

Dynamic capabilities-based strategy innovation: a theoretical framework and empirical studies in Chinese firms^{*}

LIU Jing-jiang(刘景江), CHEN Jin(陈劲), XU Qing-ru(许庆瑞)

(*School of Management, Zhejiang University, Hangzhou 310027, China*)

Received July 20, 2001; revision accepted Sept. 9, 2001

Abstract: Based on investigations of 112 Chinese firms and studies on foreign leading corporations, a theoretical framework of dynamic capabilities-based strategy innovation (SI) is put forward. Several large firms in China winning through SI were studied empirically. This paper complements previous publications on the theories of innovation and strategy. This work's findings will be useful for managers interested in our approach, which highlights the importance of SI and focuses on and points out the major pitfalls in the innovation processes. Implementing the dynamic capabilities-based strategy innovation can effectively cultivate and develop core competences of corporations. It is concluded that implementing SI is the only path for Chinese enterprise growth in the intensified competition in the knowledge economy.

Key words: Strategy innovation, Dynamic capability, Theoretical framework, Empirical study

Document code: A

CLC number: F124.3

INTRODUCTION

Since the early 60's, more and more attention have been paid by researchers to theories of strategic management (Ansoff, 1965; Hamel et al., 1994; Heene et al., 1997; Kare-Silver, 1997; Prahalad et al., 1990; Teece et al., 1994; Teece et al., 1997), and the business world has come to regard innovation as a major source of competitive advantage. The literature on innovation and innovation success is voluminous and covers numerous perspectives, levels of analysis, and objectives (Chen et al., 2000; Patel et al., 1997; Utterback et al., 1976; Xu et al., 1999; Xu et al., 2000). This paper aims to further deepen understanding and provide a theoretical framework of the dynamic capabilities-based strategy innovation (SI). Several large Chinese firms winning through SI in China were studied empirically. The following several observations underlie the motivations for this study.

First, most Chinese firms are characterized by low strategic management capability and by technological innovation, organizational, manufacturing and marketing competence. The most general lesson to be learned from the successful

cases including domestic enterprises and foreign ones is that implementing the dynamic capabilities-based strategy innovation is the only path for enterprises' growth in the intensified competition. Second, there is scarcity of literature on the theory of SI and of empirical study of the relation between SI and the growth of firms. Third, in today's competitive, fast-changing and uncertain environment caused by the accelerated rate of technological change and drastic competitiveness in the global marketplace, enterprises have to explicitly articulate strategies to induce innovative activities. In the knowledge economy, effective corporate innovation necessarily requires SI.

A THEORETICAL FRAMEWORK OF DYNAMIC CAPABILITIES-BASED SI

A resource-based strategic management approach was used to examine the resources and capabilities of corporations that enable them to enjoy a sustainable competitive advantage (Peteraf, 1993; Prahalad et al., 1990). Kare-Silver (1997) stated that corporate strategies should be customer-oriented, and that technological innovation strategy should be based on core techno-

* Project supported by the Key National Natural Science Foundation of China(No. 79730040) and International Development Center(IDRC) of Canada

logical competence. Practitioners and theorists all over the country have increasingly paid attention to competence-based competitive paradigm after the issue of core competence was put forward (Hamel et al., 1994; Heene et al., 1997). Teece, Pisano and Shuen advanced a newly strategy method — a dynamic capabilities-based method (Teece et al., 1994; Teece et al., 1997). Xu (1999; 2000) systematically present portfolio innovation paradigm. These theories examined dynamic capabilities, core competence, sustainable competitive advantage, and technological innovation strategy in different perspectives; but they did not grasp the theoretical framework of SI namely, the dynamic and sys-

tematical integration of strategy and innovation. As far as Chinese enterprises are concerned, most of them lack strategic vision, organizational learning, and do not align innovation with strategy; do not effectively balance performance and growth, corporate strategy and SBU strategy, and long-term and short-term objectives. Thus most of them have poor sustainable competitive advantage and low technological innovation capabilities. In short, Chinese enterprises separate strategy from innovation in the innovation process. Based on the above theories and work coupled with Chinese enterprises' practical situation, the theoretical framework of dynamic capabilities-based SI is put forward (Fig. 1).

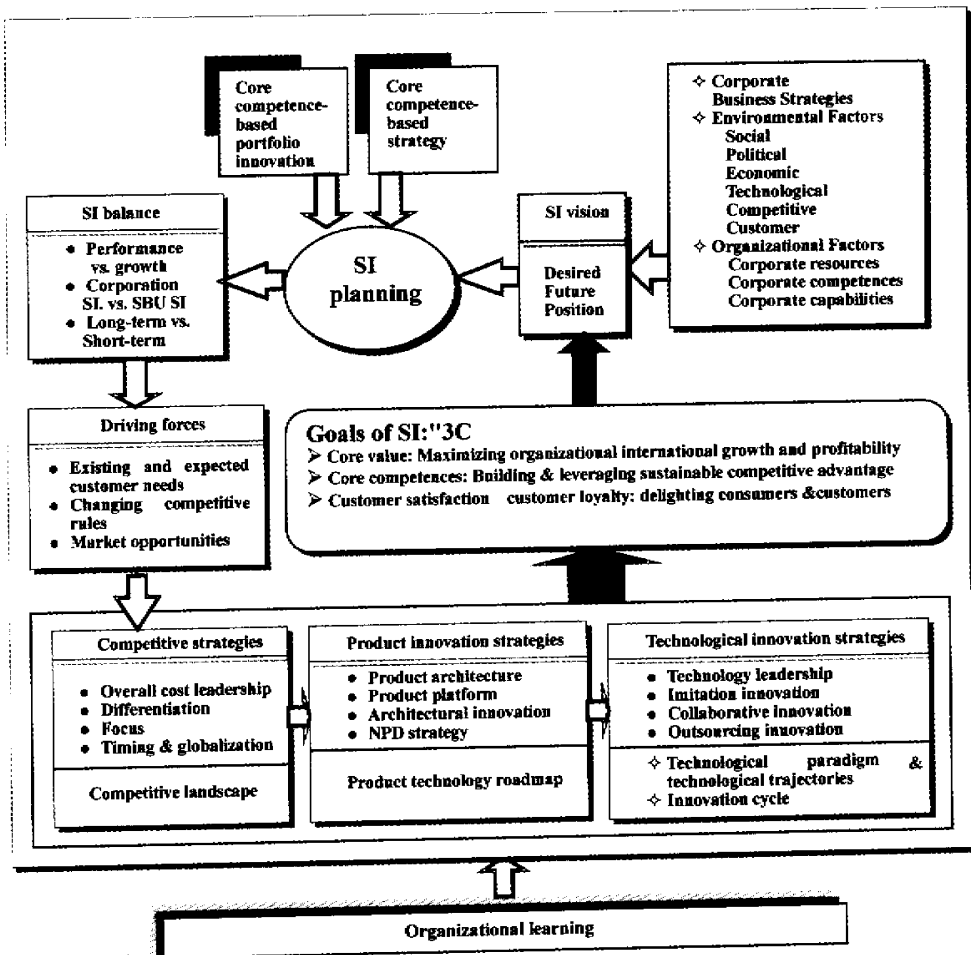


Fig. 1 The theoretical framework of dynamic capabilities-based SI

This framework indicates that SI vision is the engine that drives Chinese enterprises, and that core competence-based portfolio innovation and core competence-based strategy should be integrated systematically in SI planning. SI is embodied in competitive, product, and technological innovation strategies. Chinese enterprises should rapidly formulate and implement product and technological innovation strategies, as their future depends on maintaining a continuous flow of profitable new products in order to expand and update the existing product base, and to cultivate and sustain strong technological innovation capabilities. Goals of SI are maximizing organizational international growth and profitability in core value aspect, building and leveraging sustainable competitive advantage through wise use of core competencies, and enhancing customer and consumer satisfaction and loyalty. These goals can be briefly summarized as the “3Cs”.

Effective SI requires integrating core competence-based portfolio innovation (Xu et al., 1999) with core competence-based strategy. Core technological capabilities are cultivated and leveraged dynamically by implementing SI, which requires perpetual learning. For successful implementation SI, firms must absorb knowledge from both inside and outside the organization. If Chinese firms must organize the SI into a continuous learning process, they may develop effective learning strategies for leveraging technological absorption and technological innovation capabilities by intra-organizational and inter-organizational learning.

EMPIRICAL STUDIES: GROWTH TRAJECTORIES OF SUCCESSFUL SI FIRMS IN CHINA

The case studies examine the SI in two firms. Two trajectories of SI are analyzed in detail. They are as follows: (1) Internationalization Strategy, Leading Research Strategy, and Integration Strategy Based on Internationalization of High Quality and High S&T to build and leverage sustainable competitive advantage. The preconditions are that the firm should have relatively strong R&D competences, strategic management competence and domestic and international marketplace. A typical case is HA. (2)

Outsourcing Innovation Strategy to build and heighten core competence through R&D collaboration. The preconditions are that the firm should have good relationship and cooperation experience with partners, and should have a strong organizational learning capability. A typical case is KPG.

Case Study A

HA's SI: Internationalization Strategy, Leading Research Strategy, and Integration Strategy Based on Internationalization of High Quality and High S&T to Build and Leverage Sustainable Competitive Advantage.

Since HA's foundation, HA has formulated the guidelines of “three one-third” strategies, which mean that one-third of its products are manufactured and sold in China, one-third are manufactured in China for export, and the other one-third are manufactured and sold overseas. Obviously, it is an internationalization goal for HA. Directed by the brand name strategy and based on the internationalization of quality and R&D, HA has been rapidly growing in scale and performance in the past years, and has become the leading enterprise in the household electronic and electrical appliances industry in China. HA's SI is characterized by several aspects as follows.

1. Market-oriented strategy: a fundamental philosophy of HA's SI

Market-oriented strategy is the fundamental philosophy of HA's SI. HA has now entered several key technology fields, is developing many leading researches focused on CFC substitution, energy saving, muting, digitalization, information, engineering and macromolecule material technology; and has accumulated strong technological competences. Some technologies such as frequency conversion technology, energy-saving technology, and environmental protection lead the pack internationally.

2. Internationalization strategy, leading research strategy, and integration strategy: three key elements of HA's SI

Internationalization of quality and S&T is HA's trend of development. At present, HA has established an international network of S&T including 48 joint developing centers and an international information network including 11 information subsidiary centers spreading all over the world. HA can implement 11 kinds of inter-

national authentication systems covering 48 countries.

Leading research strategy has always been the main strategy for building sustainable competitive advantage during the past 16 years. In 1997, HA entered the black household electronics area with digital technology. In 1998, HA invented the first full digital and full media color TV in China, which captured the leading position of technology rapidly. In the same year, HA invested 0.5 billion yuan in establishing the "central research institute of HA" including 11 leading technology institutes and 12 correlated laboratories. More specially, it has more than 10 product authentication means that are the most advanced in the world.

Integration strategy is the base for innovative advantage. The innovative advantage of HA is formulated by integrating the advantage of technology, strategy, market and so on. HA, for example, has been paying much attention to the function and role of integration during the incremental expansion of scale.

Performance deriving from SI is vast. HA's technological innovation capabilities are leveraged significantly. In 1998, HA developed 262 new products and new technologies and applied for and was granted 538 patents, averaging 1 new product and 2 patents in one working day. Sales income from new products reached 12.02 billion yuan and profit reached 0.75 billion yuan; 12 new leading technologies were developed and adopted. In the first two seasons of 1999, HA has achieved sales income of 13 billion yuan. HA has developed a large number of distinctive product series. Every series has its own innovative characteristic.

HA has built sustainable competitive advantage at home and abroad. Its share in the domestic market of electric refrigerator, refrigerated locker and washing machine was 29.7%, 32.8%, 25.2% and 34.4% respectively in July of 1997. In the international market, its products of 18 series and 300 varieties have obtained approval in 19 kinds of international authentication systems covering 48 countries including UL, GS, CSA. This establishes strong foundations for exporting the products, so that HA has been able to export its products to 87 countries and regions all over the world.

3. HA's SI planning: future developing

planning of quality and S&T

HA has a strong dream that it would become one of the top 500 corporations in the world before 2015; and will constantly stick to and perfect the unitary developing strategy of internationalizing quality and S&T. HA will increase much more R&D investment in order to form a technological innovation system and an R&D network focusing on important projects.

Case study B

KPG's SI: Outsourcing innovation strategy to build and heighten core competence.

KPG has made great progress in recent years. From 1978 to 1998, sales of KPG increased by 12 times, net profits by 14 times. KPG has successfully developed one kind of first-class new medicine named Artemetheri, which is very effective for treating malaria. KPG's competence in Artemetheri was developed through technological collaboration (see the following stages).

Stage 1: Invention. The invention of Artemetheri was due to the collaboration between KPG and Shanghai Medicine Graduate School (SMGS) of the Chinese Academy of Science in 1979. SMGS has advantages for analysis of chemical and the theory of medicine and toxin, which is just what KPG are not good at.

Stage 2: Manufacturing. When it comes to the stage of manufacturing, how to improve the harvest rate of Artemetheri and to control its quality are the main problems. KPG is good at these and successfully improved the rate of harvest from 30% to 60% through Quality Risk Analysis. KPG did all the work in applying for first-class new medicine classification for Artemetheri and approval for manufacturing validation it in 1987.

Stage 3: Forming series. The stage of forming series of Artemetheri is also the co-innovation between KPG and several universities and academies, including SMGS, Chinese Verminosis Graduate School (CVGS) and Yunnan Medical College (YMC). Artemetheri is only a successful example of KPG's productions. All in all, KPG was involved in collaborated innovation in three patterns: (1) Collaborated R&D with big nationwide research units. (2) Collaborated innovation through R&D base building. (3) International collaboration through joint venture and

technological acquisition. KPG's enhancement of technological competence is shown in Fig. 2. Therefore, KPG has achieved its competitive ad-

vantage based on its competence, which was built through collaboration in R&D and innovation (Fig. 3).

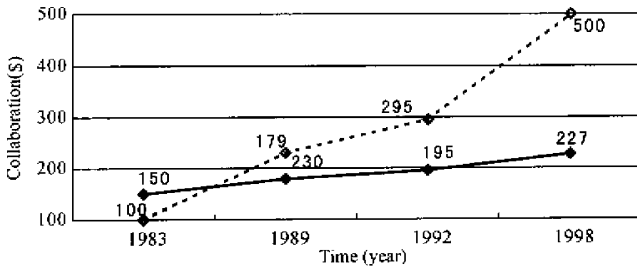


Fig.2 KPG's enhancement of technological competence (Data from: Research Report of KPG, Research Center for Management Science& Strategy, November 1999.)

---◇--- Money spent in collaboration (10⁴ \$); —●— Human in collaboration(per. Num)

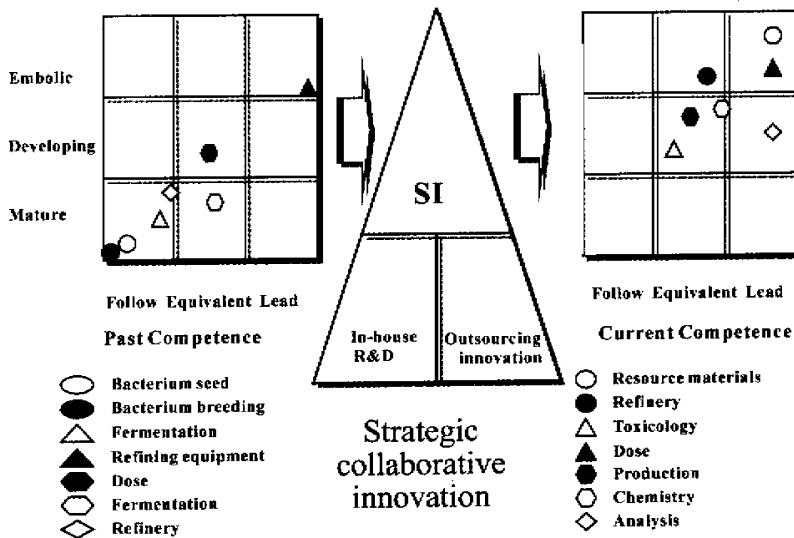


Fig.3 The chart of KPG's dynamic capabilities evolution

CONCLUSIONS: SOME THEORETICAL AND POLICY IMPLICATION

In this paper, a theoretical framework of the dynamic capabilities-based strategy innovation presents. Several large firms winning through SI in China were studied empirically. This work's findings will be useful for managers interested in our approach, which highlights the importance of

SI and focuses on and points out the major pitfalls in the innovation processes. Implementing dynamic capabilities-based strategy innovation can effectively cultivate and develop core competences of corporations. It is concluded that implementing SI is the only path for Chinese enterprise growth in the intensified competition in the knowledge economy. Some theoretical and policy implications are as follows: (1) Tomorrow's victories will go to the masters of SI, but true innovation is complex and tumultuous - full of

spurts, frustrations and sudden insights. The strategy innovation process is always filled with chaos, but it can be put into the somewhat-orderly-chaos position by formulating and implementing SI. The SI might accelerate technological innovation process, but formulation and implementation of SI need a long period of time in Chinese firms. (2) In order to gain sustainable competitive advantage in the ever-fasting market change, it is essential for top management to take dynamic capabilities-based SI into consideration. Without the strategic thinking in mind, it is hardly possible for firms to catch up the wave of change in both technological environment and market economy situation. (3) The technological innovation capabilities as well as core competence can be cultivated and leveraged by implementing SI. In the knowledge economy, the technology-intensive firms should implement SI in order to leverage and develop sustainable competitiveness.

References

- Ansoff, H. I., 1965. *Corporate Strategy*. McGraw-Hill Book Company, New York, p.15 – 26.
- Chen Jin, Xu Qingrui, 2000. Innovation Strategy for Indigenous Technological Innovation. *Science-International. Journal of Zhejiang University SCIENCE*, **2**(2): 58 – 64.
- Hamel, G., Heene, A., 1994. *Competence-Based Competition*. John Wiley and Sons, London, p.171 – 182.
- Heene, Aime and Sanchez, 1997. *Competence-Based Strategic Management*. John Wiley, Chichester, p.127 – 150.
- Kare-Silver Michael de, 1997. *Strategy in Crisis: Why Business Urgently Needs a Completely New Approach*. Macmillan Press, London, p.34 – 41.
- Patel, Pari and Pavitt, 1997. The technological competencies of the world's largest firms: Complex and path-dependent, but not much Variety. *Research Policy*, **26**: 141 – 156.
- Peteraf, Margaret A., 1993. The cornerstone of competitive advantage: A Resource-based view. *Strategic Management Journal*, **14**:179 – 191.
- Prahalad C. K., Hamel Gary, 1990. The competence of the corporation. *Harvard Business Review*, **68**(3): 79 – 90.
- Teece D. J., and Pisano G., 1994. The dynamic capabilities of firms: An introduction. *Industrial and Corporate Change*, **3**(3): 537 – 556.
- Teece D. J., Pisano G., and Shuen A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, **18**(7): 509 – 533.
- Utterback J. and Abernathy W. J., 1976. The dynamic model of product and process innovation. *Omega*, **3**: 639 – 655.
- Xu Qingrui, Guo Bin and Wang Yi, 1999. Development of Technological Innovation in China: Core Competence-based Innovation Portfolio. PICMET'99, Portland, Oregon, USA.
- Xu Qingrui, Wang Yi, and Wan Yan Shaohua, 2000. Toward Core Competence Management of Chinese Enterprises Facing the World Trade Organization. In: *China Joins the World Trade Organization: the Impact on Chinese Enterprise Management*, Shanghai Scientific and Technological Literature Publishing House, Shanghai, p.393 – 401.

International Peer Review System for Scientific Papers Published in the English-language *Journal of Zhejiang University SCIENCE*

The characteristics and requirements of world-class journal were considered in establishing a rigid peer review system for scientific papers submitted for publication in the English-language *Journal of Zhejiang University (SCIENCE)* from 2002 onward. We sent the over 160 contributions (by May 31, 2002) we received from January to May this year to the U. S. A., the U. K., France, Canada, Australia, Germany, the Netherlands, Finland, Poland, Italy, Spain, Belgium, Sweden, Denmark, Japan, India, Hongkong, Macao, Taiwan, etc., for pre-publication review by topnotch international scientists there in their respective specialties experience in scientific papers publication has shown that an international peer review system plays an important part in ensuring the high quality of a journal's contents and helping it to be known by worldwide.

Every little improvement of this journal depends on the strong support from the reviewers. We take this opportunity to give our heartfelt thanks to reviewers in China and abroad for their help since the establishment of the journal.