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Entrepreneurial orientation and firm performance: The role of knowledge creation process

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ABSTRACT

This study examines the relationships among entrepreneurial orientation, knowledge creation process, and firm performance using survey data from 165 entrepreneurs. We use LISREL analysis to test the direct and indirect effects of the entrepreneurial orientation on firm performance. Knowledge creation process – operationalized to reflect the dimensions of socialization, externalization, combination, and internalization – is used as the mediating variable for explaining the relationship between entrepreneurial orientation and firm performance. The results indicate that the significance of the direct effect of entrepreneurial orientation on firm performance is reduced when the indirect effect of entrepreneurial orientation through knowledge creation process is included in a total effect model. Consequently, entrepreneurial orientation is positively related to firm performance, and knowledge creation process plays a mediating role in this relationship.

1. Introduction

Entrepreneurial orientation refers to a firm's strategic orientation, acquiring specific entrepreneurial aspects of decision-making styles, practices, and methods (Lumpkin & Dess, 1996). Entrepreneurship scholars have attempted to explain performance by investigating the relationship between entrepreneurial orientation and firm performance (Lumpkin & Dess, 2001; Wiklund & Shepherd, 2003, 2005; Zahra & Covin, 1995; Zahra & Garvis, 2000). Some studies found that entrepreneurial orientation enables small firms or new ventures, which are defined as firms newly built or less than ten years old (Lussier, 1995), to perform better than competitors and enhance firm performance (Ireland, Hitt, & Sirmon, 2003; Lumpkin & Dess, 2001; Wiklund & Shepherd, 2005; Zahra & Garvis, 2000). However, the results of empirical studies are mixed. The varied empirical results raise the question of whether entrepreneurial orientation is always an appropriate strategic orientation or if its relationship with performance is more complex. As argued by Lumpkin and Dess (1996), most studies investigating the independent effect of entrepreneurial orientation on firm performance ignore the factors that may mediate the strength of the entrepreneurial orientation — firm performance relationship (Wiklund & Shepherd, 2005).

Entrepreneurial orientation reflects how a firm operates rather than what it does (Lumpkin & Dess, 1996). As newly built firms, new ventures tend to have relatively limited financial and managerial resources (Eisenhardt & Schoonhoven, 1990), so they may be especially careful in pursuing strategic orientation. Given the importance of entrepreneurship to firm performance, entrepreneurial orientation can be an important measure of how a firm is organized to discover and exploit market opportunities (Barringer & Bluedorn, 1999; Ireland et al., 2003; Wiklund & Shepherd, 2003; Zahra & Garvis, 2000). The resource-advantage theory views entrepreneurial orientation as resource that facilitate a firm to outperform other rivals and yield marketplace positions of competitive advantage (Hunt, 1995; Hunt & Morgan, 1996, 1997). The development of entrepreneurial orientation requires organizational members to engage in intensive knowledge activities. From the perspective of resource-advantage theory, knowledge is not easily transferred and dispersed due to its characteristics of tacitness and immobility (Grant, 1996; Hunt & Arnett, 2006; Hunt & Morgan, 1996). To respond to the dynamic and competitive environment, firms need to consistently transfer entrepreneurial orientation into feasible strategic activities to fulfill the firms' objectives and achieve superior performance by focusing attention on the utilization of knowledge creation process. Knowledge creation process allows firms to amplify knowledge embedded internally and transfer knowledge into operational activities to improve efficiency and create business value (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka, Toyama, & Nagata, 2000a). Based on the theory of knowledge creation, knowledge is created through a spiral process of socialization, externalization, combination,

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and internalization (SECI) (Nonaka, 1994; Nonaka & Konno, 1998). The SECI process of knowledge creation describes dynamic interaction between tacit and explicit knowledge (Nonaka, 1994; Nonaka & Takeuchi, 1995). When new ventures develop and formulate entrepreneurial orientation, they can utilize the SECI spiral of knowledge creation to connect and arrange new and existing knowledge from many different individuals (Gold, Malhotra, & Segars, 2001; Nonaka & Takeuchi, 1995; Nonaka, Toyama, & Konno, 2000b). Employees can learn and exchange knowledge collectively, and better understand entrepreneurial style and vision articulated by explicit concepts and notions. Entrepreneurial practices and activities are then integrated and disseminated throughout the firm to generate more knowledge applications. A firm can actualize entrepreneurial orientation into practical action and embody knowledge into valuable assets to advance new products development or marketing activities (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka & Toyama, 2005; Nonaka et al., 2000a). Such dynamic knowledge conversion of SECI can enhance the firm's capability to fulfill the strategic objective and achieve firm performance such as product innovation or process improvement (Chia, 2003; Droge, Claycomb, & Germain, 2003; Lee & Choi, 2003; Teece, 1998). Accordingly, knowledge creation process plays a critical role in the formulation and activation of entrepreneurial orientation of firms. Knowledge creation process may facilitate entrepreneurial orientation to transform into knowledge assets shared by organizational members and result in enhanced firm performance. However, little empirical study has examined how entrepreneurial orientation could utilize knowledge creation process for the improved performance.

In this study, we add to previous studies that have examined the effects of entrepreneurial orientation on firm performance. The primary objective of this article is to examine how entrepreneurial orientation adopted by new ventures affects firm performance through knowledge creation process. Using Nonaka's theory of knowledge creation as a theoretical angle (Nonaka, 1994), we develop and test hypotheses on such mediating effect using a sample of new ventures in Taiwan. We focus on the importance of knowledge creation process in the relationship between entrepreneurial orientation and firm performance by examining the direct effect of entrepreneurial orientation upon firm performance and the indirect effect of entrepreneurial orientation upon firm performance through knowledge creation process. The rest of the paper is set out as follows. The next section considers the previous literature and sets out the hypotheses of this study. Following is the methodology for the study. Then, the paper presents the results of the empirical study in achieving the goals as those set out above. Discussion and conclusions are provided in the last section.

2. Research background

In order to better and sustain competitive advantage, new ventures must acquire, retain, integrate, and create knowledge. The theory of knowledge creation depicts a firm as an entity to create knowledge actively (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995). According to Nonaka and Toyama (2005), knowledge creation processes in particular are important for new ventures to engage in new product development or marketing activities. Through knowledge conversion and creation, employees could utilize collective knowledge to serve customers or clients. Such tacit and explicit knowledge is relevant to market-related knowledge (Nonaka & Toyama, 2005).

Focusing on knowledge creation interacted between tacit and explicit knowledge, Nonaka (1994) identified four possible knowledge creation processes: socialization, externalization, combination, and internalization. Socialization process converts tacit knowledge held by individuals into new tacit knowledge through shared experiences and joint activities such as apprenticeships or social interaction among organizational members (Nonaka, 1994). The socialization process could be extended out of the firm to learn through external networks. The community of social interaction might span organizational boundaries to include supplier, customers, distributors, and competitors through the formation of alliances or outsourcing. Externalization articulates tacit knowledge into explicit and comprehensible forms that are more understandable to others. Externalization can be seen in the process of concept expression and triggered by metaphors, analogies, or dialogues (Nonaka, 1994; Nonaka & Takeuchi, 1995). Combination process converts explicit knowledge collected from inside or outside the organization into more complex and systematic explicit knowledge. The explicit knowledge may be embodied in action and practice. Internalization process transfers explicit knowledge into tacit knowledge. In internalization, individuals can acquire and absorb knowledge through demonstration or other means such as learning by doing and on-the-job training (Nonaka & Takeuchi, 1995; Nonaka et al., 2000b).

To examine knowledge creation process, this study adopts the SECI model (socialization, externalization, combination, and internalization) by Nonaka (1994) for the following reasons. First, the SECI model is one of the few knowledge creation theories available that explores the interrelationships between explicit and tacit knowledge. Second, the SECI model contains not only knowledge transfer but also knowledge creation. The existing knowledge transfer and the new knowledge creation are very significant in knowledge management. Third, the SECI model has been widely used in many research areas such as organizational learning and new product development (Lee & Choi, 2003; Nonaka et al., 2000b).

For the purpose of achieving a better understanding of firm performance, new ventures should attempt to link entrepreneurial orientation with knowledge creation process. The vital knowledge creation processes are socialization, externalization, combination, and internalization, which provide a key to the understanding of the dynamic processes of knowledge creation in the relationship between entrepreneurial orientation and firm performance.

2.1. Entrepreneurial orientation and firm performance

Entrepreneurial orientation involves a willingness to innovate, search for risks, take self-directed actions, and be more proactive and aggressive than competitors toward new marketplace opportunities (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2005). We distinguished five dimensions of entrepreneurial orientation, including innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy, as suggested by Miller (1983) and Lumpkin and Dess (2001). The importance of entrepreneurial orientation to the survival and performance of firms has been acknowledged in the entrepreneurship literature (Miller, 1983; Lumpkin and Dess, 2001; Wiklund, 1999; Wiklund & Shepherd, 2005; Zahra & Covin, 1995; Zahra & Garvis, 2000). The empirical evidences from Zahra and Covin (1995) and Wiklund (1999) showed that the positive influence of entrepreneurial orientation on performance increases over the span of time. From the perspective of resource-advantage theory, entrepreneurial orientation can be regarded as organizational resource (Hunt, 1995; Hunt & Morgan, 1996). Such resource can differentiate a firm from other rivals and result in economic dynamism and wealth creation in the competitive process (Hunt & Morgan, 1996; Ireland et al., 2003; Shane & Venkataraman, 2000). Firms with entrepreneurial orientation have the capabilities to discover and exploit new market opportunities (Barringer & Bluedorn, 1999; Lee, Lee, & Pennings, 2001; Wiklund & Shepherd, 2003), and they can respond to challenges to prosper and flourish in the competitive and uncertain environment (Lumpkin & Dess, 1996; Shane & Venkataraman, 2000).

Prior research has employed a variety of financial measures such as revenue, cash flow, return on assets, return on equity, and so forth to assess firm performance (Haber & Reichel, 2005). Such objective

financial measures are necessary but not sufficient to capture overall firm performance (Aggarwal & Gupta, 2006; Clark, 1999; Murphy, Trailer, & Hill, 1996). Thus, some studies have suggested the combination of financial and non-financial measures to offer more comprehensive evaluation on firm performance (Clark, 1999; Haber & Reichel, 2005; Venkatraman & Ramanujam, 1986). Subjective non-financial measures include indicators such as perceived market share, perceived sale growth, customer satisfaction, loyalty, and brand equity etc. (Clark, 1999; Haber & Reichel, 2005). In addition to financial and non-financial measures, another approach focuses on internal and external measures (Aggarwal & Gupta, 2006). The internal measures concern with the interests of stakeholders inside the firm. The external measures hinge on customers, suppliers, competitors, and other market-related indicators (Aggarwal & Gupta, 2006; Haber & Reichel, 2005). Performance assessment also requires the consideration of output and input perspectives. Output measures reflect the firm's key goals and emphasize profitability and final results, whereas input measures focus on tasks and activities that are instrumental in reaching the end results (Aggarwal & Gupta, 2006; Clark, 1999). In the research field of entrepreneurship, there is a lack of guidance on performance measurement given the difficulty in defining performance (Brush & Vanderwerf, 1992; Haber & Reichel, 2005). Murphy et al. (1996) examined 51 published entrepreneurship studies using performance as the dependent variable and found that the most commonly considered dimensions of performance were related to efficiency, growth, and profit. Following the suggestions of Murphy et al. (1996), this study takes efficiency, growth, and profit of firm performance into consideration. Efficiency comprises some financial measures such as return on investment and return on equity. Growth focuses on the increase in sales, employees, or market share. Profit includes return on sales and net profit margin.

Several studies have suggested that the dimensions of entrepreneurial orientation can lead to market growth rate (Ireland et al., 2003; Shane & Venkataraman, 2000) and firm performance (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2003, 2005; Zahra & Garvis, 2000). The innovativeness dimension of entrepreneurial orientation reflects the tendency to engage in and support novelty to create and introduce new products, services, or technology (Lumpkin & Dess, 1996). Innovative companies may have a broader base of skills and knowledge which they can exploit in building distinctive competences (Zahra & Garvis, 2000). According to resource-advantage theory, innovative competences may be a source of competitive advantage because they are deeply rooted in the context of the organization and cannot be explicitly articulated and imitated (Barney, 1991; Hunt & Arnett, 2006; Hunt & Morgan, 1996; Nonaka, 1994). By increasing commitment to innovative products or processes, firms can renew their operations in marketplace and improve their profitability (Lumpkin and Dess, 1996; Miller, 1983; Zahra & Garvis, 2000). Risk-taking orientation indicates a willingness to engage resources in strategies or projects where the outcome may be highly uncertain (Wiklund & Shepherd, 2003; Zahra & Covin, 1995). If new ventures have risk-taking orientation, they may seize market opportunities to obtain higher returns and make lucrative deals. Hence, risk-taking tendency may be positively related to success (Frese, Brantjes, & Hoorn, 2002; Lumpkin & Dess, 1996). Proactiveness refers to a firm's response to promising market opportunities (Lumpkin & Dess, 1996). Competitive aggressiveness involves the propensity to directly and intensely challenge its competitors (Lumpkin & Dess, 1996). Resource-advantage theory proposes that the constant competition among firms for a comparative advantage in resources that will yield marketplace positions of competitive advantage (Hunt, 1995; Hunt & Morgan, 1996, 1997). A successful firm could efficiently or effectively produce market offerings that are valued by particular market segments (Hunt & Arnett, 2006; Hunt & Morgan, 1995, 1996). A strong proactive tendency gives a firm the ability to anticipate changes of the markets and the needs of customers (Lumpkin & Dess, 2001). A proactive firm can forge a new market segment or introduce new products or services ahead of competitors (Hunt & Arnett, 2006; Hunt & Morgan, 1995; Lumpkin & Dess, 1996). With a forward-looking perspective, a proactive firm tends to become first movers, and it is rewarded by marketplace positions of competitive advantage such as unusual returns, distribution channels, and brand recognition (Hunt & Arnett, 2006; Lee et al., 2001; Lumpkin & Dess, 2001; Wiklund & Shepherd, 2005). In addition, firms with competitively aggressive orientation will have the capabilities to revise the rules of competition, redefine industry boundaries, achieve entry advantage, and improve marketplace position. These actions enable firms to acquire market share and outperform competitors (Lumpkin & Dess, 2001; Zahra & Covin, 1995). Autonomy is described as the ability and willingness to take self-directed actions in the pursuit of market opportunities. Autonomous orientation allows firms to make quick and self-reliant decisions to provide new markets with novel products or services (Frese et al., 2002; Lumpkin & Dess, 1996).

Accordingly, entrepreneurial orientation is essential for firms to discover entrepreneurial opportunities and compete with other firms. If new ventures have more aptitude for innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy, they will gain greater competitive advantage and accomplish higher firm performance. Thus, an effective entrepreneurial orientation may be a good predictor of firm performance. These arguments lead to the following hypothesis.

Hypothesis 1. Entrepreneurial orientation will be positively related to firm performance.

2.2. Entrepreneurial orientation and knowledge creation process

Entrepreneurial attitudes and behaviors are critical for new ventures to facilitate the utilization of new and existing knowledge to discover market opportunities (Wiklund & Shepherd, 2003). Knowledge creation processes such as socialization, externalization, combination, and internalization describe a spiral of interactions between explicit and tacit knowledge (Nonaka, 1994; Nonaka & Konno, 1998). The SECI model of knowledge creation allows firms to exchange and transform knowledge continuously and dynamically through a series of self-transcendental processes (Nonaka & Konno, 1998; Nonaka et al., 2000a). When developing entrepreneurial orientation, new ventures can exploit the dynamic SECI spiral to create and share knowledge dispersed among individual members.

New ventures with innovativeness may have a tendency to support new ideas and novelty, and further increase the engagement in developing new products, services, or processes (Lumpkin & Dess, 1996). The development of new products and services involves extensive and intensive knowledge activities. New ventures tend to depend on employees' knowledge and skills as key inputs in the knowledge creation process. Owing to its nature of tacitness and immobility, knowledge is not easily transferred and dispersed (Grant, 1996; Hunt & Arnett, 2006; Hunt & Morgan, 1997). The SECI spiral can facilitate knowledge conversion and transformation into new types of knowledge (Nonaka & Takeuchi, 1995). In knowledge conversion, new product development or marketing activities starts with socialization (Nonaka & Toyama, 2005). Socialization processes such as direct interaction, brainstorming, and informal meetings help employees to share and exchange valuable knowledge (Zhang, Lim, & Cao, 2004). Through externalization, employees can understand new product development and increase their involvement in the activities of articulating tacit knowledge into substantial concepts and notions (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2005). Combination process can make innovative ideas more usable, thereby crystallizing knowledge into new products or services. Internalization process promotes the actualization of new product innovation or improvement within the organization.

New ventures encounter numerous risks and uncertainties to explore business opportunities and promote innovation (Lumpkin & Dess, 1996), and they should motivate employees to take risks to deal with the challenging and creative activities. Employees need socialization process to build more interaction to exchange tacit knowledge, solve problems, and avoid mistakes (Nonaka, Takeuchi, & Umemoto, 1996; Quinn, 1992). Externalization activities articulate tacit knowledge into explicit forms. The newly created knowledge and existing knowledge are then combined, edited, or processed to form more complex and explicit knowledge through the combination process (Nonaka & Konno, 1998). The use of documents, meetings, and computerized communication networks facilitates this mode of knowledge conversion. Internalization activities accumulate and systemize the experiences and concepts of employees to the organizational tacit knowledge.

Entrepreneurial firms are likely to take proactive action to obtain intelligence on customers or competitors. In addition, they tend to compete aggressively to outperform competitors and keep them from entering the same market (Lumpkin & Dess, 1996). As such, new ventures need to enhance their ability to utilize knowledge resource to capitalize on market opportunities (Griffith, Noble, & Chen, 2006). The knowledge conversion of SECI not only provides value to their customers, but also helps to position competitively in the market (Griffith et al., 2006). For example, socialization process facilitates the transformation of tacit knowledge embedded in customers or clients (Nonaka & Toyama, 2005; Nonaka et al., 2000b). Such tacit knowledge is articulated into explicit forms through externalization process. Dialogues, metaphors, or analogies are effective methods to express one's tacit knowledge shared with others. New ventures can further develop unique combinations to anticipate future changes or opportunities, and engage in opportunistic expansion seizing market opportunities in the process of new market entry (Griffith et al., 2006; Lumpkin & Dess, 2001). And then firms can actualize the knowledge of marketing concepts or procedures into practical operations through internalization process.

Autonomous orientation reflects the ability to be self-directed in the pursuit of market opportunities (Lumpkin & Dess, 1996). Employees in new ventures need greater autonomy and self-regulation to determine what actions are required and how best to execute them. Socialization process makes employees build interaction to freely exchange highly personal or professional knowledge. To translate tacit knowledge into understandable forms, the firm engages in externalization activities such as action, experimentation, and observation. The combination activities edit and integrate knowledge by using documents or databases to generate new knowledge application. Through internalization activities, employees learn by doing autonomously to enrich their experiences and accumulate valuable know-how in an organization (Nonaka et al., 1996).

According to the above, new ventures with entrepreneurial orientation are more prone to focus attention and effort towards knowledge creation process. The SECI spiral can utilize the full potential of knowledge and further facilitate its creation and utilization within the company, which facilitates the transformation and activation of entrepreneurial orientation. We can reasonably expect the positive relationship between entrepreneurial orientation and knowledge creation process. Hence, we hypothesize:

Hypothesis 2. Entrepreneurial orientation will be positively related to knowledge creation process.

2.3. Knowledge creation process and firm performance

Resource-advantage theory recognizes knowledge as strategic resource of the firms (Grant, 1996; Hunt, 1995; Hunt & Morgan, 1996; Teece, 1998). The capability to create and utilize knowledge enables a firm to develop sustainable competitive advantage because knowledge possesses the characteristics of heterogeneity, uniqueness, and immobility (Barney, 1991; Grant, 1996; Hunt & Arnett, 2006; Zack, 1999). Previous studies have revealed the critical role of knowledge creation in the successful organizations (Chia, 2003; Gold et al., 2001; Kogut & Zander, 2003; Matusik & Hill, 1998; Nonaka & Takeuchi, 1995). Organizations that better utilize knowledge creation process can connect knowledge in new and distinctive ways, and develop market offerings to provide value to customers (Hunt & Morgan, 1997; Lee & Choi, 2003; Nonaka & Konno, 1998).

From the perspective of knowledge creation theory, knowledge is created through dynamic interaction between tacit and explicit knowledge in SECI process (Nonaka, 1994). Socialization process seeks to collectivize knowledge embedded in individual members. Frequently social interaction and perception help organizational members to share mental modes and experiences (Nonaka et al., 2000b). Employees empathize with colleagues to exchange a variety of knowledge for their work and problem-solving (Becerra-Fernandez & Sabherwal, 2001), and thus diminish communication barriers between individuals (Nonaka et al., 2000a). In socialization, companies can converge and amplify tacit knowledge to increase collective learning, and improve the stock of knowledge (Nonaka & Takeuchi, 1995; Nonaka et al., 2000a). When tacit knowledge is converted to explicit knowledge, it is easier understood by employees. Externalization facilitates employees to express images or ideas as substantial concepts and notions that are needed for new product innovation and development. The newly explicit knowledge is then integrated and disseminated at the group as well as the organizational level (Nonaka & Takeuchi, 1995; Nonaka et al., 2000b). Firms can use combination process to create new knowledge from existing knowledge and generate new knowledge application (Nonaka et al., 2000a). New knowledge and skill will enhance the firm's ability to innovate new products and services, or improve existing ones more efficiently, thereby reducing redundancies and costs (Grant, 1996; Gold et al., 2001; Lee & Choi, 2003). Through internalization, knowledge is transformed into organizational memory and is actualized in practical operations such as new product development or manufacturing procedure (Nonaka et al., 2000b). The firm utilizes its human capital to transfer tacit knowledge, which becomes the base for further innovation and new routine (Kogut & Zander, 2003; Lee & Choi, 2003; Nonaka et al., 2000a). Thus, the SECI model of knowledge creation transforms knowledge into business value and results in product innovation or process improvement (Lee & Choi, 2003; Nonaka et al., 2000b).

It is important to note that knowledge created through the SECI model triggers a new spiral of knowledge creation. The communities of social interaction can transcend organizational boundaries to transfer and utilize knowledge embedded in suppliers, customers, distributor, and competitors (Nonaka, 1994; Nonaka et al., 2000b). Such knowledge conversion enables firms to integrate emerging knowledge into its strategic development (Nonaka, 1994), and they can create new knowledge and develop new product at a lower cost and more speedily than competitors do (Droge et al., 2003). Thus, knowledge creation provides an opportunity for firms to enhance efficiency and sustain competitive advantages (Chia, 2003; Nonaka et al., 2000a).

According to the above, when firms are better at knowledge creation through SECI process, they are more inclined to achieve efficiency, growth, and profit. It is believed that knowledge creation process is critical because of its positive relationship with performance. Thus, we propose the following hypothesis.

Hypothesis 3. Knowledge creation process will be positively related to firm performance.

2.4. The mediating effect of knowledge creation process

Some researches have suggested that the relationship between entrepreneurial orientation and firm performance may be more

complex than a simple main effect (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2005). As noted previously, Hypothesis 2 states that entrepreneurial orientation will be positively related to knowledge creation process and Hypothesis 3 states that knowledge creation process will be positively related to firm performance. These two hypotheses link entrepreneurial orientation with knowledge creation process, and knowledge creation process with firm performance. This means that the relationship between entrepreneurial orientation and firm performance is hypothesized to be indirect. Therefore, knowledge creation process plays the role of intermediate variable to mediate the relationships between independent variables of entrepreneurial orientation and dependent variable of firm performance. Implicitly, the discussion suggests that the performance effect of entrepreneurial orientation is mediated by knowledge creation process. While entrepreneurial orientation provides basic elements for achieving benefits in the relationship, knowledge creation process converts entrepreneurial orientation into knowledge assets shared by organizational members to achieve firm performance. Accordingly, the following hypothesis is developed.

Hypothesis 4. Knowledge creation process will mediate the relationship between entrepreneurial orientation and firm performance.

3. Research methods

3.1. Sample and data collection

We employed a questionnaire survey approach to collect data, and all items required five-point Likert-style responses ranged from 1="strongly disagree," through 3="neutral," to 5="strongly agree." The population in the study was the firms listed in the Taiwan Securities and Futures Institute. We selected the firms founded in ten years. A questionnaire survey was developed to obtain the responses about their opinions on various variables from the entrepreneurs of new ventures. 598 questionnaires were mailed. Of the 598 questionnaires mailed, 172 responses were received and seven of them were incomplete. The remaining 165 valid and complete questionnaires were used for the quantitative analysis. It represented a useable response rate of 27.6%. Preliminary analyses were conducted to provide information about the characteristics of sample firms in Table 1, including industry, firm age, capital, sales, and employees. We used a two-tailed *t*-test to compare the respondent firms with nonrespondents. Respondent firms did not significantly differ from nonrespondents in terms of firm age and annual sales ($p>0.10$). Within each company, we collected the measures of entrepreneurial orientation, knowledge creation process, and firm performance. Because all measures were collected from the same source, the Harman's one-factor test was used to examine the potential problem of common method bias. A principal component factor analysis on the questionnaire measurement items yielded seven factors with eigenvalues greater than 1.0 that accounted for 69.67% of the total variance, and factor 1 accounted for 16.46% for the variance. Since several factors, as opposed to one single factor, were identified and the first factor did not account for most of the variance, common method bias is unlikely to be a serious problem in the data (Podsakoff & Organ, 1986).

Table 1
Characteristics of sample firms.

	Items	Frequency	Percentage (%)	Cumulative percentage (%)
Industry	Manufacture industry	42	25.5	25.5
	High-tech industry	91	55.2	80.6
	Service industry	32	19.4	100.0
Firm age	Less than 3 years	64	38.8	38.8
	4–6 years	62	37.6	76.4
	7–10 years	39	23.6	100.0
Capital	Less than 50 million	43	26.1	26.1
	50 million–500 million	76	46.1	72.2
	More than 500 million	46	27.8	100.0
Sales	Less than 50 million	44	26.7	26.7
	50 million–1 billion	70	42.4	69.1
	More than 1 billion	51	30.9	100.0
Employees	Less than 100	69	41.8	41.8
	101–500	64	38.8	80.6
	More than 501	32	19.4	100.0

Note: Currency used in the study is New Taiwan dollar.

3.2. Measures

3.2.1. Entrepreneurial orientation

Drawing upon previous studies (e.g. Lumpkin & Dess, 1996, 2001; Miller, 1983), entrepreneurial orientation was measured with five dimensions: innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy. Innovativeness refers to a willingness to support creativity and experimentation in introducing new products/services, and novelty, technological leadership and R&D in developing new processes. Risk-taking means a tendency to take bold actions such as venturing into unknown new markets, committing a large portion of resources to ventures with uncertain outcomes, and/or borrowing heavily. Proactiveness refers to how firms relate to market opportunities by seizing initiative in the marketplace. Competitive aggressiveness refers to how firms react to competitive trends and demands that already exist in the marketplace. Autonomy is defined as independent action by an individual or team aimed at bringing forth a business concept or vision and carrying it through to completion.

3.2.2. Knowledge creation process

This study used a five-point scale, adapted from Sabherwal and Becerra-Fernandez (2003), to measure knowledge creation process variable. The four dimensions of knowledge creation process were socialization, externalization, combination, and internalization (Nonaka, 1994; Nonaka et al., 2000a,b; Sabherwal & Becerra-Fernandez, 2003). Four items measured socialization: cooperative projects across directorates, the use of apprentices and mentors to transfer knowledge, brainstorming retreats or camps, and employee rotation across areas. Five items measured externalization: a problem-solving system based on a technology like case-based reasoning, groupware and other collaboration learning tools, pointers to expertise, modeling based on analogies and metaphors, and capture and transfer of experts' knowledge. Four items measured combination: web-based access to data, web pages, databases, and repositories of information, best practices, and lessons learned. Three items measured internalization: on-the-job training, learning by doing, and learning by observation.

3.2.3. Firm performance

This study was based on the work of Murphy et al. (1996) to measured firm performance variable with three dimensions: efficiency, growth, and profit. The respondents rated the firm performance on a five-point scale in relation to competitors. Three items measured efficiency: return on investment, return on equity, and return on assets in the past three years. Similarly, three items measured growth: sale growth, employee growth, and market share growth. Three items measured profit: return on sales, net profit margin, and gross profit margin (Murphy et al., 1996).

3.3. Reliability and validity

Reliability of the multi-item scale for each dimension was measured using Cronbach alphas and composite reliabilities measures. Both measures of reliability were above the recommended minimum standard of 0.60 (Bagozzi & Yi, 1988; Baker, Parasuraman, Grewal, & Voss, 2002; Nunnally, 1978). For all twelve dimensions, both

Table 2
Measurement items and reliabilities.

Construct	Dimension	Item	Cronbach alpha	Composite reliability
Entrepreneurial orientation	Innovativeness	The top managers favor a strong emphasis on R&D, technological leadership, and innovations	0.76	0.77
		My firm has very many new lines of products/services marketed in the past 5 years		
		Changes in product or service lines have usually been quite dramatic		
	Risk-taking	My firm usually has a strong proclivity for high risk projects (with chances of very high returns)	0.85	0.85
		Owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives		
	Proactiveness	In dealing with competitors, my firm usually initiates actions which competitors then respond to	0.78	0.79
		In dealing with competitors, my firm is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc		
		In general, the top managers of my firm have a strong tendency to be ahead of others in introducing novel ideas or products		
	Competitive aggressiveness	My firm usually adopts a very competitive "undo-the-competitors" posture	0.77	0.77
		My firm is very aggressive and intensely competitive		
	Autonomy	My firm has the independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion	0.83	0.83
		My firm has the ability and will to be self-directed in the pursuit of opportunities		
		My firm takes action free of stifling organizational constraints		
Knowledge creation process	Socialization	My firm usually adopts cooperative projects across directorates	0.89	0.90
		My firm usually uses apprentices and mentors to transfer knowledge		
		My firm usually adopts brainstorming retreats or camps		
		My firm usually adopts employee rotation across areas		
	Externalization	My firm usually adopts a problem-solving system based on a technology like case-based reasoning	0.88	0.89
		My firm usually adopts groupware and other learn collaboration tools		
		My firm usually adopts pointers to expertise		
		My firm usually adopts modeling based on analogies and metaphors		
		My firm usually captures and transfers experts' knowledge		
	Combination	My firm usually adopts web-based access to data	0.80	0.80
		My firm usually uses web pages		
		My firm usually uses databases		
		My firm usually adopts repositories of information, best practices, and lessons learned		
	Internalization	My firm usually adopts on-the-job training	0.77	0.78
		My firm usually adopts learning by doing		
		My firm usually adopts learning by observation		
Firm performance	Efficiency	My firm is usually satisfied with return on investment	0.80	0.82
		My firm is usually satisfied with return on equity		
		My firm is usually satisfied with return on assets		
	Growth	My firm is usually satisfied with sale growth	0.86	0.86
		My firm is usually satisfied with employee growth		
		My firm is usually satisfied with market share growth		
	Profit	My firm is usually satisfied with return on sales	0.80	0.81
		My firm is usually satisfied with net profit margin		
		My firm is usually satisfied with gross profit margin		

All items were measured with five-point Likert scale.

measures of reliability are above 0.70. Table 2 summarizes all measurement items, Cronbach alphas, composite reliability, and their scales for all the items.

LISREL provides a chi-square value and five additional indices that assess the fit of path models, the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square residual (RMSR). The fit indexes of confirmatory factor analysis for the measurement models ranged from adequate to excellent (entrepreneurial orientation: GFI=0.98, AGFI=0.92, NFI=0.93, CFI=0.96, RMSR=0.02; knowledge creation process: GFI=0.96, AGFI=0.81, NFI=0.93, CFI=0.96, RMSR=0.01; firm performance: GFI=0.92, AGFI=0.85, NFI=0.93, CFI=0.95, RMSR=0.04). Additionally, three models had chi-squares less than three times their degrees of freedom (entrepreneurial orientation, 139.63/60=2.33; knowledge creation process, 219.98/100=2.12; firm performance, 63.27/24=2.64). Overall, the CFA results suggested that the models of entrepreneurial orientation, knowledge creation process, and firm performance provided a good fit for the data.

According to Anderson and Gerbing (1988), convergent validity can be assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor is significant (greater than twice its standard error). Convergent validity was assessed using the *t*-statistics for the path coefficients from the latent constructs to the corresponding items. As mentioned above, all the path coefficients from the three constructs to the twelve measures are statistically significant, with the highest *t*-value for the items measuring entrepreneurial orientation being 9.33 and the lowest *t*-value for the items measuring firm performance being 2.02. That all the *t*-values exceed the standard of 2.00 (Anderson & Gerbing, 1988) indicates satisfactory convergent validity for all twelve dimensions.

Discriminant validity was assessed in three ways (Baker et al., 2002). First, the confidence interval for each pairwise correlation estimate (i.e., ±two standard errors) should not include 1 (Anderson & Gerbing, 1988). This condition was satisfied for all pairwise correlations in three measurement models. Second, for every construct, the percentage of variance extracted should exceed the construct's shared variance with every other construct (i.e., the square of the correlation) (Fornell & Larcker, 1981; Hult, Hurley, Giunipero, & Nichols, 2000). As may be seen from Table 3, this condition is also satisfied for all the constructs. For example, the extracted variance for innovativeness is

Table 3
Descriptive statistics, validities, and correlations ($n=165$).

	I	R	P	C	A	S	E	C	I	E	G	P
Mean	3.60	2.33	3.24	3.32	3.19	2.70	1.99	3.35	4.17	3.61	3.33	3.15
Standard deviation	0.49	0.44	0.56	0.46	0.57	0.46	0.09	0.51	0.45	0.76	0.63	0.55
Number of items	3	2	3	2	3	4	5	4	3	3	3	3
Extracted variance	0.53	0.74	0.56	0.63	0.62	0.68	0.62	0.50	0.56	0.61	0.68	0.58
Shared variances	0.11	0.11	0.27	0.40	0.40	0.07	0.07	0.31	0.41	0.06	0.06	0.02
	0.27	0.03	0.03	0.11	0.06	0.31	0.09	0.09	0.10	0.02	0.35	0.35
	0.40	0.11	0.23	0.23	0.27	0.41	0.10	0.35	0.35			
	0.40	0.06	0.27	0.21	0.21							
Correlations [a]												
1. Innovativeness	1.00											
2. Risk-taking	0.33	1.00										
3. Proactiveness	0.52	0.19	1.00									
4. Competitive aggressiveness	0.63	0.33	0.48	1.00								
5. Autonomy	0.63	0.25	0.52	0.46	1.00							
6. Socialization	0.76	0.40	0.64	0.60	0.72	1.00						
7. Externalization	0.17	0.10	0.30	0.25	0.25	0.27	1.00					
8. Combination	0.61	0.34	0.72	0.54	0.69	0.56	0.29	1.00				
9. Internalization	0.66	0.36	0.69	0.64	0.67	0.64	0.32	0.59	1.00			
10. Efficiency	0.57	0.41	0.51	0.61	0.47	0.57	0.12	0.52	0.58	1.00		
11. Growth	0.60	0.29	0.69	0.42	0.68	0.66	0.31	0.73	0.67	0.24	1.00	
12. Profit	0.63	0.29	0.57	0.48	0.66	0.64	0.23	0.65	0.59	0.15	0.59	1.00

[a] Correlations with absolute value greater than 0.15 are significant at $p<0.05$, and those greater than 0.20 are significant at $p<0.01$ (two-tailed test).

0.53, which exceeds its shared variances with risk-taking (0.11), proactiveness (0.27), competitive aggressiveness (0.40), and autonomy (0.40). Finally, within every measurement model, we constrained the correlation between each pair of constructs, one at a time, to be equal to 1 (Anderson & Gerbing, 1988; Hult et al., 2000), and then performed a chi-square test comparing this model to the model freeing that correlation. In all cases, the chi-square difference was significant at $p\leq 0.001$ level, thereby further indicating discriminant validities among all pairs of constructs in every measurement model.

4. Analysis and results

Table 3 presented the mean, standard deviation, number of items, and the correlation matrix of the variables. To test the hypothesized relationships in our path-analytic framework, we employed LISREL (Anderson & Gerbing, 1988; Joreskog & Sorbom, 1986). Calculating parameter estimates and standard errors that can be used to test statistical significance, LISREL also analyzes hypothesized relationships.

The hypotheses were examined using LISREL 8.52. Paths between constructs represent individual hypotheses, and each was assessed for statistical significance of the path coefficient. This study tested hypothesized relationships with a full model, and the LISREL analysis of this model produced a chi-square of 72.05 ($df=40$). In addition to this chi-square value, the various goodness-of-fit indices also suggested a very good fit (GFI=0.932, AGFI=0.867, NFI=0.975, CFI=0.989, RMSR=0.0124). The analysis also provided support for the first three study's hypotheses. The results were reported in Table 4 and Fig. 1 showing the path coefficients, t-values, and construct relationships.

As hypothesized, there is a positive relationship between entrepreneurial orientation and firm performance ($\gamma_{11}=0.47$, $t=7.32$). Therefore, H1 is supported. Results uphold the proposition that the two concepts are indeed related and, therefore, support the conclusions, which postulate that entrepreneurial orientation is important to enhance firm performance. A positive relationship between entrepreneurial orientation and knowledge creation process is established ($\gamma_{21}=1.19$, $t=11.70$). Therefore, H2 is supported. As scholars have postulated, perhaps the firms in new ventures may be better served by adopting appropriate entrepreneurial orientation and knowledge creation process. As predicted, there is a significantly positive relationship between knowledge creation process and firm performance ($\beta_{12}=0.52$, $t=8.26$). Therefore, H3 is supported. The finding may add to the understanding that every knowledge creation process is indeed necessary and may be linked to performance, which adds further credence to the knowledge creation theory.

An empirical study with mediator must propose that (1) the independent variable significantly influence the mediating variable, (2) the independent variable significantly influence the dependent variable without the mediator, and (3) the inclusion of the mediator attenuates the relationships between the independent and the dependent variables while showing a significant relationship between the mediator and the dependent variable (Baron & Kenny, 1986). The independent variable was entrepreneurial orientation, and the proposed mediating variable was knowledge creation process. The dependent variable was firm performance.

We tested the three conditions by using LISREL analysis. First, we examined the relationship between entrepreneurial orientation and knowledge creation process to determine if they had significant relationship. Results show that entrepreneurial orientation has significantly positive relationship with knowledge creation process ($\gamma_{21}=1.08$, $t=13.13$). Thus, the first condition for mediating effect is met. Then, the relationship between the independent and the dependent variable show that entrepreneurial orientation has significantly positive relationship with firm performance ($\gamma_{11}=1.31$, $t=11.91$), also supporting the second condition. In the third condition, entrepreneurial orientation has significantly positive relationship

Table 4
Standardized path estimates [a].

Hypothesized relationships				
Hypothesis	Variables	Path coefficient	t-value	Result
H1	Entrepreneurial orientation will be positively related to firm performance.	0.47*	7.32	Supported
H2	Entrepreneurial orientation will be positively related to knowledge creation process.	1.19**	11.70	Supported
H3	Knowledge creation process will be positively related to firm performance.	0.52**	8.26	Supported

*$p<0.05$, **$p<0.01$.
[a] $n=165$ (two-tailed test).

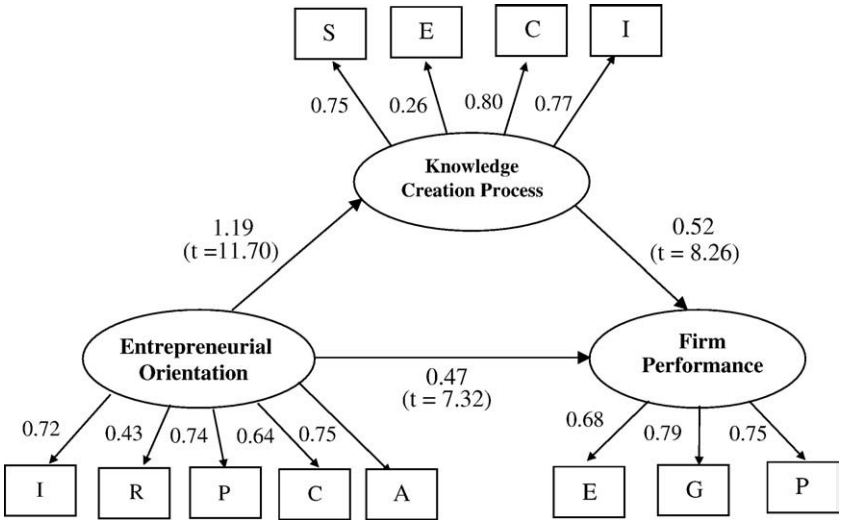

Fig. 1. The results of this study.

with firm performance (γ_{11}=0.67, t=9.23), and knowledge creation process has significantly positive relationship with firm performance (β_{12}=0.64, t=9.77). To test the third condition, we examined the change in chi-square value for entrepreneurial orientation variable between before and after entering knowledge creation process variable. Results indicate that chi-square value had substantial change after entering knowledge creation process variable ($\Delta\chi^2$=44.57, Δdf=1, p<0.001). The significance of the direct effect of entrepreneurial orientation on firm performance is reduced when the indirect effect of entrepreneurial orientation through knowledge creation process is included in a total effect model. These results reveal the mediating effect of knowledge creation process. Thus, H4 is supported.

With regard to Hypothesis 4, this model demonstrates that knowledge creation process mediates the relationship between entrepreneurial orientation and firm performance (total effect=1.089, indirect effect=0.619, p<.001, direct effect=0.47, p<.05). In the case, the indirect effect is significant, and the direct path remains significant (although reduced) in the presence of knowledge creation process. Although the direct effect remains significant, it comprises only 43.16% of the total effect of the independent variable on the dependent variable, with the remaining 56.84% occurring through the mediating variable of knowledge creation process. Overall, these results support Hypothesis 4.

5. Discussion and conclusions

This study develops a conceptual model to examine the mediating role of knowledge creation process in the relationship between entrepreneurial orientation and firm performance. The results show that entrepreneurial orientation can positively enhance firm performance; however, if we add knowledge creation process as a mediator, the directly positive relationship between entrepreneurial orientation and firm performance will attenuate. It specifically implies that entrepreneurial orientation indirectly influences firm performance by influencing knowledge creation process. Thus, knowledge creation process plays a mediating role through which entrepreneurial orientation benefits firm performance.

Our findings contribute to theoretical development in several ways. First, while the importance of entrepreneurial orientation in firm performance has been recognized, the link between entrepreneurial orientation and firm performance has remained inconsistent (Lumpkin & Dess, 1996). This study reveals that entrepreneurial orientation is critical to business ventures and has positive impact on firm performance, which gives additional grounding for statements about the positive effect of entrepreneurial orientation on firm performance (e.g. Barringer & Bluedorn, 1999; Lumpkin & Dess, 2001; Wiklund & Shepherd, 2003; Zahra & Covin, 1995). The inclusion of knowledge creation process as a mediating variable may help to enhance our understanding of how entrepreneurial orientation affects firm performance. Our findings support recent arguments for a contingency perspective on the entrepreneurial orientation — firm performance link (Lumpkin & Dess, 2001) and make a contribution to the entrepreneurship literature by clarifying the role that knowledge creation process plays. Second, the emergent model provides empirical support of Nonaka's (1994) theory of knowledge creation. The findings demonstrate the mediating effect of knowledge creation process when new ventures want to execute entrepreneurial orientation to achieve firm performance. We place primary emphasis on the dynamic processes rather than the outcomes of knowledge creation (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka et al., 2000a). Tacit and explicit knowledge is connected and converted by the interactive spiral process of socialization, externalization, combination, and internalization. The dynamic SECI model enables the firm to create new knowledge or combine existing knowledge to form new insights and become valuable knowledge assets for the use of firms. New ventures can amplify the mobilization of knowledge and trigger new spirals of knowledge creation continuously to transform entrepreneurial orientation into better business value and performance. Furthermore, the consideration of knowledge creation process makes a related support of the resource-advantage theory. According to the resource-advantage theory, knowledge embedded internally is a valuable resource because it is unique to create and difficult to imitate (Barney, 1991; Grant, 1996; Hunt & Morgan, 1996; Zack, 1999). The findings reveal that SECI spiral enhances the capabilities of new ventures to transform tacit knowledge into the organizational memory and thereby leads to improved efficiency, growth, and profit. This result joins other studies to highlight the strategic value of knowledge creation for firms to sustain competitive advantages (Chia, 2003; Grant, 1996; Lee & Choi, 2003; Matusik & Hill, 1998; Nonaka & Takeuchi, 1995). Finally, this study contributes to integrate the domains of entrepreneurial orientation and knowledge management research. Entrepreneurship literature (e.g. Lee et al., 2001; Lumpkin & Dess, 1996; Shane & Venkataraman, 2000) suggests that entrepreneurial orientation of new ventures is critical for their success because entrepreneurial orientation represents an important means to discover and exploit profitable business opportunities. Knowledge management literature (e.g. Grant, 1996; Nonaka et al., 2000a,b; Zack, 1999) emphasizes the value of leveraging knowledge and

creating new combinations. We show here that the conversion process of knowledge creation appears to be a key mechanism through which entrepreneurial orientation is developed and implemented to accomplish favorable firm performance.

From a practical point of view, our study suggests that managers should be aware of the importance of knowledge creation process in the link of entrepreneurial orientation and firm performance. Managers have to facilitate dynamics and spiral of knowledge creation by taking a leading role in managing the SECI process. Firms can amplify and enlarge knowledge through the dynamic conversion between tacit and explicit knowledge. Managers need to nurture an enabling environment that allows employees to share and exchange tacit knowledge to create new knowledge. Each mode of knowledge conversion requires different approaches for knowledge to be created and shared effectively (Nonaka & Konno, 1998; Nonaka et al., 2000b). For example, employees rely on shared experiences such as apprenticeship or practice to build mutual understanding and trust in the socialization process. In externalization, the use of metaphors in dialogue is essential for concept creation. Combination process can disseminate knowledge by utilizing information technology such as on-line network, groupware, and database. Knowledge is articulated and embodied through simulations or experiments in the internalization process. Thus, managers should carefully choose and design appropriate methods according to the SECI process to facilitate knowledge creation. Furthermore, firms need to enhance employees' involvement and participation in SECI activities. Managers should provide incentive and support to reinforce the desired behaviors of knowledge creation. Employees will be motivated to exchange, learn, and create knowledge and further transform knowledge to fulfill strategic objectives and execution.

This study has some inherent limitations. First, our cross-sectional design prevents us from studying causal relationships among our variables. A longitudinal investigation would provide further insights into the dynamic nature of knowledge creation and different organizational levels. Future researches might use longitudinal design to draw causal inferences of our model. Second, this study goes further than other studies in examining a potential mediator in the relationship between entrepreneurial orientation and firm performance. However, we do not consider the roles played by organizational routines, cultures, and other possible knowledge management processes such as knowledge accumulation and knowledge integration. In addition, we also know that often the firm's orientation looks like its manager. If the manager is changed or changes, entrepreneurial orientation and firm performance may be influenced. Future studies might gain additional insights by exploring other potential mediators such as organizational factors, other knowledge management processes, or the change of manager. Third, the firm age of this study is restricted within ten years and the majority of our response samples are small and medium enterprises. Larger firms tend to have sufficient resources or money to invest in knowledge management process. Future research could overcome this limitation by expanding the scope of studies to include larger and elder firms. Fourth, the study is based on self-report data incurring the possibility of common method bias. However, our tests of common method variance do not find it to be a significant problem in this study. We also use multiple assessments including Cronbach alphas, composite reliability, convergent validity, and discriminant validity to support the accuracy of the data and the results. Future studies might use objective measures for firm performance to strengthen the research design.

In summary, entrepreneurial orientation is critical for enhancing firm performance. Our study highlights the crucial importance of the mediating role of knowledge creation process when examining the relationship between entrepreneurial orientation and firm performance. The viewpoints proposed in this study have important implication for new ventures in today's dynamic and competitive environment.

References

Aggarwal, N., & Gupta, M. (2006). Marketing performance measures: Current status in Indian companies. *Decision*, *33*(1), 47–74.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural evaluation models. *Journal of the Academy of Marketing Science*, *16*(1), 74–94.

Baker, J., Parasuraman, A., Grewal, D., & Voss, G. B. (2002). The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of Marketing*, *66*(2), 120–141.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182.

Barringer, B. R., & Bluedorn, A. C. (1999). The relationship between corporate entrepreneurship and strategic management. *Strategic Management Journal*, *20*(5), 421–444.

Becerra-Fernandez, I., & Sabherwal, R. (2001). Organizational knowledge management: A contingency perspective. *Journal of Management Information Systems*, *18*(1), 23–55.

Brush, C. G., & Vanderwerf, P. A. (1992). A comparison of methods and sources for obtaining estimates of new venture performance. *Journal of Business Venturing*, *7*(2), 157–170.

Chia, R. (2003). From knowledge-creation to the perfecting of action: Tao, Basho and pure experience as the ultimate ground of knowing. *Human Relation*, *56*(8), 953–981.

Clark, B. H. (1999). Marketing performance measures: History and interrelationships. *Journal of Marketing Management*, *15*, 711–732.

Droge, C., Claycomb, C., & Germain, R. (2003). Does knowledge mediate the effect of context on performance? Some initial evidence. *Decision Sciences*, *34*(3), 541–568.

Eisenhardt, K. M., & Schoonhoven, C. B. (1990). Organizational growth: Linking founding team, strategy, environment, and growth among US semiconductor ventures. *Administrative Science Quarterly*, *35*(3), 504–529.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural evaluation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50.

Frese, M., Brantjes, A., & Hoorn, R. (2002). Psychological success factors of small scale businesses in Namibia: The roles of strategy process, entrepreneurial orientation and the environment. *Journal of Developmental Entrepreneurship*, *7*(3), 259–283.

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, *18*(1), 185–214.

Grant, R. (1996, Winter). Toward a knowledge based theory of the firm. *Strategic Management Journal*, *17*, 109–122.

Griffith, D. A., Noble, S. M., & Chen, Q. (2006). The performance implications of entrepreneurial proclivity: A dynamic capabilities approach. *Journal of Retailing*, *82*(1), 51–62.

Haber, S., & Reichel, A. (2005). Identifying performance measures of small ventures — The case of the tourism industry. *Journal of Small Business Management*, *43*(3), 257–286.

Hult, G. T. M., Hurley, R. F., Giunipero, L. C., & Nichols, E. L. (2000). Organizational learning in global purchasing: A model and test of internal users and corporate buyers. *Decision Sciences*, *31*(2), 293–325.

Hunt, S. D. (1995). The resource-advantage theory of competition: Toward explaining productivity and economic growth. *Journal of Management Inquiry*, *4*(4), 317–332.

Hunt, S. D., & Arnett, D. B. (2006). Does marketing success lead to market success? *Journal of Business Research*, *59*(7), 820–828.

Hunt, S. D., & Morgan, R. M. (1995). The comparative advantage theory of competition. *Journal of Marketing*, *59*(1), 1–15.

Hunt, S. D., & Morgan, R. M. (1996). The resource-advantage theory of competition: Dynamics, path dependencies, and evolutionary dimensions. *Journal of Marketing*, *60*(4), 107–114.

Hunt, S. D., & Morgan, R. M. (1997). Resource-advantage theory: A snake swallowing its tail or a general theory of competition. *Journal of Marketing*, *61*(3), 74–82.

Ireland, R. D., Hitt, M. A., & Sirmon, D. G. (2003). A model of strategic entrepreneurship: The construct and its dimensions. *Journal of Management*, *29*(6), 963–989.

Joreskog, K., & Sorbom, D. (1986). *LISREL 6: Analysis of linear structural relationships by the method of maximum likelihood.* Chicago: National Educational Resources.

Kogut, B., & Zander, U. (2003). Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*, *34*(6), 516–529.

Lee, H., & Choi, B. (2003). Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination. *Journal of Management Information Systems*, *20*(1), 179–228.

Lee, C., Lee, K., & Pennings, J. M. (2001). Internal capabilities, external networks, and performance: A study on technology-based ventures. *Strategic Management Journal*, *22*(6/7), 615–640.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*(1), 135–172.

Lumpkin, G. T., & Dess, G. G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. *Journal of Business Venturing*, *16*(5), 429–451.

Lussier, R. N. (1995). A nonfinancial business success versus failure prediction model for young firms. *Journal of Small Business Management*, *33*(1), 8–20.

Matusik, S. F., & Hill, C. W. L. (1998). The utilization of contingent work, knowledge creation, and competitive advantage. *Academy of Management Review*, *23*(4), 680–697.

Miller, D. (1983). The correlates of entrepreneurship in three types of firms. *Management Science*, *29*(7), 770–791.
Murphy, G. B., Trailer, J. W., & Hill, R. C. (1996). Measuring performance in entrepreneurship research. *Journal of Business Research*, *36*(1), 15–23.
Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, *5*(1), 14–37.
Nonaka, I., & Konno, N. (1998). The concept of 'Ba': Building a foundation for knowledge creation. *California Management Review*, *40*(3), 40–54.
Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamic of innovation.* New York, NY: Oxford University Press.
Nonaka, I., & Toyama, R. (2005). The theory of the knowledge creation firm: Subjectivity, objectivity, and synthesis. *Industrial and Corporate Change*, *14*(3), 419–436.
Nonaka, I., Takeuchi, H., & Umemoto, K. (1996). A theory of organizational knowledge creation. *International Journal of Technology Management*, *11*(7), 833–845.
Nonaka, I., Toyama, R., & Nagata, A. (2000). A firm as a knowledge-creating entity: A new perspective on the theory of the firm. *Industrial and Corporate Change*, *9*(1), 1–20.
Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, Ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, *33*(1), 5–34.
Nunnally, J. C. (1978). *Psychometric theory.* New York: McGraw-Hill.
Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, *12*(4), 531–544.
Quinn, J. B. (1992). *Intelligent enterprise: A knowledge and service-based paradigm or industry?* New York, NY: The Free Press.
Sabherwal, R., & Becerra-Fernandez, I. (2003). An empirical study of the effect of knowledge management processes at individual, group, and organizational levels. *Decision Sciences*, *34*(2), 225–260.
Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, *25*(1), 217–236.
Teece, D. J. (1998). Capturing value from knowledge assets: The new economy, markets for know-how, and intangible assets. *California Management Review*, *40*(3), 55–79.
Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review*, *11*(4), 801–814.
Wiklund, J. (1999). The sustainability of the entrepreneurial orientation–performance relationship. *Entrepreneurship Theory and Practice*, *24*(1), 37–48.
Wiklund, J., & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal*, *24*(13), 1307–1314.
Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configurational approach. *Journal of Business Venturing*, *20*(1), 71–91.
Zack, M. (1999). Developing a knowledge strategy. *California Management Review*, *41*(3), 125–146.
Zahra, S. A., & Covin, J. G. (1995). Contextual influences on the corporate entrepreneurship–performance relationship: A longitudinal analysis. *Journal of Business Venturing*, *10*(1), 43–58.
Zahra, S. A., & Garvis, D. M. (2000). Entrepreneurship and firm performance: The moderating effect of international environmental hostility. *Journal of Business Venturing*, *15*(5), 469–492.
Zhang, Q., Lim, J., & Cao, M. (2004). Innovation-driven learning in new product development: A conceptual model. *Industrial Management and Data Systems*, *104*(3), 252–261.

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