5	0
Xinxiang	17	23	0

⁶ See: Liu, Xiao, Liu (2007). Technological Innovation and Organisational Learning, working paper for the CICALICS Workshop 2007, Beijing

⁷ Resource: Soft Science Project of State Intellectual Property Office of People's Republic of China "Investigation and Case Study of The Situation of Intellectual Property Rights In Sichuan Import & Export Enterprises". According to our investigation, till the end of 2005, there are just 17 out of 64 companies of different industries have specialized IPR Office. But none of them except Grace's IPR Office reports directly to the President and Chairman.

⁸ Source: IPR Office, Yibin Grace Group Co., Ltd.

⁹ Source: State Intellectual Property Office of People's Republic of China 2007-12-21

In this stage, a whole-people-participating internal technological innovator network was shaped (see Figure 2). It consists of four levels. The first level is for R&D of new processes and products by the R&D Department. The second level is for testing and promoting new processes and products by the Science and Technology Laboratory. The third and broadest level is for applying new processes and techniques and improving old ones to reduce costs, improve the quality, increase efficiency and product variety by all the functional sections in the firm. The fourth level is the project teams whose members are from different departments. These project teams are very flexible in size and functions. This structure can also be described as a structure built by users, promoters and researchers. Big scale innovation such as R&D of new product and process is mostly involved in the centralized and formalized R&D Department and S&T Laboratory. Small scale innovation such as improving old process and applying new process is mostly involved in a decentralized and informal structure such as different functional sections. The hybrid-matrix-like project teams can be flexibly involved in big and small scale of innovation projects. The R&D Department, the Science and Technology Laboratory, the functional departments, together with the cross-hierarchical and cross-functional technological innovation project teams form a comprehensive innovator network, and it involves high participation in decision making. The S&T Department, whose duty is to coordinate technological activities, effectively facilitated different kinds of technological innovations.

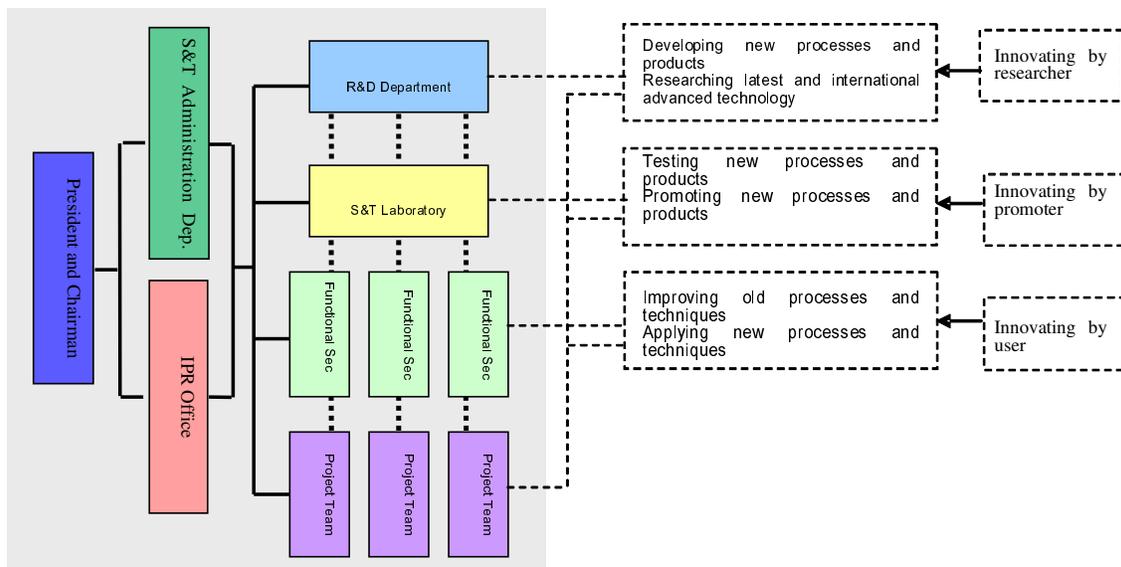


Figure 2: Technological-innovation-oriented Organisational Structure of Grace

- *Building an innovation-friendly organisational culture*

The evolutionary history of Grace’s organisational culture can be illustrated by the changes of its company slogan. From 1997 to 1998, during the founding stage of Grace’s technological-innovation-based strategic capabilities, the slogan of Grace’s organisational culture is “Higher, Finer, and Nicer” which focused more on high quality of production. In 1999 the slogan was changed to “Pursuing with Ambition, Managing with Wisdom” which concentrated on

high efficiency of operation. In 2003 after visiting Grace, the Chinese President Hu Jintao commented that technological innovation is the key of Grace's high growth. In 2004 Grace summarized its culture and put forward a new company slogan that reads "Achieving goals by innovation, Getting stronger by wisdom," which shows that innovation has become the core element of its organisational culture. We try to analyze the process of building innovation-friendly organisational culture in Grace from the following four aspects.

Goals for technological innovation and the standards for achieving those goals were made known to employees. When it is clearly communicated in an organisation that creativity and innovation are valued goals, there is a greater likelihood that individuals will engage in more creative behavior (Tesluk et al., 1997). Since 2002 Grace has set the goal of technological innovation which is measured by the increase of profit based on technological innovation in its annual plan every year. This goal is then broken down to the functional sections, and subsequently assigned to the individuals. Compensation of departments and individuals is linked to their performance of technological innovation. A scientific committee was set up to estimate the quality and quantity of the innovation outcomes. The mid level managers were asked to pay more attention to and expend more energy on technological innovation rather than daily operation.

Methods and procedures for technological innovation were conveyed to employees. If management is able to convey through its actions and words that it values challenging the existing norms, active risk taking, sharing of information, and open debate, employees are more likely to engage in those behaviors (McLean, 2005). As we observed, the top management, especially the President and Chair Feng, is the most enthusiastic promoter and pacemaker of innovation. The President's personal power, forward role, and strength of conviction profoundly influenced and encouraged the employees to devote to innovation. Feng is the inventor of the idea of 2S technology. He sold the idea to the engineers and persuaded them to work on it in spite of the doubts and concerns from the veterans. He insisted on the improvement of 2S when the first attempt failed and a huge compensation had to be paid. He traveled a lot with the engineers both inside China and abroad to learn about updated technologies. He set up a technological information database of the countries with developed chemical fiber technologies, such as Germany, Japan and Italy. He invited technological expert from universities, research institutes to give lectures to the employees. He told the employees that every visitor was a distinguished guest of Grace and they should do their best to make the guests feel at home because that was the best opportunity to learn from the outsiders. The President also continually wrote articles in the company newspaper to emphasis the importance of technological innovation capabilities to Grace's competitiveness. With Feng's enthusiastic promotion, the concept of innovation was widely spread and accepted in Grace. In 2004, during the Annual Forum of China's Chemical Fiber Industry, Grace's outstanding performance on technological innovation was highly recognized by the industry, and the innovation-friendly organisational culture was considered to

be one of the most important factors to foster Grace's fast growth.

Rewards and evaluations were allocated on the basis of efforts towards and outcomes of technological innovation. As we illustrated above, the compensation of departments and individuals were linked to how much they devote to technological innovation and how much they create by technological innovation. The innovation-friendly organisational culture of Grace was reinforced by the aggressive rewarding policy to foster technological innovation. The President said: "We do want to make researchers and inventors in the firm get rich and obtain honor through their technological innovation. Our job is to overwhelmingly protect the creativity of our employees. We must provide them a stage for innovation, illuminate the stage, make ready for applause and stop catcalls". When it comes to encouraging technological innovation, the most famous statement of the President is "rather incorrectly reward 1,000 people than omit one person". He explained this was because of the complexity and immeasurability of scientific and technological research, and the change-with-time value of technological innovation. This policy appears to have boosted technological innovation in every section level.

Failures and mistakes were tolerated in the process of technological innovation. In the early stage of applying 2S, Grace paid out claims amounting to millions of RMB because of the sub-standard quality resulted from the immature technology. The President said: "Innovation is creating something new or doing something in a new way. There is no existing lessons or indications we can learn or follow. Making mistake is normal when innovating. We must tolerate the mistakes and pay the tuitions. Otherwise we can achieve nothing". Tolerance provided socio-emotional support to the employees to make them feel free to function innovatively. When employees perceive that an organisation has their welfare and best interest in mind, when an environment of open debate and discussion is in place, and when trust exists among employees, especially with management, employees can feel more open to take risks and put forth creative ideas (Mclean, 2005).

(c) The renewal stage

The third stage is Renewal stage which started from 2006 and is continuing till now. In this stage Grace is confronted with great challenge. First, cost of raw material kept increasing and the requirement of environment protection forced Grace to invest more on reducing pollution. Technological innovation became more and more important for survival. Second, the pressure from the local government to build up Grace to become one of the ten 10-billion-annual-revenue-companies in Sichuan province forced Grace to seek new profit growing opportunities by entering into new industries. In 2006 Grace entered into real estate industry which invited criticisms from commentators and scholars. However, one and a half years later, Grace surprisingly and successfully became the most famous real estate brand name in Southern Sichuan.

In this stage Grace appears to have successfully built significant new capability in a new industry. They transferred their innovation capability from textile industry to real estate industry

and acquired new capabilities in terms of operating the new business which is totally different from what they were familiar with. In this section we focus on how Grace renewed their strategic capability built up in textile industry.

- *Entering into real estate industry*

Grace formally entered into the real estate industry in 2006. In 2005 it put forward a new mid-and-long-term strategic plan which focuses on new technologies, new products and new industries. The main purpose of this strategic adjustment is to meet the requirement of 10-billion-annual-revenue-company set by the government. In 2005 the local government decided to move the location of Grace from the city to the suburb for the reason of environmental protection. But the government did not have resources to finance this move. Alternatively, they gave the land of the original site to Grace as compensation. Grace then decided to invest this land into real estate industry. In December 2005 when we visited Grace we were concerned with this surprising decision because unrelated diversification can be a very dangerous pit to Grace and it was a total novice to real estate industry. In 2006 when we revisited Grace, the director of its real estate project, who was the former director of the IPR Office, told us that the residential buildings had already been sold out even though most of them were still under construction. By the end of 2007 the residential community developed by Grace has become the most popular and expensive community in Yibin city. Their residential project Rhine Riverside turned out to be a flagship of the real estate industry in South Sichuan. Before 2006 only conventional residential apartments with dull appearance and simple function were generally available in the real estate market of Yibin city. Grace introduced the high-class residential community to the market. The local people have never seen the western style houses and apartments before. The concept of park, plaza, and cinema with good entertainment facilities in their communities was totally new to the people. They neither had a club nor a website for residents to communicate with each other. They also did not have one of the best professional estate management companies in China to take care of their houses and provide them value-added services. All these created by Grace are totally new to the residents of Yibin. With the unusual and novel real estate project, Grace successfully entered into the real estate industry which was unrelated to their traditional core business.

Grace is now ambitiously developing new business in real estate industry. In 2007 Grace acquired a bamboo paper manufacturing company in Changning County. One of the objectives behind this acquisition is to develop bamboo as a new material of viscose fiber which is their conventional main product. Another intention is to copy their success in real estate industry in the acquired company. This paper company is now located in the city of Changning. Within five years, it has to move out of the city because of environment protection, the same reason as moving Grace out of Yibin city two years ago. Then the original land will be given to Grace as a compensation for relocation. It is possible that Grace will repeat their successful story in Changning as they did in Yibin. At the same time, Grace is trying to cooperate with the local government on some municipal projects such as reconstruction of the old districts in the city.

Now real estate has become another main pillar in Grace's business in addition to its traditional chemical fiber operation.

- *Transferring and renewing human resources*

At the beginning, the key members of real estate project team were all from Grace. The first director of Grace's real estate project was the former director of its IPR office. The Vice President Wang explained: "The reason why Grace didn't use a real estate veteran is that people in real estate industry usually just can do what they are used to, but Grace wanted to do something totally new. The managers in Grace have such quality and courage to do something different". People transferred from Grace headquarter brought their knowledge and skills, their managerial capabilities, their innovative ideas, and what is more important, the innovative tradition of Grace to the new project.

But the personnel from the headquarters were lacking experience and skills for real estate business. To acquire new capability to manage their real estate projects, Grace recruited new personnel from the real estate companies all over the country. This group of people is knowledgeable and experienced in real estate industry.

Combining the new with the old staff from the headquarters of Grace, the real estate company of Grace built up competent project teams for its real estate projects. The general manager of the real estate company of Grace commented that the competent project teams and the tradition of continually and persistently pursuing innovation projects in Grace were the key factors of their success. The director of Grace's Strategic Planning Department also commented that Grace was very confident of exploring market potential and promoting business development in real estate industry because they had already cultivated competent personnel for the new industry.

We find that transferring and renewing human resources are the main approaches of Grace's transfer and reconfiguration of its strategic capabilities. In the strategy literature, resource-based relatedness had a positive influence on the performance of multi-business firms (Szeless, Wiersema, and Gunter, 2003). The achievement of synergies through portfolio interrelationships may be the only valid motive for multi-business companies (John and Harrison, 1999; Kanter, 1998). Synergies out of portfolio interrelationships can arise in two ways: through the sharing of resources between two or more business units and through the transfer of resources from one business unit to another or several others (Collis and Montgomery, 1998; Nayyar, 1992a). The transfer of resources usually involves intangible resources that can be used in different business units simultaneously. Human resource transfer is an effective way to transfer knowledge, skills, learning capabilities, managerial capabilities. It is also an effective way to transfer organisational culture as people are the vehicle of culture. The most prominent example of resource transfer was highlighted by Prahalad and Bettis (1986) who argue that the success of a company in a specific business is crucially depending on whether the "dominant management logic" of the company can be applied in this business. Human-resource-transfer delivers the dominant management logic

of the company from its old business to the new operation. Strategic alliance and human-resource-renewal are both for acquiring new resources and to build new capabilities. Teece (1992) defined strategic alliance as an agreement characterized by the commitment of two or more firms to reach a common goal entailing the pooling of their resources and activities. Human-resource-renewal provides new knowledge and skills for the new business. Existing human resource transferred from the textile business combined with new resources acquired through recruitment and strategic alliance appears to have created synergies for building new strategic capabilities in Grace.

6. Conclusions

In this paper we set out to investigate the pattern of how different bundles of the key resources contribute to the strategic capabilities in the case firm -- Grace. We explored the evolution of the process by which our case firm has built up its strategic capabilities by acquiring, fostering, and mobilizing its key resources. We developed an analytical framework on the basis of RBV theory and value chain analysis, to assess the effect of the company's key resources on its strategic capabilities. We employed a dynamic perspective to examine the evolutionary process of the firm's strategic-capability-building.

It is evident that in the case firm technological-innovation-based strategic capabilities are broadly influenced by neither technological resources, nor innovation resources, but by organisational culture, human resources and organisational structure. This finding is justified and supported by the critical events in the evolutionary history of the case company's strategic-capability-building. We found that in the founding stage of its strategic capabilities the company has changed its top management and recruited a great number of new employees to build new capabilities. In the development stage of their strategic capability, Grace constructed an innovation-oriented organisational structure and an innovation-friendly organisational culture to support and enhance their strategic capabilities. In the renewal stage of their strategic capability, Grace transferred their strategic capability cultivated in their core conventional business to an entirely new business – the real estate industry by transferring personnel from its headquarters to the new business unit and by recruiting new personnel and forging strategic alliance with an existing major player in the real estate business. All these efforts were focused on cultivating, enhancing or reconfiguring the firm's organisational culture, human resources and organisational structure.

We found that human resources has been the most dynamic resources for building the case company's technological-innovation-based strategic capabilities in Grace. When building new strategic capabilities, the firm acquired new human resources which is evident in the founding stage to build up strategic capability in textile industry and in the renewal stage to build up strategic capability in real estate industry. When transferring existing strategic capabilities to new industry, the case company transferred human resources from its existing core business to its new

business. In other words, whenever the case firm intended to change or transform its capability significantly, it changed, restructured, and enhanced the human resources. When the firm attempted to raise and maintain its technological capability at a high level, the firm focused on strengthening its human resources in terms of quantity, quality and organizational flexibility.

Despite the data limitations imposed by a single case study, our findings have some important policy implications for industrial practitioners. To build strategic capabilities based on technological innovation, firms need to pay as much attention to foster, organise and mobilize their human resources, organisational culture, and organisational structure as, if not more attention than, they pay narrowly to technological resources and innovation resources. For firms with ambition to build and maintain high level of technological capabilities it is imperative they develop, restructure, and enhance their human resources in a flexible organisational environment.

Reference

1. Barney, J. B. (1986a). Strategic Factor Markets: Expectations, Luck, and Business Strategy. *Management Science*, 32, 1512-1514
2. Barney, J.B. (1991). Firm Resources and Sustained Competitive Advantage, *Journal of Management*, 17, 1, 99-120
3. Barney, J.B. (1995). Looking Inside For Competitive Advantage, *The Academy of Management Executive*, 9, 49 – 61
4. Collis, D. J. and C. A. Montgomery (1998): Creating Corporate Advantage. *Harvard Business Review*, 98, 71-83.
5. Cohen, M.D. and Bacdayan, P. (1996), "Organisational Routines are Stored as Procedural Memory", in Cohen, M.D. and Sproull, L.S. (eds), *Organizational Learning*, Sage, London.
6. Dierickx, I. and Cool, K. (1989). Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science*, 35: 1504-1511.
7. Dess, G.G., Gupta, A., Hennart, J.F. and Hill, D.W.L. (1995). Conducting and Integrating Strategy Research at the international Corporate and Business levels: Issues and Directions, *Journal of Management*, 21, 376
8. Dosi, G., Teece, D. and Winter, S. (1992). Toward a Theory of Corporate Coherence:Preliminary Remarks, In: Dosi, G. et al (eds) *Technology and Enterprise in a Historical Perspective*. Oxford: Clarendon Press
9. Dosi, G., Nelson, R. and Winter, S. (eds.), (2000). *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press, Oxford and New York.
10. Eisenhardt, K.M. (1989). Building Theories From Case Study Research, *Academy of Management Review*, 14, 4, 532-550
11. Eisenhardt, K. M., and Martin, J.A. (2000). Dynamic Capabilities: What are They? *Strategic Management Journal* Special Issue, 21,1105-1121
12. Grant, R.M. (1991). *Contemporary Strategy Analysis*. UK, Blackwell Business, Cambridge
13. Grant, R.M. (1996). Toward a Knowledge-Based Theory of the Firm, *Strategic Management Journal* 17, 109-122.
14. Gu, S.L., Liu, J., Lundvall, B.A. and Serger, S.S. (2008) China's System and Vision of Innovation: Analysis of the National Medium- and Long-term Science and Technology Development Plan (2006-2020), *The Proceedings of GLOBELICS Conference Mexico*
15. Hall, R. (1992). The Strategic Analysis of Intangible Resources, *Strategic Management Journal*, 13, 136-139
16. Hambrick, D. (1987). Top Management Teams: Key To Strategic Success, *California Management Review*, 30, 88-108
17. Helfat, C. E. and Peteraf, M. A. (2003) The Dynamic Resource-based View: Capability Lifecycles. *Strategic Management Journal*, 24, 997-1010.
18. Hitt, M. A., Ireland, R.D. and Hoskisson, R.E. (2001). *Strategic Management: Competitiveness and Globalization*, 4th ed. South-Western College Publishing, IL: Cincinnati
19. Inkpen, A. C. and Crossan, M. M. (1995). Believing is seeing: Joint Ventures and Organization Learning. *Journal of Management Studies*, 32, 595-618
20. John, C. H. St. and J. S. Harrison (1999): Manufacturing-based Relatedness, Synergy, and Coordination. *Strategic Management Journal*, 20, 129-145.
21. Kanter, R. (1983). *The Changemasters*, New York: Simon&Schuster
22. Karim, S. and Mitchell, W. (2000). Path-dependent and Path-breaking Change: Reconfiguring Business following Acquisitions in the U.S. Medical Sector, 1978-1995, *Strategic Management Journal*, 21, 10-11, 1105-1121
23. Kanter, R. M. (1998): Seeking and Achieving Synergies. In: A. Campbell and K. S. Luchs (eds.), *Strategic Synergy* (2nd edition), International Thomson Business Press, London.
24. Kogut, B. and Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology, *Organisation Science*, 3, 383-397.
25. Kor, Y. Y. and Mahoney, J. T. (2004). Edith Penrose's (1959) Contributions to the Resource-based View of Strategic Management, *Journal of Management Studies*, 41, 1 183-191
26. Lazonick, W. (2002a), *Innovative Enterprise and Historical Transformation*, *Enterprise & Society*, 3, 1, 35-54
27. Lengnick-Hall, C.L. and Wolff, J.W. (1999). Similarities and Contradictions In The Core Logic of

- Three Strategy Research Streams, *Strategic Management Journal*, 20, 1109-1132
28. Levitt, B. and March, J. G. (1988). Organizational learning, *Annual Review of Sociology*, 319-340
 29. Malerba, F. and Orsenigo, L. (1996). The Dynamics and Evolution of Industries, *Industrial and Corporate Change*, 5, 1, 51-87.
 30. Mathews, J.A., (2006). *Strategizing, Disequilibrium and Profit*. Stanford University Press: Stanford, California.
 31. Mathews J.A. (2002). A Resource-based View of Schumpeterian Economic Dynamics. *Journal of Economics*, 12, 29-54.
 32. McLean, L.D. (2005). Organisational Culture's Influence on Creativity and Innovation: A Review of the Literature and Implications for Human Resource Development, *Advances in Developing Human Resources*, 7, 2, 226-247
 33. Nayyar, P. R. (1992): The Measurement of Corporate Diversification Strategy: Evidence from Large U.S. Service Firms. *Strategic Management Journal*, 219-235.
 34. Nelson, R. R. and Winter S. G. (1982). *An Evolutionary Theory of Economic Change*. Harvard University Press: Cambridge, MA.
 35. Nelson, R. R. and Winter, S. G. (2002). Evolutionary Theorizing in Economics, *Journal of Economic Perspectives*, 16, 2, 23-46
 36. Prahalad, C. K. and R. A. Bettis (1986): The Dominant Logic: A New Linkage Between Diversity and Performance. *Strategic Management Journal*, 7, 485-501.
 37. Penrose, E.T. (1959). *The Theory of The Growth of The Firm*, UK: Basil Blackwell, Oxford
 38. Peteraf, M.A. (1993). The Cornerstones of Competitive Advantage: A Resource-based View. *Strategic Management Journal*, 14, 179-191.
 39. Pettigrew, A. M. (1990). Longitudinal Field Research On Change: Theory and Practice, *Organisation Science*, 1, 3, 267-292
 40. Rouse, M.J. and Daellenbach, U.S. (1999). Rethinking Research Methods for The Resource-based Perspective: Isolating Sources of Sustainable Competitive Advantage. *Strategic Management Journal*, 20, 5, 487-494
 41. Rumelt, R. P. (1984). Towards a Strategic Theory of the Firm. in R. B. Lamb (ed) . *Competitive Strategic Management*, Englewood Cliffs, NJ: PrenticeHall.
 42. Szeless, G., Weirsema, M. and Muller-Stewens, G. (2003). Portfolio Interrelationships and Financial Performance in the Context of European Firms, *European Management Journal* 21, 2, 146-163
 43. Teece, D.J. (1986). Profiting From Technological Innovation: Implications For Integration, Collaboration, Licensing and Public Policy, *Research Policy* 15, 285-306
 44. Teece, D. J., Pisano, G. and Shuen, A. (1997). Dynamic Capabilities and Strategic Fit, *Strategic Management Journal*, 18, 510-533
 45. Tesluk, P. E., Farr, J. L. and Klein, S. A. (1997). Influences of organisational culture and climate on individual creativity. *Journal of Creative Behavior*, 31, 1, 27-41.
 46. Wernerfelt, B. (1984). A Resource-based View of the Firm. *Strategic Management Journal*, 5, 171-180.
 47. Winter, S. G. (1987), Knowledge and Competences as Strategic Assets, in Teece, D. (ed.), *The Competitive Challenge*. Ballinger: Cambridge, MA.
 48. Winter, S. G. (2000). The Satisficing Principle in Capability Learning, *Strategic Management Journal*, 21, 10-11, 981-996.
 49. Winter, S. G. (2003). Understanding dynamic capabilities, *Strategic Management Journal*, 24, 10, 991-995
 50. Zahra, S. and Pearce, J. (1990). Research Evidence on the Miles-Snow Typology, *Journal of Management*, 16, 4, 751-768

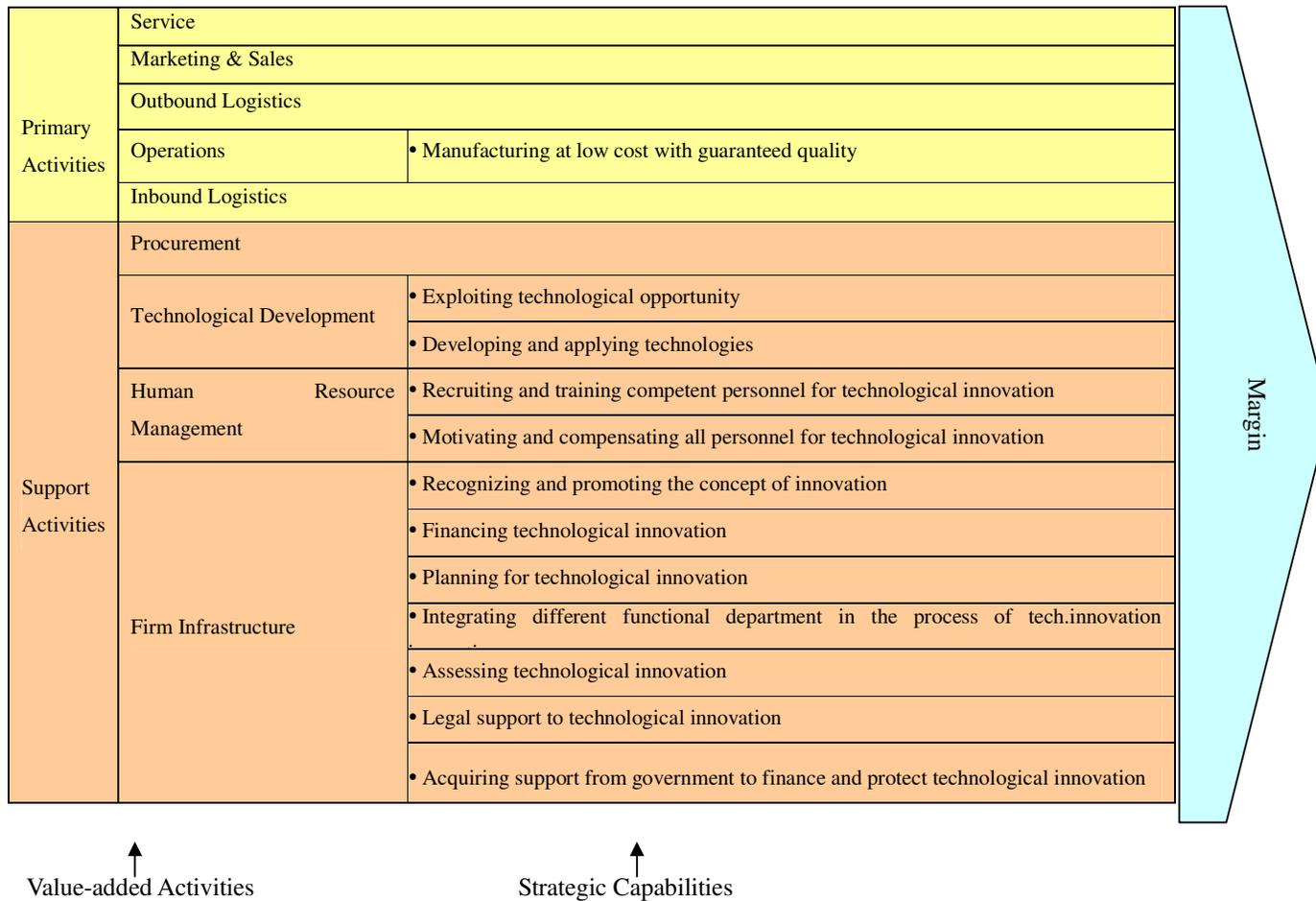


Figure1. Value chain analysis of Grace's Strategic Capabilities

Table3. Links between Grace's Key Resources and Strategic Capabilities

				Key resources						
				Tangible Resources		Intangible Resources				
				Organisational structure	Technological resources	Human resources	Innovation resources	Organisational culture		
Strategic Capabilities	Primary Activity Related	Operations Related	Manufacturing at low cost and with guaranteed quality		+	+	+	+		
	Support Activity Related	Technological Development Related	Exploiting technological opportunity	+		+	+	+		
			Developing and applying technologies			+	+	+		
		Human Resource Management Related	Recruiting and training competent personnel for technological innovation			+	+	+		
			Motivating and compensating all personnel for technological innovation	+		+		+		
		Firm Infrastructure Related	Recognition and promotion of the concept of innovation	+		+		+		
			Financing technological innovation					+		
			Planning for technological innovation	+		+		+		
			Integrating different functional department in the process of technological innovation	+		+		+		
			Assessing technological innovation	+		+		+		
			Legal support to technological innovation	+		+		+		
				Acquiring support from government to finance and protect technological innovation			+		+	
		Total number of the links between resources and capabilities				7	1	11	4	12