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Chung-Ming LAU

Daphne W. YIU

Singapore Management University, daphneyiu@smu.edu.sg

Ping-Kwong YEUNG

Yuan LU

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Strategic orientation of high-technology firms in a transitional economy[☆]

Chung-Ming Lau^{a,*}, Daphne W. Yiu^{a,1}, Ping-Kwong Yeung^{b,2}, Yuan Lu^{a,3}

^a Department of Management, The Chinese University of Hong Kong, Shatin, NT, Hong Kong

^b School of Business and Administration, The Open University of Hong Kong, Homantin, Kowloon, Hong Kong

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Abstract

Strategic orientation is a critical factor for a firm's competitiveness in a transitional economy context but it is understudied in the current literature. This article examines the antecedents of strategic orientation from both the socio-cognitive and resource-based view perspectives. The study posits that the strategic orientations of firms in a transitional economy context are influenced by the top managers' cognitions and organizational resources. Based on a national survey of high-technology firms in China, the study finds that a stronger market-focused strategic orientation was facilitated by managerial cognitions about the future of the industry and current operation and performance of the firm, as well as organizational resources including an R&D infrastructure, technological alliance, and top managers' foreign experience. The study confirms that strategic orientations should be examined from multiple theoretical perspectives.

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1. Introduction

Studies focusing on the outcomes of realized strategies populate the strategic management literature. Very few of them examine how strategies are developed. Nevertheless, the managerial cognitions studies help to understand the process of strategy development by examining how managers come to understand the business environment (Dutton et al., 1989; May et al., 2000; Walsh, 1995). Strategic orientation is a major theme of this line of investigation (Durand and Coeurderoy, 2001).

Broadly defined, strategic orientation is the business direction and objectives that the top management of a firm wants to achieve. Strategic orientation is particularly important in determining a firm's success in a transitional economy context (Luo et al., 2005; Zhou et al., 2005; Zhou and Li, in press). During an institutional transition from a centrally planned economy towards a market-based economy, emerging firms in transitional economies face a key strategic constraint of lacking forerunners for them to learn. Also, the experience in the pre-reform era provides little and not so relevant prior knowledge that enables these firms to evaluate external environment as well as to acquire and exploit resources. Similarly, the business mindset and experience that functioned effectively in the planned economy may become obsolete in the newly emerging market economies (Uhlenbruck et al., 2003).

Accordingly, the need for a focus on managerial cognitions to transform organizations during institutional upheaval is critical (Newman, 2000). Firms in transitional economies are required to explore new mechanisms to learn how to strategize in order to facilitate effective organizational transformation (for incumbents) and to search for how to play under the new rules of the game (for new entrants) during institutional transition. In some sense, the possession of a strong strategic and market-

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* Corresponding author. Tel.: +852 2609 7803; fax: +852 2603 5104.

E-mail addresses: cmlau@cuhk.edu.hk (C.-M. Lau), dyiu@cuhk.edu.hk (D.W. Yiu), pkyeung@ouhk.edu.hk (P.-K. Yeung), yuanlu@baf.mssmail.cuhk.edu.hk (Y. Lu).

¹ Tel.: +852 2609 7789.

² Tel.: +852 2768 6913.

³ Tel.: +852 2609 7810.

oriented mindset is critical for these firms as they now have to engage in the entrepreneurial process with a strategic focus (Bruton et al., 2004).

This article therefore examines how strategic orientation is developed in a new institutional environment. We choose to focus on the high-technology industry in the transitional economy of China. This is because technology-based ventures are critical for the development of transitional economies (Bruton and Rubanik, 2002). Also, high-technology firms are more entrepreneurial and require stronger strategic orientation in order to compete in the industry. In regard to China, high-technology firms are often referred to those firms that have a technology focus and are technology-intensive, and are called ‘high and new technology firms’. These firms are regarded as ‘emerging’ firms as they are ‘new’ to China. Most of the firms are in the chemical, pharmaceutical, electronics, telecommunications, machineries and equipment industries. Although the technology level of these firms may not be always comparable to that of those cutting-edge, world-class high-technology firms in developed countries, the high-technology firms in China have experienced phenomenal growth in the last decade. Some firms have achieved world-class status in terms of marketing, manufacturing, and technological development (Li et al., 2000). Yet, these firms are subject to hostile forces in the transitioning institutional environment (Ahlstrom and Bruton, 2002; Lau et al., 2002a,b).

In China, most of the high-technology firms are young and entrepreneurial ventures, while some of them are spin-offs or reformed ventures from state-owned enterprises in the pre-transition period. The owners and chief executives (who are regarded as entrepreneurs) are operating in a complex social and economic context, with diverse demands and constraints (Lau and Busenitz, 2001). They also need to make use of their limited resources to compete with the larger state-owned enterprises and foreign invested firms. Thus, examining the strategic orientations of these firms allows us to better understand the strategy development process of firms in a transitional economy context.

This study suggests that the development of strategic orientation can be understood by examining both the cognitive mindset of top managers (entrepreneurs) and organizational resources of the firms during institutional transition. This is because the examination of managers’ cognitive mindset is particularly important in situation with high ambiguity and uncertainty, like in the context of a transitional economy, and both the adaptation of indigenous resources and the development of new resources are crucial for strategic competitiveness during institutional transition. This echoes the call of Ginsberg (1994) that there is a need to integrate the cognitive and resource-based perspectives in studying firm strategies. By focusing on ventures that require entrepreneurship, this study also contributes to the understanding of the particularity of high-technology ventures and how their strategic orientations are developed in a new industry sector in a transitional environment. This implies that neither an entrepreneurial cognition nor organizational resources alone are sufficient to develop market-focused strategic orientations in a transitional economy.

2. Strategic orientations in a transitional context

Strategic orientation is based on a cognitive understanding and interpretation of the external environment and internal resources, and it represents a resource allocation priority of a firm with long-term growth and shareholders’ wealth as the ultimate objective (Hitt, Dacin, Tyler, and Park, 1997). An orientation is developed in a strategist’s mind that involves different investment and deployment of financial resources and human capital. It represents how aggressively a firm desires to compete in the market, and thus the willingness to explore and develop competencies, products, or markets (Zhou and Li, *in press*). Different strategic orientations involve different investments in time, financial resources, human and political capital. The basis of this orientation is how the top management organizes and interprets information about the environment and the level of necessary resources the firm possesses.

Recent studies have examined what strategic orientations are and the relationships of strategic orientations with organizational design and performance (McKinley et al., 2000; Ramaswamy, et al., 1994; Veliyath and Shortell, 1993). There are similar studies on entrepreneurial cognitions in new venture creation in the field of entrepreneurship as well (e.g., Baron, 2004; Busenitz and Lau, 1996; Durand and Coeurderoy 2001; Shane and Venkataraman, 2000; Wiklund and Shepherd, 2003). However, these studies have been focusing on examining the consequences of different entrepreneurial orientations, such as organizational outcomes like reward system, organizational performance, and intentions of new venture creation. They seldom study the antecedents, and the construct, of orientation itself, especially from a strategic perspective in a transitional economy context.

Further, high-technology ventures are normally regarded as more entrepreneurial. This is especially so in a transitional economy context because the environment is more risky and uncertain, and competitive advantages come from innovative and proactive orientation (Peng, 2001). These firms have to be both strategic and entrepreneurial. Ireland, Hitt, and Sirmon (2003) proposed that the strategic entrepreneurship process should include an entrepreneurial mindset, culture, and leadership, as well as strategic management of resources and application of creativity to develop innovation. Lumpkin and Dess (1996) have also identified several key dimensions of an entrepreneurial orientation. In particular, autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness are the key characteristics of an entrepreneurial process. These dimensions are also relevant to the entrepreneurial nature of high-technology firms. For example, Wiklund and Shepherd (2003) found that entrepreneurial orientation enhanced the relationship between knowledge-based resources and firm performance in small and medium-sized firms.

In fact, in a transitional economy context, firms often face strategic issues related not just to the development of new products and markets, but also to the transformation of current organizational structure, management systems, as well as the development of capable human resources with market-orientation (Li, 2005; Wei and Lau, 2005). They share some

similarities with new start-ups in market economies in terms of opportunity seeking, but often differ from them in terms of size and age. Hence, the strategic orientation of these firms could be described from a corporate entrepreneurship perspective that involves sustained regeneration, organizational rejuvenation, strategic renewal, and domain redefinition (Covin and Miles, 1999). These ideas are useful to represent the strategic orientations of high-technology firms in such a context.

3. Development of strategic orientations

We examine the antecedents of strategic orientations from two theoretical perspectives: the socio-cognitive perspective of the entrepreneurial cognitions literature and the resource-based view (RBV) of the strategic management literature. The socio-cognitive approach emphasizes on the subjective nature of business environments and competitive situations but it fails to link them with a firm's competitive advantages. On the other hand, the RBV focuses on the importance of organizational resources, including managerial cognition, in creating economic rents but has yet to pay attention to the processes through which managerial cognition leads to competitive advantages (Ginsberg, 1994). As such, combining the socio-cognitive and the RBV offers a more comprehensive picture about how managerial cognition and organizational resources function together to sustain a firm's competitive advantage.

The socio-cognitive approach provides a framework to understand how the internal and external environments are perceived by the top managers of new ventures (Lau and Busenitz, 2001). Top managers have to acquire information and build up business knowledge for the success of the ventures (Zahra et al., 2005). However, the reliance on factual-based logic is very costly. So, using managerial heuristics and perceptions to piece limited information together may be virtually the only way to progress forward in the decision-making process (Busenitz and Barney, 1997). Therefore, entrepreneurs

and managers rely on extensive use of individual heuristics and beliefs in the decision-making process (Busenitz and Lau, 1996). The examination of managerial cognition is particularly important in situation with high ambiguity and uncertainty, such as the high-technology industry. In a transitional economy like China, high-technology firms are facing the demand of rapid organizational transformation and they have to be more entrepreneurial in order to remain competitive in the market. Ahlstrom and Bruton (2002) found that the institutional environment is forcing the Chinese technology-focused firms to engage in strategic actions for the reason of legitimacy. Thus, the development of strategic orientations can only be effective if top managers are able to understand the changing institutional environment correctly and have a good understanding of the firm's resources. That is to say, those firms which have stronger aspirations towards proactively exploiting opportunities in the external environment and developing production, technological, and organizational capabilities, are more inclined to engage in strategic activities.

From the resource-based view (RBV) of a firm, firms must possess certain critical resources in order to exploit the market opportunities (Barney, 1991). In a transitional economy context, resources are not naturally endowed in firms due to the less developed or more costly external factor markets (Uhlenbruck et al., 2003). Thus, firms have a higher pressure to develop or acquire resources necessary to build up their sustainable competitive advantages (Lee et al., 2001). In addition, different configurations of resources will facilitate firms for the pursuit of different competitive strategies (Borch et al., 1999). For instance, technology firms are prospectors and their strategies are product- and growth-oriented. To facilitate the pursuit of such strategies, organizational mechanisms that facilitate effective acquisition and transfer of knowledge throughout the organization are key resources that help these firms to build competitive advantages (Bruton et al., 2007). Accordingly, the resource endowment and established organizational

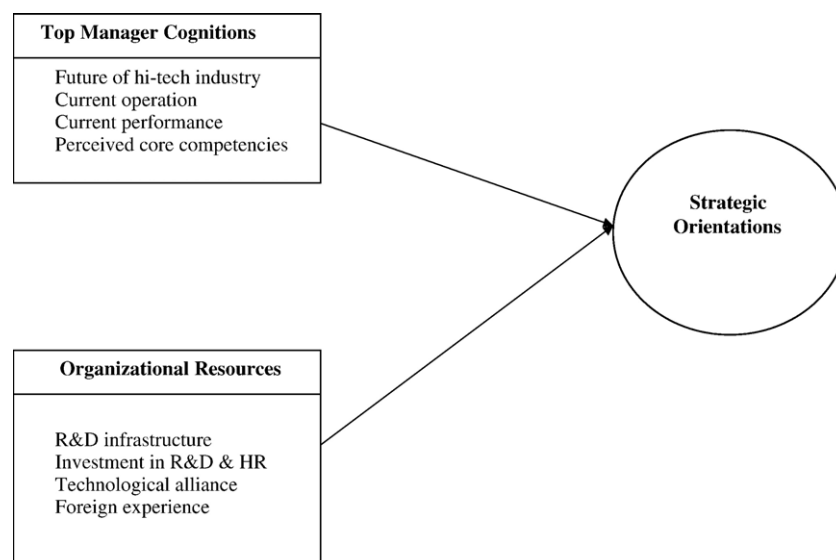


Fig. 1. A model of strategic orientation of high-technology firms.

mechanisms of a high-technology firm that facilitates technology dissemination allow the firm to develop a more proactive strategic orientation.

Combining the socio-cognitive perspective and the RBV, we suggest that top managers (who may be regarded as entrepreneurs in the context of this study) should have appropriate perception of the business environment, and hence the willingness to create knowledge and necessary capability of the firm leading to competitive advantages and hence performance (Hitt et al., 2002; Liao et al., 2003). Also, the resource endowment of the firm may enhance or constrain the capability in developing a stronger strategic orientation (Borch et al., 1999; Wiklund and Shepherd, 2003).

In the following, we will formulate hypotheses on the relationship between the cognitions of top managers as well as organizational resources with strategic orientations, as shown in Fig. 1. The empirical context of the study is high-technology firms in China. These firms include young entrepreneurial ventures as well as reformed enterprises, and are operating in a transitioning environment with increasing competitive forces from multinational enterprises in both local and global markets. Although China is chosen as the empirical context, the theoretical implications derived are applicable to other contexts undergoing institutional transition.

4. Hypotheses development

4.1. Top manager cognitions

Owners and top managers play a key role in shaping the strategic direction and operations of an organization, as they are responsible for managing the organization's shift from one set of routines to another (Dess et al., 2003). Nevertheless, these owners and chief executives could think and act like *entrepreneurs* since they are involved in corporate entrepreneurial processes, even though the firms may not be new start-ups. Their strategic orientation is instrumental in developing strategies as the orientations are the cognitive understanding about the environment and the firm in terms of broad and specific future actions. The strategic orientation is more entrepreneurial in the case of high-technology firms. Hence, the socio-cognitive approach of new venture creation (Busenitz and Lau, 1996; Mitchell et al., 2000) is relevant to the understanding of strategic decisions and growth intentions of firms, which are reflected in the top managers' cognitions about the environment (both external and internal) and related strategic orientations.

Cohen and Levinthal (1990) emphasize that absorptive capacity is cumulative and history dependent in the sense that a firm learns by building on what it has learned before, and such prior knowledge increases a firm's ability to put the knowledge into memory as well as to facilitate the learning of related new knowledge. Thus, how the top managers perceive a firm's past and current conditions will influence whether investments and commitment would be made to build up the competitiveness of the firm. This knowledge also enables a firm to predict more accurately the nature of future technological advances, which is particularly important in uncertain environment as found in a

transitional economy. We therefore first propose that strategic orientations will largely depend on the cognitive structure of the top managers, i.e. the knowledge accumulated from their assessment of external environment and their perception on the firm's core competencies.

4.1.1. Environmental assessment

Environmental assessment is a key area in the studies of managerial cognitions. The environmental stimuli provide information to prompt entrepreneurs to action. The information comes from both external environment (market) and internal environment (firm). Isabella and Waddock (1994) establish the link between the top management team's environmental assessment and their strategic decisions. The assessment is how managers come to perceive, interpret, and act upon environmental uncertainty. Garg, Walters, and Priem (2003) noted that environmental scanning emphases have impacts on the sales growth of firms. In a study of Russian executives, May et al. (2000) suggest that environmental scanning behavior is important for firm performance in a transitional economy.

The high-technology firms in China face uncertainties arising from the business risks of their industries. Since technology-based firms are new to China and these firms may not have an advantageous position in technology as compared to their counterparts in the developed countries, the uncertainty is much higher (Li, 2005). Lau (1998) suggests that chief executives in China's state-owned enterprises used market and political information from the environment to come up with their strategic decisions. When chief executives perceive that there are more market opportunities, they will be interested in making their firms more competitive to ensure better financial rewards and better firm reputation. Thus, having more confidence on the future of the industry may induce more incentives for the top managers to engage the uncertain and volatile environment. Accordingly, a more favorably evaluated market will reinforce their willingness to invest in learning new knowledge and acquiring more information. This will also guide them to develop a more competitive orientation. Thus, it is hypothesized that:

Hypothesis 1a. Firms in which the top managers assess the industry environment more favorably tend to have a stronger strategic orientation than those with top managers assessing the industry environment less favorably.

In addition, top managers not only assess what the market is like, they also evaluate what they have achieved. In fact, there is a link between a firm's past performance and its risk-taking behaviors (Bromiley, 1991). The level of achievement of current operation and performance serves as the signal of a job well-done in the past, and hence, top managers learned that they can be more strategic and aggressive in the future. If the ongoing reform is successful, they will invest more in improving the firm's competitive position.

From another angle, a firm's absorptive capacity is largely a function of its prior knowledge (Cohen and Levinthal, 1990). The current operation and performance of a firm reflect its past experience and routines. The current performance sets the

aspiration level for a firm to learn. This is because past experience has defined the locus of a firm's technological search and influenced the development of path-dependent capabilities of knowledge acquisition and assimilation (Zahra and George, 2002). Firms search for information in areas where they have had past successes (Christensen, 1997). If the firm is rather weak at present, it may concentrate on building up its competencies instead of exploiting the market aggressively. Moreover, the knowledge of success is a part of managerial heuristics of the executives. Since they tend to rely on heuristics in making strategic decisions (Busenitz and Barney, 1997), their assessment of current performance will therefore affect their willingness to pursue a more proactive course of action. Hence, the perception of a firm's current operation and performance is expected to exert an impact on what and how a firm should develop strategically. Thus, we can hypothesize that:

Hypothesis 1b. Firms that have better current operation and higher current performance have a stronger strategic orientation than those with worse current operation and lower current performance.

4.1.2. Perceived core competencies

Besides the assessment of external environment, how top managers perceive a firm's internal environment and strategic resources will affect how the firm should compete. For instance, start-ups led by entrepreneurs with more experience in the pre-transition era are more likely to compete primarily on the basis of networks and relationships, while those led by entrepreneurs with less or no such experience would rely more on market-based resources and capabilities to compete (Peng, 2003). More importantly, the internal environment of the firms during institutional transition is very complex because firms are undergoing fundamental organizational transformation and resource reconfiguration (Uhlenbruck et al., 2003). According to Peng (2003), the capability needs of a firm to have a competitive advantage will differ over the period of institutional transition since the strategy choices and organizational constraints will vary as the institutions change.

The competence-based view argues that firms must have certain resources and knowledge in order to be innovative (Durand, 1997; Hoopes and Postrel, 1999). In the high-tech sector, the types of resources needed are very much related to the development and utilization of technology in this industry (Lau et al., 2002a,b). So, firms with core competencies in R&D will have more competitive advantages. Empirical evidence also shows that firms that develop strengths in market-based capabilities, such as technological capabilities for continuous product development, will sustain competitiveness in emerging markets such as China (Yiu et al., 2005). Therefore, we argue that managers who perceive that their firms having core competencies in R&D are more likely to articulate a stronger strategic vision.

In addition to technological capabilities, organizational capabilities are crucial for firms in transitional economies. Henderson and Clark (1990) suggest that reconfiguring existing component knowledge leads to a new knowledge configuration, which subsequently serves as a platform for producing

Schumpeterian type of innovations — combining existing stocks of product means in new ways (Schumpeter, 1934). Van den Bosch, Volberda, and Boer (1999) refer this to combinative capabilities. Thus, firms with perceived competencies to organize and strategize in an uncertain environment will have competitive advantages in the high-tech sector. Hence, a stronger strategic orientation is likely to be formulated.

Hypothesis 1c. Firms with perceived core competencies in R&D and organizing and strategizing have a stronger strategic orientation than those without such perceived core competencies.

Since high-technology industry is more knowledge-based and emphasizes more on product innovations, core competencies in merely production efficiency and manufacturing will not be sufficient enough to create a competitive edge. In contrast, if the competencies are in technology or new product development, the firms can have higher competitiveness. Hence, it is expected that firms with perceived competencies in production efficiency and manufacturing will be less aggressive and weaker in their strategic orientations.

Hypothesis 1d. Firms with perceived core competencies in production and manufacturing have a weaker strategic orientation than those without such perceived core competencies.

4.2. Organizational resources

From the RBV of a firm, firms must possess certain critical resources in order to exploit the market opportunities (Barney, 1991). As the primary objective of high-technology firms is on improving their competitiveness in the unstable and volatile market through innovative products, these firms have a much higher pressure to develop or acquire resources necessary for sustainable competitive advantages.

In a high-technology firm, competitive advantages come from the firm's direct efforts in developing resources and mechanisms for effective development of technology, transfer of knowledge, and hence proactive actions (Cohen and Levinthal, 1990). The literature suggests that firms must develop certain structure and process in order to enhance technology development and transfer. Structural design is regarded as one kind of organizational learning mechanisms that facilitates the acquisition, exploitation, and assimilation of knowledge (Dess et al., 1999; Lau et al., 2002a; Uhlenbruck et al., 2003). The other organizational mechanisms include organizational culture and human resource system (Lau and Ngo, 2004; Van den Bosch et al., 1999). As such, R&D infrastructure, investments, and alliances are all relevant factors.

4.2.1. R&D infrastructure

A firm's structural design reflects the commitment to develop high-technology capabilities. For example, the presence of a technology development center is an indicator of the technological advancement orientation of the firm. Teece, Pisano, and Shuen (1997) suggest a dynamic capability approach to describe a firm's ability to integrate the process and structure necessary to achieve new and innovative competitive advantage. Further, firms from transitional economies may seek resources by setting

up R&D centers in developed countries in order to improve their own advantages (Dunning, 2006). Therefore, a R&D center reflects the firm's commitment to entrepreneurial process from a strategic perspective. Although a firm may not need to set up R&D centers in order to be more aggressive, the presence of a R&D center nevertheless signals that the firm is adopting a more aggressive and market-focused strategic orientation.

Hypothesis 2a. Firms with an established R&D infrastructure (such as technology development center) have a stronger strategic orientation than those without a technology development center.

4.2.2. R&D and HR investment

Financial resources such as investments specifically spent on R&D and human resources are critical in enhancing a firm's capacity in innovation. This is especially important in high-technology firms. This type of investment also represents the firm's commitment to aggressive development in the industry. Moreover, human capital is a major characteristic of a knowledge-based firm (Bolland and Hofer, 1998). It can be represented, for example, by the ratio of university graduates in the workforce. In general, university graduates are critical resources for innovation. More relevant university graduates indicate a higher capability potential to develop innovative products and hence improved technological advantages. The presence of educated staff reflects a firm's commitment to technology, which implies that a firm would be able to engage in a more aggressive strategic orientation.

Hypothesis 2b. Firms with higher investment in R&D and human resources have a stronger strategic orientation than those with lower investment in such resources.

4.2.3. Technological alliances

Besides implementing internal organizational mechanisms, firms can also access to more resources and learn from external parties via forming strategic alliances. In the high-technology industry, networks and alliances are instrumental in learning for value-creation (Anand and Khanna, 2000; Bruton et al., 2007) and innovation (Fischer and Varga, 2002). The formation of technological alliances and cooperative ventures with industry partners can facilitate the exploration of new market opportunities and is an indication of a firm's growth orientation. Networking alliances are critical in new product development (Soh, 2003). Hence, the alliances would enhance the firm's capacity to learn and therefore would enable the firm to engage more in entrepreneurial activities, such as strategic renewal and organizational rejuvenation (Covin and Miles, 1999). In addition, there is an institutional pressure in the high-technology industry on the organizational design to maintain legitimacy, such as engaging in alliances and maintaining a flexible design (Van de Ven and Poole, 1995). Finally, allying with multinational enterprises is an imperative means of acquiring R&D capabilities for firms in transition economies (Zhao et al., 2005). Thus, the formation of technological alliances will facilitate firms in developing strategic orientation.

Hypothesis 2c. Firms engaging in technology alliances with industry partners have a stronger strategic orientation than those without such alliances.

4.2.4. Foreign experience

Many top managers in the transitional economy of China are not able to learn from their counterparts in the country since nearly all of them have no prior experience in high-technology industry. One way for them to acquire new knowledge or latest information to build up their learning capacity of their firms is to go outside of China and learn from foreign countries. Thus, the overseas experience of these entrepreneurs is an important source of knowledge. This, in fact, is another type of strategic resources that a firm possesses.

Zahra et al. (2005) also suggest that an understanding of global competition is important in the mental models of entrepreneurs. These top managers, with a wider exposure, should have a broader business mindset, and be more strategic in managing the high-technology ventures. We therefore hypothesize that foreign experience is a kind of person-specific resources endowed in the firm which facilitates the formation of a stronger strategic orientation.

Hypothesis 2d. The foreign experience of top managers relates positively with a stronger strategic orientation.

In summary, the implementation of various organizational mechanisms (by establishing a technology development center, investing in technological and human capital, and engaging in alliance formation) and the top managers' international experiences enhance a firm's ability in technology acquisition and development, which subsequently results in a stronger and more aggressive strategic orientation.

5. Method

5.1. Sample

This study is based on an annual survey of Chinese chief executives and owners conducted at the national level by a government research agency in China. There are 697 firms classified in the category of the high-technology sector in the survey conducted in 2000. We used these 697 firms as the study sample. Most of these firms are in the chemical, pharmaceutical, telecommunications and machinery industries. The research agency that develops the database is a reputable unit that supplies information to the Central government for policy decisions. They conduct an annual survey among various types of firms (public and private firms) and provide feedbacks to participating firms on specific topics. Besides their own checking of some common items across surveys, we also cross-checked the internal reliability and validity of information contained in the database. Thus, the reliability of the data is assured. Additionally, we employed objective data in regression analyses to make sure common method variance did not pose significant inflation on the results. We also checked the internal consistency of all items in the analyses. They are reported in the description of the measures below.

All respondents are the owners and chief executives of the high-technology firms. These firms vary in size and years of establishment. The median number of employees is 403 and the median firm age is 12 years. The sample also consists of firms with different ownership types, including state-owned (32%), share-holding (47%), private businesses (5%), and other forms (including joint ventures, 16%).

5.2. Measurement

5.2.1. Strategic orientation

We used a 7-item 5-point scale to measure the key dependent variable-strategic orientation. The scale asks the chief executives to evaluate the extent to which “the firm is now emphasizing and working hard on” the following areas: meeting customer demand, increasing sales, enhancing market-orientation, gathering intelligence and communication, implementing cost-control, improving staff quality, and promoting innovation. These seven items are similar to the dimensions of strategic renewal, organizational rejuvenation, and sustained regeneration in the corporate entrepreneurship literature (Covin and Miles, 1999; Dess et al., 2003) and hence should reflect the strategic orientations of high-technology ventures in a transitional economy. A higher score on this scale indicates a stronger and more aggressive strategic orientation of the firm. The Cronbach’s alpha of this scale is 0.737.

5.2.2. Future of high-technology industry

We assessed the future of high-technology industry using a 5-point, single-item scale. The respondents rated the future development of high-tech industry in China from very pessimistic (1) to very optimistic (5).

5.2.3. Firm’s current operation and performance

We constructed a 5-item, 3-point scale to measure the assessment of top managers on the firm’s current operation. The top managers gave their overall assessment of “the firm’s current situation as compared to the previous period” regarding general operation, order placed, production, sales, and profit. The Cronbach’s alpha of this scale is 0.835. The assessment of a firm’s current performance is a single-item measure in terms of the actual profit in the first half of year 2000. This is based on a 5-point scale ranging from huge deficit (1) to huge surplus (5).

5.2.4. Perceived core competencies

To measure perceived competences, we used three dummy variables. Each of the dummy variables has a value of ‘1’ when the respondent believes that the firm has such kind of core competencies and a value of ‘0’ otherwise. The three types of core competencies are: (1) research and development, (2) production efficiency and manufacturing, and (3) organizing and strategizing.

5.2.5. R&D infrastructure

We used the presence of a technology development center to represent firm’s investment in R&D infrastructure. We asked respondents if they had “structural or organization design

changed” through the establishment of a technology development unit in the last two years.

5.2.6. R&D and HR investment

We measured investment in R&D and human resources using two indicators. The first one is related to expenses incurred by the firms in these two areas. It is measured by the sum of the proportion of R&D and training and development expenses to total sales for the year. In addition, we calculated the ratio of university degree holders (educational attainment of university or above) to the total number of employees as another measure of HR investment.

5.2.7. Technological alliances

Technological alliances is measured by a dummy variable that asks whether the firm has formed strategic alliances or cooperative ventures with firms in related industries, or has close cooperation with industry or research units.

5.2.8. Foreign experience

Foreign experience refers to whether the top managers have stayed outside of the country before. We coded top manager having experience outside of China for over 3 months in the past using a dummy variable with a value of ‘1’ and ‘0’ otherwise. Given the survey period and the higher-level status of respondents (chief executives), it is not so likely that they have full-time education or working experiences in overseas countries for an extended period. As such, a three-month period is considered appropriate since most of the Chinese do not have a chance to be out of a country for more than 2 weeks at a time, and there are often restrictions in regard to the number of exchange visits and travels they can make a year. Leaving their own country for 3 months implies some forms of training and exchange already.

5.2.9. Controls

We also controlled for a number of both firm-level and individual-level factors. At the firm level, we controlled for *firm size* in terms of total assets and number of employees, with natural logarithm transformation. Moreover, the age of a firm is normally associated with better resource endowment and higher competitiveness. However, this may not be the case in high-technology industries and especially in a transitional economy. High-technology firms require high strategic flexibility to meet with the dynamic environment. As such, firm experience might be a liability that blinds the organization in recognizing emerging market opportunities. Thus, we controlled for *firm age* in the analyses. We measured firm age by taking the natural logarithm of the number of years since the firm has founded. It is worth noting that state-owned firms in this sample (which is also true for all Chinese SOEs) may have a higher firm age than what is normally expected for high-technology firms in a market economy. This is because they could be a newly set up division of a research institute or a spin-off of a large state-owned enterprises that has a long heritage and hence a higher age of firm. Finally, we controlled for *ownership* types of firms. We used three dummy variables to represent state-owned enterprises, share-holding

Table 1
Descriptive statistics and correlations

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1 Strategic orientation	3.664	0.432									
2 Employee size (ln)	6.142	1.365	−0.035								
3 Total asset (ln)	8.995	1.754	0.022	0.730							
4 Ownership (SOE)	0.290	0.454	−0.111	0.282	0.121						
5 Ownership (Private)	0.041	0.199	0.114	−0.169	−0.188	−0.132					
6 Ownership (Share)	0.526	0.500	−0.012	−0.046	−0.012	−0.672	−0.218				
7 Firm age (ln)	2.602	0.936	−0.184	0.488	0.263	0.397	−0.116	−0.135			
8 Industry (electronics)	0.190	0.393	−0.014	−0.060	−0.022	−0.093	−0.001	0.054	−0.063		
9 Industry (chemical)	0.195	0.397	0.028	0.018	0.100	−0.015	−0.069	0.078	−0.016	−0.238	
10 Top manager age	49	8.235	−0.061	0.113	0.154	0.123	0.051	−0.189	0.153	0.018	−0.010
11 Education (College)	0.300	0.459	0.070	−0.052	−0.084	−0.097	0.034	0.118	−0.005	−0.074	0.045
12 Education (Univ.)	0.446	0.498	−0.080	0.148	0.163	0.189	−0.134	−0.191	0.063	0.052	−0.038
13 Education (Graduate)	0.156	0.364	0.045	−0.009	−0.008	−0.104	0.018	0.140	−0.019	−0.046	0.055
14 Industry future	3.503	0.918	0.209	−0.093	−0.088	0.069	0.084	−0.090	0.006	−0.108	0.041
15 Current operation	2.280	0.486	0.206	0.067	0.032	−0.054	0.030	−0.028	−0.032	0.066	−0.033
16 Current performance	3.944	0.900	0.214	0.001	0.042	−0.180	0.056	0.072	−0.101	0.103	0.074
17 Core comp (R&D)	0.710	0.454	−0.045	−0.015	−0.087	0.009	0.047	0.050	0.068	−0.051	−0.114
18 Core comp (Mfg)	0.395	0.489	−0.132	0.129	0.086	0.155	−0.008	−0.199	0.091	−0.030	−0.027
19 Core comp (Org.)	0.556	0.497	−0.045	0.020	0.013	0.047	−0.050	0.020	−0.012	−0.002	0.022
20 R&D infrastructure	0.856	0.351	0.098	0.193	0.129	0.068	0.011	0.050	0.135	−0.063	−0.002
21 R&D HR expenses	8.497	8.893	0.040	−0.222	−0.186	−0.025	0.180	−0.081	−0.129	−0.009	−0.114
22 HR investment	20.361	19.553	0.126	−0.362	−0.184	−0.107	0.141	−0.003	−0.274	0.169	−0.101
23 Tech alliances	0.444	0.497	0.108	−0.049	−0.091	−0.001	0.050	0.001	−0.021	0.081	0.004
24 Foreign experience	0.528	0.500	0.127	0.109	0.160	−0.155	−0.063	0.090	0.005	−0.014	−0.015

Note: $N=390$ (listwise).

$|\text{correlations}| \geq 0.100$ are significant at the 0.05 level, and ≥ 0.132 are significant at the 0.01 level (two-tailed).

firms, and private businesses respectively. Other ownership type (e.g. joint ventures) is the reference group. Lastly, we also controlled for *industry effects* of these high-technology firms. We used two dummy variables to represent their industries: ‘chemical and pharmaceutical’ and ‘electronics and telecommunications’. ‘Other industries’ is the reference group.

At the individual level, we controlled for the top manager’s demographics. In the entrepreneurial literature, two key demographic characteristics relevant to strategic decisions are *age* and *education* (Busenitz and Lau, 1996). In China, the substantial experiences accumulated in the pre-transitional era of older executives may constrain their strategic decisions. Furthermore, younger entrepreneurs who are professionally trained during the transition are less resistant and more eager to form and accept new practices emphasizing market competition. Thus, we controlled for the age and education level of the top managers in this study. The age of an entrepreneur is the actual age reported. Education levels are measured by three dummies representing the highest qualification attained: college, university, or graduate school. High school education level is used as the reference group.

5.3. Analysis

A potential endogeneity concern may exist in the relationship between top executives’ cognitions and strategic orientation. To check whether endogeneity may pose biased estimates of the regression and requires the use of instrumental variable regression analysis rather than the ordinary OLS regression analysis, a Hausman test is conducted (Davidson and MacKinnon, 2003;

Greene, 2000; Wooldridge, 2003). The results of the Hausman test illustrated that there is no statistically significant difference in the coefficient estimates obtained from the OLS regression and those obtained from instrumental variables regression (Chi-square=9.06, $p=0.43$). Thus, we stick to using hierarchical regressions for testing the hypotheses. We entered the control variables first in Model 1. Then, we added each group of independent variables (top managers’ cognitions and organizational resources) in Model 2 and Model 3 respectively. Finally, Model 4 represents the full model.

6. Results

Table 1 shows the means, standard deviations, and correlation matrix of the variables used in the analysis. Table 2 depicts the hierarchical regression results with standardized coefficients. Overall, the R^2 square of the full model, Model 4, shows that the variables explained a reasonable amount of variance of the dependent variable, strategic orientation. Also, the hierarchical regression indicates significant incremental variance explained (the statistical significance of the F tests for R^2 change are from $p < .01$ to $p < .001$ levels). Furthermore, the regression coefficients of the variables largely remain stable in terms of values and direction across the four models, indicating robustness of the results.

Model 1 shows the regression results of the control variables on strategic orientations. Except for the firm age, the effects of all other control variables are not statistically significant. The negative coefficient indicates that older firms have weaker strategic orientation. The demographics of the top managers have no statistically significant effects on strategic orientation.

10	11	12	13	14	15	16	17	18	19	20	21	22	23
0.046													
0.100	−0.588												
−0.294	−0.282	−0.386											
0.056	0.007	−0.003	−0.059										
−0.051	−0.027	0.048	−0.027	0.101									
0.058	0.041	−0.076	0.058	0.075	0.459								
0.109	−0.075	0.073	−0.021	0.067	−0.021	−0.053							
0.129	0.021	0.077	−0.146	0.009	−0.014	−0.078	−0.213						
−0.027	0.044	−0.029	0.001	−0.045	0.079	0.030	−0.252	−0.218					
0.094	0.077	−0.044	−0.085	0.001	−0.068	−0.001	0.093	−0.028	−0.027				
−0.032	0.020	0.007	−0.021	0.176	−0.037	−0.072	0.097	−0.085	0.007	−0.020			
−0.120	−0.174	0.114	0.127	0.105	0.022	0.060	0.068	−0.126	−0.046	−0.099	0.199		
−0.023	−0.055	0.008	0.028	−0.028	−0.037	0.004	0.013	−0.024	0.018	0.218	0.044	0.114	
0.076	−0.043	0.073	0.039	0.025	0.154	0.164	−0.071	0.070	0.087	0.008	0.039	0.180	0.068

Thus, the results show that strategic orientation is not related to firm size, ownership, nor top managers' demographics.

The block of top managerial cognition variables was entered subsequently in Model 2. This block of variables brought significant incremental variance explained to strategic orientation, as shown by the change in R square ($\Delta R^2 = .107, p < .001$). Hypothesis 1a predicts that a more favorable perceived future of the industry is related to a stronger strategic orientation. It is strongly supported, as shown by the positive coefficient of the perceived future of the high-tech industry ($p < .001$). Regarding the assessment of firm's internal environment, the current operation and current performance of a firm are positively related to strategic orientation ($p < .05$ and $p < .10$ respectively). Thus, Hypothesis 1b receives moderate support. Contrary to Hypothesis 1c, the effect of perceived core competencies in organizing and strategizing on strategic orientation is negative ($p < .05$), while the effect of perceived firm core competencies in R&D is not statistically significant. Therefore, Hypothesis 1c is not supported. Finally, the coefficient of perceived core competencies in production efficiency and manufacturing is negative and statistically significant ($p < .01$).

Model 3 shows the effect of organizational resources on strategic orientations. R&D infrastructure (as measured by established technology development center) is significant ($p < .05$). Both measures of R&D & HR investment (expenses and university graduates ratio) are not significant. The coefficient for technological alliances is not significant as well while foreign experience is only marginally significant at the 0.1 level.

Model 4 represents the full model. Most of the coefficients of the cognitive and resources variables remain unchanged, except

that current performance is not significant now and technological alliances instead of foreign experience is marginally significant. So, Hypotheses 1a and 1d receive support, the support for Hypothesis 1b is weaker now and Hypothesis 1c is also not supported in the full model. Similar to Model 3, the coefficient of R&D infrastructure is positive and statistically significant at the .05 level and hence supports Hypothesis 2a. The coefficients of investments in R&D and HR are not statistically significant. Therefore, the results do not support Hypothesis 2b. Regarding the relationship between technological alliance formation and strategic orientation, the results in the full model show that the coefficient of technological alliance is positive and statistically significant at the .10 level only. This only supports Hypothesis 2c marginally. Foreign experience is statistically significant at the .10 level in Model 3. Thus, Hypothesis 2d receives weak support. Overall speaking, R&D infrastructure is the most critical organizational resource variable that is associated with a stronger strategic orientation.

7. Discussion and conclusions

7.1. Top manager's cognition and strategic orientation

The current study examines how both top management cognitions and organizational resources affect the strategic orientation of high-technology firms in a transitional economy context. The study provides an empirical test of high-technology firms from the combined socio-cognitive and RBV perspectives. Specifically, we found that top managers' cognitions and organizational resources exerted influence on the development

Table 2
Hierarchical regression results on strategic orientations

	Model 1	Model 2	Model 3	Model 4
<i>Control variables</i>				
Employee size (ln)	.046	.060	.058	.050
Total asset (ln)	.075	.073	.058	.066
Ownership (SOE)	-.114	-.071	-.114	-.073
Ownership (Share-holding)	.074	.057	.057	.048
Ownership (private)	-.124	-.103	-.145	-.123
Firm age	-.181**	-.175**	-.175**	-.175
Industry (electronics & telecom)	-.009	-.017	-.017	-.022
Industry (chemical & pharmaceutical)	.020	-.006	.030	-.002
Top manager's age	-.050	-.038	-.062	-.047
Education (College)	.107	.115	.101	.121
Education (University)	.015	.026	-.013	.018
Education (Graduate)	.066	.064	.046	.060
<i>Cognitions</i>				
Future of hi-tech industry		.198***		.196***
Current operation		.130*		.136*
Current performance		.094		.075
Core comp (R&D)		-.078		-.084
Core comp (Organizing & strategizing)		-.105*		-.111*
Core comp (Manufacturing)		-.162**		-.164**
<i>Organizational resources</i>				
R&D infrastructure			.109	.106*
R&D HR expenses			-.005	-.026
HR investment			.086	.044
Tech alliances			-.005	.092†
Foreign experience			.099	.082
ΔR^2	.069**	.107***	.040**	.141***
Adjusted R^2	.039	.136	.068	.161
R^2	.069	.176	.109	.210
F	2.322***	4.410***	2.677***	4.237***

$N=390$. Standardized coefficients (betas) are reported.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

of strategic orientations of firms. Overall, our findings show that a firm's top management cognitions characterized by their favorable evaluation of the external and internal environments, as well as the firm's commitment in devoting resources in R&D infrastructure are important antecedents of a firm's strategic orientation. In addition, technological alliance and international experience of top managers, though marginally significant, are also associated with stronger strategic orientation.

Top managers' cognition of the external environment in terms of the future of high-technology industry and current operation and performance are significant predictors of stronger strategic orientations. The top managers' cognitive evaluation of the environment provides them the basis to make strategic decisions. A favorable operating environment and already attained achievement will give them extra incentives to engage in more proactive and entrepreneurial actions. This is very much needed in all industries, especially in the highly turbulent high-technology environment.

In terms of perceived internal environment, the results show that perceived core competencies in R&D do not have statistically

significant effect on the firm's strategic orientation. Also, contrary to our expectation, perceived core competencies in organizing and strategizing is negatively, instead of positively, related to strategic orientation. Together with the significant negative effects of core competencies in manufacturing, the results of perceived core competencies found in this study suggest a problem faced by top managers in transitional economies, that is, knowledge reconfiguration. First, the insignificant effect of perceived core competencies in R&D is consistent with the result of R&D investment, which is also found to impose insignificant impact on strategic orientation. This may be due to the fact that the knowledge reconfiguration process takes longer time in transitional economies where the external market for resource acquisition is not so well developed. As such, the effects brought by utilizing R&D competencies take time to be evident. Additionally, the lack of intellectual property protection in transitional economies such as China may make managers hesitate to develop core competencies in R&D. Also, while top managers perceive that their firms possess superior technological capabilities, such perceptions are relative to their existing competitors in the transitional economies and thus may not serve as a good benchmark of the level of capabilities for achieving sustainable competitive advantage.

Second, the negative effect of perceived core competencies in organizing and strategizing indicates the difficulty encountered in the knowledge reconfiguration during the strategic renewal process. Managers in transitional economies lack the strategic knowledge and skills necessary to develop and implement competitive strategies compared to managers in market-based economies (Zahra et al., 2000). Also, organizational capabilities may become a liability for a firm to adapt to a new environment because organizational capabilities may result in conformity and inertia to change.

Finally, the negative relationship between core competencies in production efficiency and manufacturing and strategic orientation clearly demonstrates the core rigidities (Leonard-Barton, 1992) that are typically found in firms transformed from state-owned enterprises in transitional economies. In all, the findings on perceived core competencies suggest the importance of examining organizational unlearning and relearning in future research.

Overall, in regard to the relationship between managerial cognition and strategic orientation, the results suggest that the cognition variables related to the assessment of external environment are more critical in the formulation of strategic orientation than the assessment of firm's internal core competencies. These managerial cognition findings also suggest that managers in transitional economies are more short-term oriented in the sense that their strategic orientations are driven more by environmental opportunities than by organizational competencies. They believe stronger in environmental determinism rather than in environmental voluntarism (Lau, 1998; May et al., 2000).

7.2. Organizational resources and strategic orientation

With respect to the findings on the relationship between organizational resources and strategic orientations, this study shows that a competitive strategic orientation of high-tech firms in the transitional economy of China is facilitated by resources

committed to structural design, not by human capital or R&D expenses per se. Adopting an organizational learning perspective, structural design related to knowledge management is relevant to high-technology industries (Lau et al., 2002a). As such, it is very possible that an organizational learning mechanism, such as technological alliances, is more important than just investing in human resources and R&D activities for firms in transitional economies (Cohen and Levinthal, 1990; Uhlenbruck et al., 2003). Also, learning from alliance partners or through exposure to foreign countries may be a quicker and more effective means. The managers regard resource acquired and knowledge gained from the external parties and foreign countries as external stimuli to pursue a stronger strategic orientation. While perceived competencies in R&D and R&D and HR investment have insignificant effects, there is a positive, significant effect of R&D infrastructure on strategic orientation. This indicates that structural design, from an institutional perspective, may constitute a symbolic meaning for organizational legitimacy (Meyer and Rowan, 1977). The R&D center helps legitimizing the high-tech firm, which subsequently facilitates the formation of a stronger strategic orientation. On the other hand, the effects of R&D and HR investment on strategic orientation may only be realized through some other organizational variables, which suggests a mediating relationship for future studies to explore.

An interesting finding in regard to the control variables is that the negative relationship between firm age and strategic orientation is consistent with the results in past studies that younger firms are more growth-oriented (Hamilton et al., 2002). This suggests that those high-technology firms which are well-established and better fitted in the pre-transitional institutional context may not actively take stronger strategic orientation. Instead, because of organizational inertia (Oliver, 1996), they may only react to the crisis of the day as it occurs, hoping to “muddle through” the transitions with minimal changes (McCarthy and Puffer, 1995). As a result, these older firms are not interested, and do not have the competence, in sustaining regeneration or rejuvenating their organizations.

7.3. Theoretical implications and future research

The findings of this study have highlighted the importance of both the *cognitive* and *resources* aspects of a firm in shaping strategic orientations. That is to say, in addition to the generally acknowledged RBV in strategy studies, cognitive studies are also relevant. This provides support to Baron's (2004) claim about the value of a cognitive perspective in the study of entrepreneurship as well as Ginsberg's (1994) view of competitive advantage. Nonetheless, given the transitioning nature of the institutional environment in transitional economies, the institutional effects, as evident by managerial perception of external environment, may diminish over time. On the contrary, more attention should be paid to the managers' assessment of a firm's internal environment and organizational resources. As suggested by Zahra and George (2002), organizational mechanisms such as social integration mechanism are important in transforming potential absorptive capacity into realized capacity. As such, it is expected that the

effects of organizational resources might become more evident over time. Therefore, we should conduct longitudinal studies to examine the co-evolution of organizational competencies development and strategic orientations in the future.

The current study is based on a sample of high-technology firms in China. This group of high-technology firms, nevertheless, is comprised of firms from several major technology-based industries. There may be subtle differences among these industries (though the effects of industry are not statistically significant in our empirical models) that were not studied. One possible avenue is to focus on a single technology-based industry in the future. From another perspective, it would be also interesting to compare high-technology firms with firms in relatively traditional industries such as retailing and services. These firms may face very different environments and hence result in different strategic orientations.

We can further explore the effect of demographics of the top managers. This study does not find any significant effect of the top managers' demographic variables, which is contradictory to some findings in entrepreneurship research (Honig, 1998; Robinson, 1994). In a transitional economy, where high-technology firms may be still emerging, individual background relatively does not play a major role. An alternative possible reason is that current experience (such as international exposure), rather than their previous education would better align with the knowledge and skills necessary to develop and implement competitive strategies (Zahra et al., 2000). This also leads to the endogeneity concern in our model. There could be some individual or industry factors that are common to those cognitive variables and strategic orientation we studied. This is an area that future studies can address. Moreover, the measurement of foreign experiences, in terms of three months of stay in overseas country, may not be a good indicator for international exposures in today's high-technology firms. Thus, new measures for this knowledge acquisition construct should be developed.

The present study has also demonstrated that the entrepreneurial environment in transitional economies is institutionally based. Since the transformation of organizations is subject to institutional forces (Ahlstrom and Bruton, 2002; Newman, 2000), it is therefore natural to explore institutional factors in influencing the cognitions of top managers and chief executives in more depth (Clemens and Douglas, 2005; Lau et al., 2002b). In China, the high-technology sector is still developing. The strategies of these firms should be relatively more flexible and volatile than those counterparts in more matured economies in Asia (such as Taiwan and South Korea) or Europe and America. Therefore, the dynamic relationship of strategic orientations and realized strategies is an area worthy of future investigation.

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