The Mediating Effect of Knowledge Creation on Entrepreneurial Orientation and Firm Performance

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ABSTRACT

Based on Nonaka’s theory of knowledge creation, this study examines the role of knowledge creation process in the relationship between entrepreneurial orientation and firm performance. Using data collected from 165 firms in Taiwan’s new ventures, we find that the entrepreneurial orientation - firm performance relationship is mediated by knowledge creation process, including socialization, externalization, combination, and internalization. Structural equation modeling is used to test measurement and structural models with the survey data. The results suggest the need for consideration of knowledge creation process as a mediator in the relationship between entrepreneurial orientation and firm performance. The limitations and implications are discussed.

Keywords: entrepreneurial orientation, firm performance, knowledge creation process
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1. INTRODUCTION

Entrepreneurial orientation refers to a firm's strategic orientation, acquiring specific entrepreneurial aspects of decision-making styles, practices, and methods (Lumpkin and Dess, 1996). Entrepreneurship scholars have attempted to explain performance by investigating a firm's entrepreneurial orientation (Wiklund & Shepherd, 2003). Some scholars have found that firms with more entrepreneurial orientation perform better for new ventures (Wiklund & Shepherd, 2005), defined as firms newly built and less than ten years old (Lussier, 1995). The literatures of entrepreneurship suggest that entrepreneurial orientation could improve firm performance, but the empirical studies are mixed. The scholars of entrepreneurial orientation have empirically explored the independent effect of entrepreneurial orientation on firm performance (Zahra and Covin, 1995), but have largely ignored Lumpkin and Dess's (1996) call for research that also investigates how characteristics internal to the firm mediate the entrepreneurial orientation-firm performance relationship (Wiklund & Shepherd, 2003). This raises the question of whether entrepreneurial orientation is always an appropriate strategic orientation or if its relationship with performance is more complex. A possible reason for the various empirical results is that most studies have not examined factors that may mediate the strength of the relationship between entrepreneurial orientation and firm performance. The little empirical study investigating the mediation of the relationship between entrepreneurial orientation and performance is an important research gap.

Entrepreneurial orientation reflects how a firm operates rather than what it does (Lumpkin & Dess, 1996). Entrepreneurial orientation requires substantial financial and managerial resources to be successful. 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. In the competitive environment, entrepreneurship is widely viewed as the main sources of competitive advantage of firms. Successful firms are those that can consistently transfer entrepreneurial orientation into feasible strategic activities operated by organizational administrators to fulfill the firms' objectives and achieve superior performance. The competition of new ventures has shifted from natural resources to knowledge assets. Given the importance of entrepreneurship to firm performance, entrepreneurial orientation could be an important measure of the way how a firm is organized to enhance the performance benefit of a firm's knowledge assets by focusing attention on the utilization of these assets to discover and exploit opportunities (Wiklund & Shepherd, 2003). New ventures must rely on the effective utilization of knowledge assets to formulate and develop entrepreneurial orientation. From the theory of knowledge creation, knowledge is created through a spiral process of socialization, externalization, combination, and internalization (Nonaka, 1994; Nonaka & Konno, 1998). The SECI process of knowledge
creation describes dynamic interaction between tacit and explicit knowledge. Knowledge creation process enables firms to amplify knowledge embedded internally and transfer knowledge into operational activities to improve efficiency and create value (Nonaka & Konno, 1998; Nonaka, Toyama, & Nagata, 2000a). When new ventures make diversely strategic decisions, they can leverage the SECI spiral of knowledge creation to connect and arrange new and existing knowledge from many different individuals in developing new products or marketing activities (Nonaka & Takeuchi, 1995; Nonaka, Toyama, & Konno, 2000b; Gold, Malhotra, & Segars, 2001). Socialization process emphasizes the collective learning and knowledge exchange among employees to solve problems in their work. Externalization process makes employees better understand strategic vision by articulating tacit knowledge into explicit concepts and notions. Combination process integrates and disseminates knowledge throughout the firm to generate more application. Internalization process can actualize strategy into practical action and embody knowledge into valuable assets of firm's own (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka et al., 2000a). Such dynamic knowledge conversion can enhance the capability of firm to fulfill the strategic objective and achieve favorable performance such as effectiveness, improvement, or innovation (Teece, 1998; Droge, Claycomb, & Germain, 2003; Chia, 2003; Lee & Choi, 2003). Accordingly, the development of entrepreneurial orientation involves intensive knowledge activities and knowledge creation process plays a critical role in strategic decision of new ventures. Knowledge creation process may facilitate entrepreneurial orientation to transform into knowledge assets shared by organizational members and result in enhanced firm performance. However, most studies have not examined how entrepreneurial orientation could leverage 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. We assess the importance of knowledge creation process for the relationship between entrepreneurial orientation and firm performance by examining the direct effect of entrepreneurial orientation upon firm performance and their indirect effect with firm performance through knowledge creation process. We investigated these hypotheses among a sample of new ventures from Taiwan. This study contributes to this matter by developing and testing a model of the relationship among entrepreneurial orientation, knowledge creation process, and new venture performance. Findings in the study would enable scholars and managers to better understand the importance of knowledge creation process in the study of entrepreneurial orientation and firm performance. The focus of this paper is on the aspect, that is, knowledge creation process facilitating new ventures to transform entrepreneurial
orientation into practical strategic activities administered by organizational managers to enhance firm performance.

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

Many scholars have proposed knowledge creation process. These studies subdivide knowledge creation into several processes. For example, Alavi and Leidner (2001) addressed four basic processes of creating, storing, transferring, and applying knowledge. These major processes could be subdivided into creating internal knowledge, acquiring external knowledge, storing knowledge in documents versus storing in routines (Teece, 1998) as well as updating the knowledge and sharing knowledge internally and externally. Focusing on knowledge shared through the interaction between tacit and explicit knowledge, Nonaka (1994) identified four possible modes: socialization, externalization, combination, and internalization. Socialization transforms tacit knowledge into new tacit knowledge through social interactions among organizational members. Externalization converts tacit knowledge into explicit notions. Combination is the organizational knowledge creation mode whereby individual explicit knowledge is converted to organizational explicit knowledge. Internalization is the conversion of explicit knowledge into the organizational tacit knowledge. To examine knowledge creation process, this study adopts the SECI (socialization, externalization, combination, and internalization) model by Nonaka (1994) for the two reasons. First, 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. Second, the SECI model has been widely used in many research areas such as organizational learning and new product development (Lee & Choi, 2003).

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

2.1 Entrepreneurial Orientation and New Venture 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 (Wiklund & Shepherd, 2005; Lumpkin & Dess, 1996). 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 widely acknowledged in the strategy literature (Miller, 1983; Lumpkin and Dess, 1996; Zahra & Garvis, 2000; Frese, Brantjes, & Hoorn, 2002; Wiklund & Shepherd, 2005). Entrepreneurial orientation is necessary for firms to prosper and flourish in competitive and uncertain environments because entrepreneurial attitudes and behaviors facilitate the utilization of knowledge-based resources to discover and exploit opportunities (Barringer & Bluedorn, 1999; Lee, Lee, & Pennings, 2001; Wiklund & Shepherd, 2003). Several studies have suggested the dimensions of entrepreneurial orientation can lead to favorable outcomes of a start-up's performance (Zahra & Covin, 1995; Lumpkin & Dess, 1996, 2001; Lee et al., 2001; Wiklund & Shepherd, 2003).

Innovativeness leads to the tendency to engage in and support novelty, and 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 a distinctive competence (Zahra & Garvis, 2000). By increasing commitment to innovative products or processes, firms can renew their operations and improve their benefits (Miller 1983; Lumpkin and Dess 1996; 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 venture 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 (Lumpkin & Dess, 1996; Frese et al., 2002). Proactiveness refers to a firm's response to promising market opportunities (Lumpkin & Dess, 1996). A strong proactive tendency gives a firm the ability to anticipate changes or needs of the markets and customers (Lumpkin & Dess, 2001). Proactive business ventures tend to become first movers by forging a new market segment or by introducing new products or services ahead of competitors (Lumpkin & Dess, 1996). With a forward-looking perspective, proactive business ventures can capture unusual returns, dominate distribution channels, and establish brand recognition (Wiklund & Shepherd, 2005; Lee et al., 2001). Competitive aggressiveness involves the propensity to directly and intensely challenge its competitors (Lumpkin & Dess, 1996). Firms with competitively aggressive orientation will have ability to revise the rules of competition, redefine industry boundaries, and achieve entry or improve position. These actions allow firms to acquire and sustain market share and outperform competitors (Zahra & Covin, 1995; Lumpkin & Dess, 2001). Autonomy is described as the ability and willingness to take self-directed actions in the pursuit of opportunities. Autonomous orientation allows firms to make quick and self-reliant decisions, and promote novel ideas or venture into new markets (Lumpkin & Dess, 1996; Frese et al., 2002).

Accordingly, entrepreneurial orientation provides businesses the ability to discover new opportunities and response to challenges that can differentiate them from other firms. If ventures have higher level of innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy, they will gain more competitive advantage and achieve greater
performance. Thus, an effective entrepreneurial orientation may be a good predictor of new venture performance. These arguments lead to the following hypothesis.

Hypothesis 1: Entrepreneurial Orientation will be positively related to new venture 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 new ventures develop entrepreneurial orientation, the dynamic spiral of knowledge creation plays a critical role in facilitating the conceptualization and actualization of entrepreneurial orientation.

New venture with a broader orientation of innovativeness may have a tendency to support new ideas and novelty and further increase their engagement in developing new products, services, or processes (Lumpkin & Dess, 1996). The development of new products and services involves extensive and intensive knowledge creation activities. New ventures can use SECI spiral to convert knowledge into new types of knowledge (Nonaka & Takeushi, 1995). 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 & Takeuchi, 1995; Nonaka & Konno, 1998). 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 (Quinn, 1992; Nonaka, Takeuchi, & Umemoto, 1996). 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 anticipate future changes or opportunities and engage in opportunistic expansion seizing market opportunities in the process of new market entry (Lumpkin & Dess 1996). Competitively aggressive firms try 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). Socialization process facilitates the transformation of tacit knowledge embedded in customers or clients (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 that not only provide value to their customers, but also help to position competitively in the market (Griffith et al., 2006). And then firms can actualize the knowledge of marketing concepts or procedures into practical operations through internalization process.

Autonomous orientation reflects the ability and will to be self-directed in the pursuit of opportunities (Lumpkin & Dess 1996). Employees in a new venture 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, organizations that have an entrepreneurial orientation are more prone to focus attention and effort towards knowledge creation process. When new ventures develop entrepreneurial orientation, they need to take into account the SECI spiral of knowledge creation process which transforms and exchanges explicit and tacit knowledge. We can reasonably expect the positive relationship between entrepreneurial orientation and knowledge creation processes. Hence, we hypothesize:

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

2.3 Knowledge Creation Process and New Venture Performance

Knowledge is widely recognized as strategic source (Grant, 1996; Teece, 1998). The capability to create and utilize knowledge allows a firm to develop sustainable competitive advantage because of the ambiguity, uniqueness, and difficulty to imitate (Grant, 1996; Matusik & Hill, 1998; Zack, 1999). Previous studies have suggested the critical role of knowledge creation in the success of the organizations (Kogut & Zander, 2003; Nonaka & Takeuchi, 1995; Gold et al., 2001; Chia, 2003). Organizations with better knowledge creation process can connect knowledge in new and distinctive ways and provide value to customers.

From the perspective of knowledge creation theory, knowledge is created through dynamic SECI processes of socialization, externalization, combination, and internalization (Nonaka, 1994). Socialization is the process of converting tacit knowledge held by individuals through shared experiences. Frequently social interaction and perception help organizational members 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). In socialization, companies can converge and amplify tacit knowledge, which diminishes barriers between individuals (Nonaka et al., 2000a). Externalization process articulates tacit knowledge into explicit knowledge. 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. Combination process converts explicit knowledge into more complex and systematic explicit knowledge (Nonaka et al., 2000b). The newly explicit knowledge is integrated and disseminated at the organizational level. 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 (Gold et al., 2001; Grant, 1996; Lee & Choi, 2003). Internalization process embodies explicit knowledge into tacit knowledge. Through internalization, knowledge is transformed into organizational memory and is actualized in practical operations such as new product development or manufacturing procedures (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; Nonaka et al., 2000a; Lee & Choi, 2003). Thus, the SECI model of knowledge creation transforms knowledge into business value and results in organizational effectiveness, improvement, and innovation (Nonaka et al., 2000b; Lee & Choi, 2003).

It is important to note that knowledge created through the SECI model triggers a new spiral of knowledge creation. Firms transcend organizational boundaries to transfer and utilize knowledge embedded in customers or suppliers (Nonaka et al., 2000b). Such knowledge conversion allows firms to 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 take advantage of knowledge creation process effectively, they are more inclined to achieve efficiency, productivity, and favorable performance. It is believed that knowledge creation process is critical because of its positive relationship with performance. If new ventures attain higher level of knowledge creation
process, it will lead to higher level of performance. Thus, we propose the following hypothesis.

Hypothesis 3: Knowledge creation process will be positively related to new venture performance.

2.4 The Mediating Effect of Knowledge Creation Process

Hypothesis 2 and 3 link entrepreneurial orientation with knowledge creation process, and knowledge creation process with new venture performance. This means that the relationship between entrepreneurial orientation and new venture 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 new venture 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 hypotheses are developed.

Hypothesis 4: Knowledge creation process will mediate the relationship between entrepreneurial orientation and new venture performance.

3. RESEARCH METHODS

3.1 Sample and Data Collection

We employed a questionnaire survey approach to collect data, and all items were 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. 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 usable response rate of 27.6%. 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 new venture performance. Because all measures were collected from the same source, the Harman one-factor test was used to examine the potential problem of common method bias. A factor analysis on the questionnaire measurement items yielded seven factors with eigenvalues greater than 1.0 that accounted for 69.67 percent of the total variance, and factor 1 accounted for 16.46 percent for the variance. Since a single factor did not emerge and one general 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).

3.2 Measures
**Entrepreneurial Orientation.** In this study, entrepreneurial orientation was measured through five dimensions: innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy (Miller, 1983; Lumpkin & Dess, 1996). 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 (Lumpkin & Dess, 2001).

**Knowledge creation process.** In this study, knowledge creation process was measured through four dimensions: socialization, externalization, combination, and internalization (Sabherwal & Becerra-Fernandez, 2003). Socialization was measured with four items: cooperative projects across directorates, the use of apprentices and mentors to transfer knowledge, brainstorming retreats or camps, and employee rotation across areas. Externalization was measured with five items: a problem-solving system based on a technology like case-based reasoning, groupware and other learn collaboration tools, pointers to expertise, modeling based on analogies and metaphors, and capture and transfer of experts’ knowledge. Combination was measured with four items: web-based access to data, web pages, databases, and repositories of information, best practices, and lessons learned. Internalization was measured with three items: on-the-job training, learning by doing, and learning by observation.

**New venture performance.** New venture performance was measured with three dimensions: efficiency, growth, and profit (Murphy, Trailer, & Hill, 1996). Efficiency was measured by three items. The respondent was asked to rate the new venture on a five-point scale, in relation to competitors, on return on investment, return on equity, and return on assets in the past three years. Similarly, growth was measured by three items: change in sales, change in employees, and market share growth. Profit was measured by three items: return on sales, net profit margin, and gross profit margin.

### 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 measures of reliability are above 0.70. Table 1 summarizes all measurement items, Cronbach alphas, composite reliability, and their scales for all the items.

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 new venture performance being 2.02. That all the t-values considerably 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 2, this condition is also satisfied for all the constructs. For example, the extracted variance for innovativeness is 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 2 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). 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). Calculating parameter estimates and standard errors that can be used to test statistical significance, LISREL also analyzes hypothesized relationships.

The hypotheses were tested using LISREL 8.52. Paths between constructs represent individual hypotheses, and each was assessed for statistical significance of the path coefficient. The model was tested to examine the study's hypothesized relationships, and the LISREL analysis of this model produced a chi-square of 72.05 (d.f. = 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 3 and figure 1 showing the path coefficients, t-values, and construct relationships.

As hypothesized, there is a positive relationship between entrepreneurial orientation and new venture 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 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 new venture 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 variable 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 new venture 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 new venture performance ($\gamma_{11} = 1.31$, $t =11.91$), also supporting the second condition. In the third condition, entrepreneurial orientation has significantly positive relationship with new venture performance ($\gamma_{11} = 0.67$, $t = 9.23$), and knowledge creation process has significantly positive relationship with new venture performance ($\beta_{12} = 0.64$, $t =9.77$). 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 ($\Delta \chi^2=44.57$, $\Delta$ d.f.=1, $p<0.001$). The significance of the direct effect of entrepreneurial orientation upon 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 new venture 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 percent of the total effect of the independent variable on the dependent variable, with the remaining 56.84 percent 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 new venture 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 new venture performance by influencing knowledge creation process. Thus, knowledge creation process plays a mediating role through which entrepreneurial orientation benefit new venture performance.

Our findings contribute to theoretical development in several ways. First, whereas the importance of entrepreneurial orientation in venture performance has been recognized, the link between entrepreneurial orientation and firm performance has remained considerably inconsistent. This study helps to increase understanding of how entrepreneurial orientation affects firm performance. It clarifies the inconsistent results of prior studies by suggesting that the relationship between entrepreneurial orientation and firm performance may operate mainly through knowledge creation process. Second, the emergent model highlights the critical role of knowledge creation process and provides empirical support of Nonaka’s (1994) theory of knowledge creation. The findings demonstrate the potential mediation effect of knowledge creation process when new ventures want to execute entrepreneurial orientation to achieve favorable 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. Further, the consideration of knowledge creation process makes a related
support of the knowledge-based view. According to the knowledge-based view, knowledge embedded internally is valuable resource because it is unique to create and difficult to imitate (Grant, 1996; Zack, 1999). The findings reveal that SECI spiral enhances new ventures' ability to transform tacit knowledge into the organizational memory and thereby leads to improved efficiency, growth, and performance. This result joins other studies to highlight the strategic value of knowledge creation for firms to sustain competitive advantages (Nonaka & Takeuchi, 1995; Grant, 1996; Matusik & Hill, 1998; Chia, 2003; Lee & Choi, 2003). Finally, this study contributes to integrate the domains of entrepreneurial orientation and knowledge management research. Strategic management literature suggests that entrepreneurial orientation of new ventures is critical for their success because entrepreneurial orientation represent an important means to affect performance. Knowledge management literature 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 by which entrepreneurial orientation is developed and implemented to accomplish favorable new venture 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 venture 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, group-ware, 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 prevented us from studying causal relationships among our variables. 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 new venture 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. Future studies might gain additional insights by exploring organizational factors or other knowledge management processes. Third, 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 venture performance to strengthen the research design.

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

REFERENCES


