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How does new venture strategy matter in the environment–performance relationship?

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Abstract

Drawing on environmental determinism and environmental management perspectives, this study examines the roles of strategy in the relationship between environment and performance in new ventures. With data from 184 ventures in China's high technology industries, I found that new venture strategies play differential roles in dealing with different environmental dimensions to affect performance. In particular, the results suggest that marketing differentiation strategy plays a significant role in mediating the positive effect of perceived industry growth on performance. Market breadth and marketing alliance strategies significantly moderate the negative impact of perceived environmental hostility on performance. Product innovation strategy plays both mediating and moderating roles in the environment–performance relationship. Theoretical and managerial implications are discussed. © 2001 Elsevier Science Inc. All rights reserved.

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1. Introduction

The significant role of new ventures (e.g., firms newly established and less than 8 years old) in economic and social development has led practitioners and researchers to search for the factors that affect new venture performance. One of the major research streams in strategic management literature suggests that new ventures' strategic decisions are critical for their success because

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strategies represent an important means by which new ventures align their strengths and weaknesses with the opportunities and threats in the environments (e.g., Eisenhardt & Schoonhoven, 1990; McDougall, Covin, Robinson, & Herron, 1994). For example, researchers have found that new ventures that entered the marketplace with aggressive marketing and targeted broad markets were more successful than those that targeted narrower segments (Bigadikke, 1976; Miller & Camp, 1985; Sandberg, 1986; Tsai, MacMillan, & Low, 1991).

Stinchcombe (1965) argued that new ventures are characterized as “liability of newness,” a high propensity to fail. This is because, compared with large and well-established firms, new ventures tend to have relatively limited resources (including managerial and financial ones) and lack of legitimacy. Thus, they are highly dependent on environments for resources and information (Eisenhardt & Schoonhoven, 1990; Pfeffer & Salancik, 1978). On the other hand, new ventures possess such capabilities as niche filling, speed, and flexibility that allow them to exploit certain industry opportunities more readily than large and established firms (Dean, Brown, & Bamford, 1998; Sandberg, 1986). Thus, how new ventures adopt strategies to deal with environments for better performance becomes the central theme of this kind of research.

In the extant literature, there are two competing perspectives on the environment–strategy relationship, namely, environmental determinism and environmental management. Environmental determinism (Aldrich, 1979; Hannan & Freeman, 1977; Scherer, 1980) tends to view the environment as a deterministic influence and strategic decisions of the firms are expressing adaptation to opportunities and threats in the environment. For example, it is found that dynamic and uncertain environments are typically associated with innovation and marketing differentiation strategies (Miles & Snow, 1978; Porter, 1980). Research in industrial organization (e.g., Scherer, 1980) and population ecology (Hannan & Freeman, 1977) streams has adopted a similar stance, claiming that industrial structure and population conditions influence a firm’s strategic choices. In contrast, environmental management perspective (Clark, Varadarajan, & Pride, 1994; Galbraith, 1977; Zeithaml & Zeithaml, 1984) proposes that firms can and do implement strategies to manage their external environments for resources and competitive advantage. For example, a firm may gravitate toward customers with a specific strategy, resulting in retaliation and/or imitation from competitors (Lenz, 1981), thus changing market competition in the industry. These different views imply that a firm may use strategies in either a reactive or a proactive way to deal with the environment–performance relationship. Although both of these views shed light on the relationships between environment, strategy, and performance, prior research on new ventures is subject to the problems found in empirical work more generally, namely, alternate theories that would also fit the data are rarely stated and compared. Specifically, there have been no studies within the strategic management and organization literature investigating new venture strategy as both mediator and moderator simultaneously in the environment–performance relationship.

Recall that underlying the failure of new ventures is their limited resources (Eisenhardt & Schoonhoven, 1990; Stinchcombe, 1965). This problem is more salient for new ventures in transitional economies (e.g., China and Russia) than those in market economies (e.g., the US). Due to relatively underdeveloped institutional frameworks, new ventures in transitional economies, compared with their counterparts in market economies, are much more constrained by limited financial resources as well as limited technical, managerial, and marketing

capabilities (Li, 1998; Peng & Heath, 1996). Yet, the extant literature on new venture strategy has a clearly distinct bias toward market economies and has largely ignored how new ventures in transitional economies adopt strategies to deal with environments. The research gap is particularly significant given the recent flourishing of technology ventures in transitional economies such as China and Russia (Bruton & Rubanik, 1997; Li, 1998; Zhao & Aram, 1995). Take China as example. In the past decade, over 100 national and regional developmental zones for high technology industries have been established across the country. Within these zones, thousands of technology ventures were incubated and fostered under preferential governmental policies in terms of sales tax, land use, equipment importing, and others. For example, in Beijing High Technology Experimental Zone (BHEZ), the number of technology firms has been increased from 527 in 1988 to 4546 in 1998. Sales income from these firms has been increased from US\$175 million to US\$5.7 billion with annual growth rate of 42.6% (China's Science and Technology Commission, 1999). Therefore, any attempt to examine the environment–strategy–performance relationships in the context of new ventures in transitional economies may represent an important step to advance the theories on new ventures.

This article aims to investigate how strategies adopted by new ventures in China's transitional economy deal with the environment to affect performance. By integrating environmental determinism and environmental management perspectives, I argue that new venture strategies can be viewed both as the ventures' adaptive response to the environments for threat attenuation and as proactive actions to extend its influence over the environments for opportunity exploration. Following the environmental determinism argument, I expect that new venture strategy will mediate the relationship between environmental threat/opportunity and performance. Following the environmental management perspective, I expect that new venture strategy will moderate such a relationship. This research will contribute to the literature by addressing the call for further exploratory research into new venture strategies and their performance implications (Carter, Stearns, Reynolds, & Miller, 1994; McDougall & Robinson, 1990). Findings of the study should be helpful to scholars interested in the study of new venture strategies, particularly in transitional economy, and will enable practitioners to better understand the appropriateness of new venture strategies for better performance.

The remainder of the article is organized as follows. First, I briefly review the literature on environments and new venture strategies. Then, I develop the framework and hypotheses that link environment, strategy, and new venture performance. Third, I test the hypotheses with data collected from new ventures in China's high technology industries. I conclude with a discussion of the results of empirical analyses, implications of the findings, some limitations of the empirical study, and potential directions for future research.

2. Research background and hypotheses

2.1. Environments faced by new ventures

Firms depend on environments for resources and information (Pfeffer & Salancik, 1978). For newly established firms, they face many potential hazards (e.g., lack of resources, lack of

knowledge of environments) and have short track records with customers and suppliers (Stinchcombe, 1965). Thus, environments have critical impact on new venture performance. Although parsimony disallows including and analyzing all possible environmental factors, clearly some environmental concerns are more relevant to new ventures than others might be (Chandler & Hanks, 1994). A review of the literature suggests that new ventures have two major environmental concerns: opportunity and threat concerns. These concerns are consistent with strategic management literature, which suggests that “opportunity” and “threat” are two salient strategic issue categories (Dutton & Jackson, 1987). Though these two concerns may be applied into any type of firms, they are particularly pertinent to new ventures.

2.1.1. Opportunity concern

Gartner (1985) argues that the essence of new ventures is entrepreneurship, which represents the creation and exploitation of the environment. The creation and exploitation of the environment depend on observing market discrepancies and/or the potential for creating such discrepancies and pursuing them in order to attain more resources and opportunities (Savitt, 1988). Prior research has suggested that the founding environment plays a crucial role in shaping the resource opportunities of new ventures (Carroll & Delacroix, 1982; Eisenhardt & Schoonhoven, 1990). In particular, industry growth, a key component of market attractiveness, has been argued to have significant relationship with new venture entry and growth. For example, Porter (1980) argued that opportunities are more abundant in rapid growth industries because new ventures entering into these industries would provoke less retaliation by incumbent firms. Miller and Camp (1985) suggested that managers should look for situations where high market growth can potentially reduce the effect of competitive pressures. Chandler and Hanks (1994) found that market attractiveness is positively related to new venture growth.

Industry growth level also indicates environmental munificence, the extent to which resources required by new ventures are available in the environment (Pfeffer & Salancik, 1978). In high-growth industries, new ventures are more likely to get resources critical for their survival than they could do in low growth industries. Empirical evidence has also shown that venture capitalists prefer to invest in new ventures in high-growth industries (MacMillan, Siegel, & Narasimha, 1985; Sandberg, 1986). However, other researchers cautioned that high-growth markets may not be desirable as many other firms may be entering simultaneously (McDougall et al., 1994; Tsai et al., 1991). Nonetheless, industry growth represents an important environmental dimension that has been widely repeated in the literature. Consistent with the literature, in this study I use *perceived industry growth* to tap the richness of opportunities in the environment.

2.1.2. Threat concern

The second environmental dimension critical for new ventures is environmental threat. In his seminal paper, Stinchcombe (1965) argued that liabilities of newness inhere in special difficulties that new ventures face in acquiring resources. Particularly, new technology ventures often require substantial resources to fund early-stage and speculative development projects while revenues cannot be expected until well into the future (Stuart, Hoang, &

Hybels, 1999). Moreover, technologies in the industry are changing rapidly and once-promising development projects may be derailed by unanticipated kinks (Tushman & Rosenkopf, 1992). In addition, because new ventures often lack knowledge of their environments and working relationships with customers and suppliers, their legitimacy is limited (Hannan & Freeman, 1977; Stinchcombe, 1965). Therefore, new ventures are in a risky and vulnerable position in the market. A key challenge for new ventures in such a market position is to handle — typically reduce — the total amount of threats they confront in their business operations. Research has suggested that environmental hostility serves as a threat to new venture viability and performance (Covin & Slevin, 1989; Tsai et al., 1991). Yet, this important characteristic seems to have received somewhat less attention (Rajagopalan, Rasheed, & Data, 1993). In this study, I focus on *perceived environmental hostility* to tap the extent to which the environment is characterized by precarious industry settings and intense competition.

Note that in this study environments are viewed as perceptual phenomena. Such a view is consistent with the “enactment theory,” which argues that environmental situations can be perceived or experienced only through decision making in an organization (Weick, 1969). Similarly, Tsai et al. (1990, p. 11) argued that while “objective conditions are important because they determine the quality of opportunity . . . perceptions are also important because they are the basis for entrepreneurial action.” Therefore, in this study, environmental opportunities and threats are indicated by managers’ perceived industry growth and environmental hostility, respectively.

2.2. *New venture strategy*

In the extant literature, new venture strategies have been conceptualized and operationalized in different ways. Based on the work by Eisenhardt and Schoonhoven (1990), McDougall and Robinson (1990), Miller (1987), Romanelli (1989), and others, in this study I focus on four strategic dimensions: product innovation, marketing differentiation, market breadth, and marketing alliance.

Product innovation refers to the degree to which new ventures develop and introduce new products and/or services. Product innovation has also been emphasized in numerous new venture studies, albeit under different names and with different variables used to measure the construct (Chandler & Hanks, 1994; Eisenhardt & Schoonhoven, 1990). This strategy reflects a venture’s proactive attempt to deal with the increasing competition. *Marketing differentiation* refers to the extent to which a firm is pursuing a strategy based on unique marketing efforts (Miller, 1987). Several studies have identified this strategy as an important strategic decision by new ventures (Ostgaard & Birley, 1994; Romanelli, 1989).

Market breadth addresses the scope of the market that new ventures cater to: the variety of customers, their geographic range, and the number of products. McDougall and Robinson (1990) argued that providing a broad range of products to a large customer base is a critical component of new venture strategy. Given its importance, McCann (1991, p. 193) claimed that market breadth “is a variable that should at least be considered in any [new venture] research.” *Marketing alliance* refers to a form of lateral working relationship between a

venture and its competitors in one or more aspects of marketing (Bucklin & Sengupta, 1993). Prior new venture research has documented the importance of marketing alliances and suggests that marketing alliances allow an entrepreneur or a new venture to remedy lack of resources in changing markets (Bucklin & Sengupta, 1993; Dowling & McGee, 1994; Kotabe & Swan, 1995). Through alliances, new ventures may attain both concrete resources such as specific skills and financial resources and abstract ones such as legitimacy and market power that improve their market position (Eisenhardt & Schoonhoven, 1996).

I recognize that these strategic dimensions are not exhaustive and there may exist other dimensions that have not been incorporated in this conceptualization. As Miller (1987, p. 56) argued, however, “there is no way to prove, and we have no desire to claim, that these are in any way the only, or the most critical, strategic categories.” Nonetheless, these strategies represent fundamental strategic choices that are meaningful in a variety of environmental settings and enjoy much prominence in strategic management literature. Equally important, the extant literature has provided evidence of the relevance of some of the strategies like market breadth and marketing alliance strategy to Chinese firms (Li, 1998; Peng & Heath, 1996). Also, my pretest and field interviews suggest that these strategic choices are prominent for new ventures in China.

2.3. Environment, strategy, and new venture performance

In this study, I draw on environmental determinism and environmental management perspectives to develop hypotheses regarding the relationships between environment, strategy, and new venture performance. Specifically, environmental determinism perspective suggests a mediating role of new venture strategy while environmental management perspective proposes a moderating role of new venture strategy in the environment–performance relationship. Fig. 1 graphically depicts the theoretical relationships examined in this study.

2.3.1. The mediating role of new venture strategy

Environmental determinism perspective has been widely adopted in strategic management literature (Aldrich, 1979; Hannan & Freeman, 1977; Scherer, 1980). The dominant paradigm in industry organization research is the structure–conduct–performance hypothesis, suggesting that industry structure affects firms’ competitive behavior (conduct) and

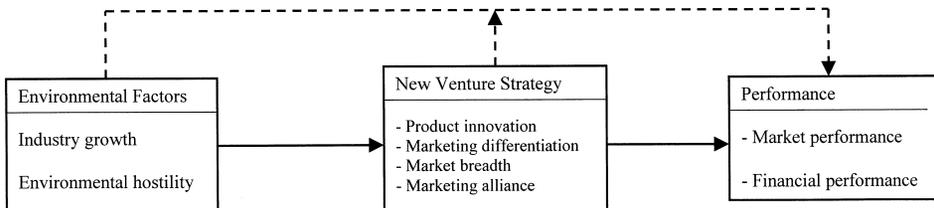


Fig. 1. Theoretical framework. The relationship with solid line represents the mediating effect while the relationship with dash line represents the moderating effect.

then performance at the industry level (Scherer, 1980). Porter (1980) adapted this paradigm to strategic management and argued that a firm's performance depends on its strategy, which, in turn, depends on the structure of the industry. This perspective takes new venture strategy as a strategically adaptive response to the external environment. It assumes that the use of strategy tends to intervene the environment–performance relationship. Therefore, I expect that the use of new venture strategy may mediate the impact of the environment on new venture performance. If the environment provides the opportunities critical for performance, new ventures need certain kinds of strategies to transform these opportunities into actual performance. On the other hand, if the environment is hostile, which may be adverse to new venture performance, strategies may entail creating options and risk-hedging ways to absorb uncertainties in the environment, thus attenuating the adverse impact.

Empirical evidence is limited on the mediating role of new venture strategies in the environment–performance relationship in the literature. Though Sandberg (1986) extended Porter's (1980) work to new venture study, he did not test whether new venture strategy may play as an intervening variable between environment and performance. One study I can locate is the work done by Tsai et al. (1991). Tsai et al. proposed that new venture strategies (e.g., product quality, price, and promotion) mediate the positive impact on return on investment of environmental munificence in terms of product life cycle, and these strategies also mediate the negative impact on market share of environmental hostility in terms of dependence of three large competitors. However, their results failed to support such propositions and thus they concluded that environment and strategy tended to separately affect new venture performance. In this study, I recognize the independent effects of environment and thus I propose that new venture strategies partially rather than completely mediate the impact of environment on new venture performance (James & Brett, 1984).

Hypothesis 1: The positive relationship between perceived industry growth and new venture performance will be partially mediated by new venture strategies: (a) product innovation, (b) marketing differentiation, (c) market breadth, and (d) marketing alliance.

Hypothesis 2: The negative relationship between perceived environmental hostility and new venture performance will be mediated by new venture strategies: (a) product innovation, (b) marketing differentiation, (c) market breadth, and (d) marketing alliance.

2.3.2. The moderating role of new venture strategy

The environmental management perspective provides an alternative view about how new venture strategy deals with the environment to affect performance. This view argues that firms “desire to influence and/or control their environments, particularly those sections of the environment that critically affect operations and performance” (Clark et al., 1994, p. 25). Thus, the development of strategies by new ventures is to manage or alter their external dependence on the environment (Galbraith, 1977; Zeithaml & Zeithaml, 1984). The use of different strategies can proactively reduce the negative impact and enhance the positive impact of environment on performance. Hence, this perspective suggests that new venture strategies play a moderating role in the environment–performance relationship.

My proposition is different from the traditional contingency approach in strategic management literature, which focuses on the moderating role of environment in affecting the relationship between strategy and performance (Prescott, 1986). The traditional approach attempts to investigate under what environmental conditions a specific strategy is more or less effective and thus it emphasizes the adaptive role of strategy in dealing with environment. In contrast, my proposition suggests how the use of new venture strategy may modify the relationship between environment and performance (Child, 1972; Zeithaml & Zeithaml, 1984). Although both approaches are similar in terms of analytical methodology, mine is much more relevant in this study. No matter what strategies new ventures might adopt, the environment does affect their performance. In addition, strategies are more under control by managers of new ventures than the environment is. At the substantive level, it is of practical significance for new venture managers to know whether their use of different strategies can effectively deal with environment's influence on performance.

Though the moderating role of strategy has not been explicitly addressed in the literature, implicit reference is nevertheless evident. For example, Covin and Slevin (1989) found that innovation strategy will be more positively related to small firm performance in hostile than in benign environments. Given the similarity of vulnerable market position between small firms and new ventures, we may imply that product innovation may be one of the important environmental management tools for new ventures. Through product innovation, new ventures may gain or maintain a competitive advantage, thus reducing the negative impact of environmental hostility on performance. By developing aggressive sales force, sales promotion, and pricing programs, marketing differentiation strategy facilitates new ventures to acquire and control resources as soon as possible (MacMillan & Day, 1987). The use of market breadth strategy provides new ventures opportunities to acquire revenues from different market segments and disperse the risks raised by focusing on a niche market (Dowling & McGee, 1994). Moreover, prior research has suggested that alliances can help firms to conserve resources and share risks (e.g., Eisenhardt & Schoonhoven, 1996). For all these reasons, I propose that the use of these strategies may allow new ventures to exploit opportunities in a munificent environment and buffer the threats from of a hostile environment.

Hypothesis 3: The positive relationship between perceived industry growth and new venture performance will be stronger when: (a) the degree of product innovation is higher, (b) the degree of marketing differentiation is higher, (c) the degree of market breadth is higher, and (d) the degree of marketing alliance is higher.

Hypothesis 4: The negative relationship between perceived environmental hostility and new venture performance will be weaker when: (a) the degree of product innovation is higher, (b) the degree of marketing differentiation is higher, (c) the degree of market breadth is higher, and (d) the degree of marketing alliance is higher.

In brief, environmental determinism and environmental management perspectives provide different views of the role of new venture strategy. Rather than competing, I view them as complementary. In the next section, I will discuss the research design and analytical methods for hypothesis testing.

3. Methods

3.1. Sample and data collection

The research sample was the population of high technology firms in BHEZ, one of the most developed high technology industry zones in China. The population was developed from industry lists compiled by the BHEZ Office. The final population consisted of 300 firms at the age of no more than 8 years old, which are mainly from industries such as computer software and hardware, electronics and information technology, integrated optical–mechanical and electric products, new energy and new materials, and new pharmaceuticals and bioengineering. Selected ventures met three criteria used to define a high technology firm in China: the management is composed of engineers or scientists, those with 30% or more of technical employees, and 3% or more of total sales spent on R&D. A letter was sent to the general managers of these ventures, explaining the purpose of the study and inviting their participation in the study. As a result of these efforts, 202 ventures agreed to participate in the study.

All data were collected via questionnaire measures administered on site. Questions were derived from the literature and in-depth interviews with seven entrepreneurs and business managers from five high technology ventures in China. The questionnaire was originally designed in English and then translated into Chinese by two management scholars competent in both languages and with substantial research experiences in the subject area in China. To avoid cultural bias and ensure validity, the Chinese version was finally back-translated into English and I paid special attention to detecting any significant misunderstanding due to translations. The instrument was then pretested with founders and senior managers from 10 technology ventures in China to improve the clarity and relevance of the questionnaire and ensure that questions were interpreted as expected.

The CEO, president, or senior manager was targeted as the single respondent from each of the sampled ventures. It is believed that they typically possess the most comprehensive knowledge of need information for new ventures (Hambrick, 1981). While the ideal may be to use multiple respondents, my pilot test suggested that a multiple-respondent approach is very expensive and more time-consuming in China. Nonetheless, in 45 cases, I surveyed two informants from each of the firms and thus obtained 90 responses as a validation sample. A series of *t* test were conducted to examine if there were any response differences between CEO/president respondents and non-CEO/president respondents in terms of the major constructs (with continuous measures). Results of the *t* test show that there were no statistically significant differences across these two kinds of respondents, suggesting that the single respondent approach is valid in this study.

Further, the respondent was asked to indicate the level and the extent of his/her involvement in strategic decision making in the venture. The means of the level and the extent of involvement were 7.18 and 7.09, respectively, on a nine-point Likert scale. I also calculated the average working period of the respondent in the current industry, with the mean of 7.8 years. These results suggest that the selected participants were experienced and knowledgeable about the issues under study and they were able to provide accurate information.

I received 202 completed questionnaires but 18 were excluded from the analysis because of missing values. Thus, the effective response rate was 61.3% (184/300). Of the responding ventures, 25.8% were in computer software and hardware industry, 24.7% in electronics and information technology, 17% in integrated optical–mechanical and electric products, 12.6% in new energy and new materials, 10.4% in new pharmaceutical and bioengineering, and 9.3% were classified as miscellaneous. These percentages are generally consistent with those shown in an annual report (1994) published by the BHEZ Office (1995). I view this consistency as evidence that the sample of this study was representative of the types of the firms that were in the BHEZ. Further, no significant differences between respondents and nonrespondents were found in terms of venture size and age.

3.2. Measures

To capture its multidimensional nature, new venture performance was measured along two dimensions: financial and market performance. *Financial performance* ($\alpha=.85$) was measured by five items adapted from McDougall et al. (1994). The respondent was asked to rate the new venture on a five-point scale, in relation to competitors, on return on investment, return on sales, profit growth, return on assets, and efficiency in the past three years. Similarly, *market performance* ($\alpha=.78$) was measured by four items: sales growth rate, market share growth, cash flow from market operations, and firm's overall reputation. Objective data were obtained on market share growth from 71 firms and profit growth from 72 firms. A correlation analysis shows that market share growth is positively related to market performance ($r=.39, P<.001$) while profit growth is positively related to financial performance ($r=.28, P<.05$). This evidence suggests that subjective performance measures are valid for the subsequent analyses in this study.

Product innovation strategy ($\alpha=.83$) was measured with four items drawn from Miller (1987) and Zahra and Covin (1993). The respondent compared his/her firm with its major competitors using a five-point scale on the extent of emphasis on new product development, as well as rate of change, speed, and variations in new products developed. *Marketing differentiation* ($\alpha=.76$) was measured by six items drawn from Dess and Davis (1984) and Miller (1987), tapping the extent to which new ventures spent on marketing efforts to distinguish them from the competitors. *Market breadth* ($\alpha=.68$) was measured by three items drawn from McDougall and Robinson (1990). *Marketing alliance* ($\alpha=.86$) was measured by six items based on the work of Bucklin and Sengupta (1993). These measures assessed the focal new venture's degree of emphasis on marketing complementary products, design and manufacture of new products, introducing new products, promoting new products, providing support services, design, and pricing collaboration with other firms.

Perceived environmental hostility ($\alpha=.61$) was measured by three items drawn from the study by Covin and Slevin (1989) and Miller (1987), tapping the degree of competition, risk, and threats in the principal industry. *Perceived industry growth* ($\alpha=.75$) was measured by three items drawn from McDougall et al. (1994) and Romanelli (1989), tapping the degree of demand growth and growth opportunities in the principal industry. Several

control variables were included in these analyses: NTV *size* (natural log of the number of full-time employees), *origin* (dummy coded: independent NTVs=0 versus corporate NTVs=1), *age* (upper limit is 8 years), and form of *ownership* (state/collectively owned=0 versus joint ventures/private-owned firms=1). Prior research indicates that these factors may affect NTVs' strategy making and performance (Chandler & Hanks, 1994; McCann, 1991).

3.3. Validation of measures

I examined unidimensionality and convergent validity of the constructs with confirmatory factor analysis. Given sample restrictions I divided the constructs into three submodels of theoretically related groups: performance measures, environmental variables, and strategy variables (cf. Bentler & Chou, 1987). The fit indices indicate that the models fit the data well: performance measures ($\chi^2=30.28$, $P=.11$, RMSEA=.04, GFI=.96, CFI=.99), environmental variables ($\chi^2=48.60$, $P=.00$, RMSEA=.06, GFI=.94, CFI=.91), and strategy variables ($\chi^2=53.79$, $P=.00$, RMSEA=.05, GFI=.95, CFI=.96). All items loaded on their respective constructs with each loading large and significant at .01 level.

To assess discriminant validity of strategic constructs, a model in which the correlation between a pair of constructs was constrained was compared with an unconstrained model. To satisfy the discriminant validity criteria, the fit of the unconstrained model should be significantly better than the constrained model. The pairwise tests among the constructs indicate that in each case the χ^2 difference was significant at $P=.01$ level, providing evidence of discriminant validity. As an example, the comparison involving product innovation strategy and marketing alliance yielded a $\chi^2(1)=179.02$ ($P<.01$) Table 1 presents the results of discriminant validity assessment.

Table 1
Assessment of discriminant validity of strategic constructs

Description	ML estimate, ϕ	t value	χ^2 statistic		χ^2 difference
			Constrained model (df)	Unconstrained model (df)	
<i>Product innovation with</i>					
Marketing differentiation	.32	4.27	132.24 (13)	16.88 (12)	115.36
Market breadth	.40	4.99	94.81 (13)	30.41 (12)	64.40
Marketing alliance	.41	6.01	281.40 (34)	102.38 (33)	179.02
<i>Marketing differentiation with</i>					
Market breadth	.58	7.74	56.13 (9)	14.38 (8)	41.75
Marketing alliance	.23	2.71	219.90 (27)	100.25 (26)	119.65
<i>Market breadth with</i>					
Marketing alliance	.20	2.36	181.39 (27)	94.59 (26)	86.80

All χ^2 differences are significant (for one degree of freedom) at the .01 level.

4. Results

4.1. Mediating effect

For mediation to be established, an empirical analysis must show that (1) the independent variables significantly predict the mediating variable, (2) the independent variables significantly predict 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 variables were perceived environmental hostility and perceived industry growth in this study, and the proposed mediating variables were strategic variables. The dependent variables were financial and market performance.

Table 2 shows the means, standard deviations, and correlations among all independent, dependent, and control variables. I examined the intercorrelations of each environmental component and new venture strategy variable to determine if they were significantly related. Results show that perceived industry growth has significantly positive relationship with product innovation ($r=.51, P<.001$), marketing differentiation ($r=.25, P<.01$), and market breadth ($r=.25, P<.01$) while perceived environmental hostility is positively related with marketing alliance ($r=.28, P<.01$). Thus, the first condition for mediating effect is met.

Then, I tested the second and the third conditions by using regression analysis. As shown in Table 3, I regressed each performance dimension on independent variables separately. For each performance dimension, I tested two models. In Model 1, only environmental variables were entered in the regression equation with control variables. In Model 2, I added strategic variables into the equation and tested their relative contribution to variance in the dependent variable. With respect to financial performance, in Model 1 environmental variables explained 28% of the variance ($F=8.05, P<.001$). In Model 2, adding the set of strategic variables increased the variance explained by 7% ($\Delta F=2.90, P<.05$), thus supporting the second condition. With respect to market performance, in Model 1 environmental variables explained 20% of the variance ($F=5.21, P<.001$). In Model 2, adding the set of strategic variables increased the variance explained by 15% ($\Delta F=6.62, P<.001$), also supporting the second condition.

To test the third condition, I examined the change in regression coefficient for each of environmental variables between before and after entering strategic variables. Results indicate that among the two environmental variables, only perceived industry growth had substantial change of its regression coefficients after entering strategic variables. I followed the procedure as outlined in Arnold (1982) to assess the magnitude of change in regression coefficients, $\Delta\beta$, of perceived industry growth. With respect to both financial performance and market performance, $\Delta\beta$ of perceived industry growth was .14 ($P<.05$) and .19 ($P<.01$), respectively. These results suggest that the mediating effects of strategic variables are primarily on perceived industry growth rather than environmental hostility. Thus, Hypothesis 2 was not supported. Furthermore, among the four strategic variables, only product innovation and marketing differentiation have significant relationship with both financial and market performance while market breadth and marketing alliance do not relate

Table 2
Correlation matrix and summary statistics^a

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. Financial performance	3.49	0.68											
2. Market performance	3.54	0.69	.64***										
3. Perceived environmental hostility	3.5	0.83	-.09	-.15									
4. Perceived industry growth	3.85	0.77	.51***	.40***	-.03								
5. Product innovation	3.95	0.84	.42***	.44***	.13	.51***							
6. Marketing differentiation	3.57	0.79	.32***	.38***	-.04	.25**	.34***						
7. Market breath	3.53	0.81	.24**	.35***	.01	.25**	.36***	.47***					
8. Marketing alliance	3.11	0.91	.06	.08	.28***	.12	.37***	.23**	-.18**				
9. NTV size	160.98	200.16	-.06	-.09	.07	-.04	-.05	.05	-.09	-.07			
10. NTV origin	0.34	0.47	-.09	-.11	-.16*	-.12	-.16*	-.07	-.00	-.22**	-.14		
11. NTV age	4.83	2.03	.02	-.03	.00	.09	.02	-.04	-.08	-.04	.25**	.07	
12. NTV ownership	0.78	0.42	.19*	.16	.06	.20**	.14	.09	-.09	.13	-.29**	-.28**	-.07

^a N=184.

* P<.05.

** P<.01.

*** P<.001.

Table 3

Results of regression analyses for mediating effect of new venture strategies^a (standardized regression coefficients)

Independent variables	Dependent variables			
	Financial performance		Market performance	
	Model 1	Model 2	Model 1	Model 2
<i>Control variables</i>				
Size of the venture	.05	.03	.05	.02
Origin of the venture	-.03	-.03	-.07	-.08
Age of the venture	-.10	-.09	-.09	-.08
Ownership of the venture	.08	.06	.07	.03
<i>Environmental variables</i>				
Perceived environmental hostility	-.09	-.09	-.17*	-.17*
Perceived industry growth	.50***	.36***	.38***	.17*
<i>Strategic dimensions</i>				
Product innovation		.22*		.29**
Marketing differentiation		.16 [†]		.16 [†]
Market breadth		.02		.13
Marketing alliance		-.09		-.09
R^2	.28	.35	.20	.35
Adjusted R^2	.25	.29	.16	.29
F	8.05***	6.29***	5.21***	6.34***
ΔR^2		.07		.15
ΔF		2.90*		6.62***

^a $N = 184$.* $P < .05$.** $P < .01$.*** $P < .001$.[†] $P < .10$.

significantly to either dimension of performance. These results suggest that it was product innovation and marketing differentiation strategies that partially mediate the relationship between environment and performance. Thus, hypotheses 1a and 1b were supported but hypotheses 1c and 1d are not.

4.2. Moderating effects

I analyzed moderating effects by entering each multiplicative combination (an environmental variable by a strategic variable) in the regression equation following both sets of environmental and strategic variables. Each multiplicative combination was entered individually. Table 4 summarizes the results of moderating effects. Results show that none of the interactions between perceived industry growth and strategy variables was significant, suggesting that strategies did not play the moderating role in the relationship between perceived industry growth and new venture performance. Thus, hypothesis 3 was not supported.

Table 4
Interaction effects^a

Variables	Financial performance		Market performance	
	β	ΔF	β	ΔF
Perceived environmental hostility \times Product innovation	.14	3.13*	.15	3.22*
Perceived industry growth \times Product innovation	.04	0.21	-.01	0.00
Perceived environmental hostility \times Marketing differentiation	.04	0.30	.01	0.01
Perceived industry growth \times Marketing differentiation	.03	0.20	-.03	0.16
Perceived environmental hostility \times Market breadth	.20	6.78**	.13	2.70 [†]
Perceived industry growth \times Market breadth	.01	0.02	-.02	0.03
Perceived environmental hostility \times Marketing alliance	.12	2.24 [†]	.15	3.23*
Perceived industry growth \times Marketing alliance	-.05	0.39	-.11	1.81

^a $N = 184$.

* $P < .05$.

** $P < .01$.

[†] $P < .10$.

However, results showed that the interaction between perceived environmental hostility and product innovation was positively related with financial performance ($\beta = .14$, $P < .05$) and market performance ($\beta = .15$, $P < .05$). It appears that when new ventures emphasize product innovation, the negative effect of environmental hostility on new venture performance will be attenuated. Thus, hypothesis 4a was supported. The results show that the interaction between environmental hostility and market breadth has significantly positive relationship with both financial performance ($\beta = .20$, $P < .01$) and market performance ($\beta = .13$, $P < .10$), supporting hypothesis 4c. It seems that the use of market breadth by new ventures may weaken the risk posed by a hostile environment on new ventures. The interaction between environmental hostility and marketing alliance had significantly positive relationship with both financial performance ($\beta = .12$, $P < .10$) and market performance ($\beta = .15$, $P < .05$). Thus, hypothesis 4d was also supported. However, hypothesis 4b, stating that the negative relationship between perceived environmental hostility and new venture performance will be weaker when the degree of marketing differentiation is higher, was not supported.

5. Discussion and conclusion

This article is the first, I think, to systematically investigate the mediating and moderating roles of new venture strategies in dealing with environments to affect performance. I did so by drawing on environmental determinism and environmental management perspectives. The resulting hypotheses were examined using a sample of new ventures in China's high technology industries. There are several results.

Consistent with environmental determinism predictions, I found that new venture strategies partially mediate the relationship between environmental factors and new venture performance. Two interesting points are noteworthy here. First, new venture strategies can only mediate a certain type of environmental situations but not all of them. In this study, the

mediating effects of new venture strategies are primarily on perceived industry growth rather than environmental hostility. Second, not all of the strategies may play the mediating role. Results indicate that only product innovation and marketing differentiation strategies mediate the positive effect of perceived industry growth on new venture performance. Note that in a hostile environment new ventures tend to adopt marketing alliance strategy while in a high-growth industry new ventures tend to use such strategies as market breadth, product innovation, and marketing differentiation, as shown in Table 2. It seems that although new ventures may adopt various strategies in response to different environmental conditions, product innovation, and marketing differentiation strategies are two major ways for new ventures to effectively exploit industry opportunities. These results are consistent with Romanelli's (1989) finding that new ventures that take an aggressive posture (e.g., relying on high expenditure on R&D and emphasizing large-scale promotional programs) are more likely to acquire resources and improve their chances of survival. Similarly, McDougall et al. (1994) argued that aggressive growth strategies are perceived necessary to achieve better performance in a rapidly growing industry.

Consistent with environmental management predictions, results of the study suggest that new venture strategies moderate the relationship between environment and performance. Specifically, when new ventures emphasize product innovation, market breadth, and marketing alliance strategies, the negative impact of environmental hostility on new venture performance becomes weaker. These findings suggest that the use of product innovation may contradict the negative impact of environmental hostility on new venture performance. Considering the high technology nature of the sample, it is not surprising to find that new ventures will focus on product innovation to overcome environmental difficulties. These results are consistent with Covin and Slevin's (1989) findings that performance among entrepreneurial/small firms in hostile environments was positively related to innovative strategic posture. The significant findings related to marketing alliance are consistent with the strategic position view of alliance (Eisenhardt & Schoonhoven, 1996), which suggests that alliances may help new ventures to defend their vulnerable market positions through acquiring more resources in a hostile environment. The results also support the view that new ventures with broad strategy are more likely to be successful (Bigadikke, 1976; Miller & Camp, 1985; Sandberg, 1986). Although the main effect of market breadth on new venture performance is not significant, this strategy can successfully attenuate the negative effect of environmental hostility on performance. It seems that through covering broader markets, new ventures may reduce environmental threats. This proposition is partially supported by the study done by Guthrie (1997), which found that small and weak firms in China tend to cover more businesses to handle economic instability inherent in the economic transition characterized by rapidly changing market system and incomplete institutional framework. However, I did not observe any significant interactions between strategies and perceived industry growth. It could be that perceived industry growth is more likely to have direct or indirect positive impact on new venture performance rather than is contingent on any strategies.

Taken together, results of this study suggest that environmental determinism holds when the industry is perceived as high growth by technology new ventures while environmental

management perspective holds when the environment is perceived as hostile. These findings are inconsistent with the literature, which suggests that organizations are proactive (an environmental management view) in the benign environment while they become reactive (an environmental determinism) in the hostile environment (Dutton & Jackson, 1987; Miles & Snow, 1978). For example, Dutton and Jackson (1987, p. 84) proposed that when environments are perceived with more opportunities, decision makers are more likely to construct or generate an organizational response that includes taking actions directed at changing the external environment. My interpretation for these inconsistencies is the sample I used in this study. Because of their liability of newness and vulnerable position in the market, technology new ventures have no choice rather than proactively exploit industry opportunities even the environment is highly hostile. As newly established organizations, their capabilities in terms of speed and flexibility allow them to do so (Dean et al., 1998). In contrast, when the environment is much munificent, their motivation for being proactive could be weakened. Yet, I caution that this postulation warrants further research.

Nonetheless, results of the study provide a relatively complete picture of the roles of new venture strategies in dealing with different types of environments to affect performance. The results suggest that there may exist three types of new venture strategies having different roles in the environment–performance relationship. The first one is the *opportunity-exploration-only* strategy (e.g., marketing differentiation), which plays a mediating role in the environment–performance relationship. This kind of strategy represents an aggressive posture of new ventures in market competition (Romanelli, 1989). Given their liability of newness and increasing market competition, it is critical for new ventures to use this type of strategy to explore and exploit environmental opportunities and transform these opportunities into actual performance. This is particularly true in China. Researchers have found that in China's transitional economy where marketing skills/resources are less available, firms that know how to effectively use marketing resources and implement strategies are more likely to build up differential advantage (Calantone, Schmidt, & Song, 1996).

The second is the *threat-attenuation-only* strategy (e.g., market breadth or marketing alliance), which plays a moderating role in the environment–performance relationship. Although new ventures are entrepreneurial in essence (Gartner, 1985), the adverse impact of environmental hostility presents a great threat to them because of their limited resources. The results advised that the adverse impact of environment hostility on performance might be attenuated by new ventures' targeting broad market or seeking alliances with other firms. Particularly in China, where institutional frameworks are relatively underdeveloped, firms tend to adopt networking strategies (Peng & Heath, 1996) or cover broad market (Guthrie, 1997) for survival and growth.

The third one is the *dual-effect* strategy (for both opportunity exploration and threat attenuation purposes, e.g., product innovation), which plays both the mediating and the moderating roles in the environment–performance relationship. Although the importance of product innovation has been emphasized in numerous studies in the literature (Chandler & Hanks, 1994, Eisenhardt & Schoonhoven, 1990), the “black box” between product innovation and performance has not been well understood. This study advances the literature by revealing that product innovation may contribute to new venture performance in two ways.

First, new ventures may rely on product innovation to aggressively exploit growth opportunities. Second, new ventures may use product innovation to gain competitive advantage, thus buffering environmental threats to their survival and growth.

Findings of this study contribute to the literature by providing some insights into understanding why new ventures have diversity of strategic choices. While the literature has suggested that industrial and market conditions may lead new ventures to adopt different strategies (e.g., Carter et al., 1994), how these strategies deal with environments is not clear. The findings suggest that the diversity of new venture strategies results from their different roles in dealing with environments to affect performance. Further, the classification scheme of new venture strategy presented above coincides with that of organization adaptation modes to complex environments elaborated by Boisot and Child (1999): complexity reduction and complexity absorption. Each of these two modes shapes the way that firms deal with environments. On one hand, firms adapt to the environments as their decision makers perceive and interpret them; on the other hand, firms have the capacity to enact some of the perceived environments and modify them proactively (Boisot & Child, 1999; Child, 1972; Weick, 1969). Clearly, we have extended this stream of research into new venture context.

The findings have implications for the development of new venture theory. The state of new venture theory is in its infancy. Prior research on the environment–strategy–performance relationship tends to rely on either the environmental determinism or environmental management perspective. However, findings of this study suggest that there is a need to integrate these two perspectives in modeling the determinants of new venture performance. Clearly, if we only rely on either of the two perspectives adopted in this study, the role of new venture strategy, and then the relationship between environment, strategy, and new venture performance, may not be well understood. Because a new venture is such a complex phenomenon, it is asserted that no single theory could provide sufficient guidance for model development and hypothesis generation regarding new venture performance (Schoonhoven, Eisenhardt, & Lyman, 1990). This study confirms this assertion.

5.1. Limitations

Despite some encouraging findings, the study is not without its limitations. Perhaps most importantly, perceptual data for both the independent and dependent variables used in this study may reduce the validity of the findings. For example, environmental variables were measured based on the managers' perception of changes in the market and institutions. They might be biased by the relative optimism that the managers display. However, it would be difficult to gather objective environmental variables because high technology industries are newly developed industries in China. Regarding to new venture performance, while no financial and accounting data were made available, the informants were able to compare their relative performance with close competitors. The use of perceptual data was justified by theoretical implications, which was further supported by the practical difficulties associated with data collection in China (Calantone et al., 1996, Li, 1998).

I acknowledge that the use of perceptual self-report measures raises a legitimate concern that the relationships between the dependent and independent variables could be attributable

to common method variance. I examined potential common method variance with the Harman's one-factor test (Podsakoff & Organ, 1986). A principle component factor analysis of the dependent and independent variables yielded eight factors accounting for 67.7% of the variance while Factor 1 accounted for 20.1% of the variance. Since a single factor did not emerge and one general factor did not account for most of the variance, common method variance may not be a serious problem in the data. Also, it is important to note that there is no theoretical reason to expect an interaction from common method variance. In support of this contention, Evans (1985) concluded that correlated error from the use of similar methods to collect measures on criterion and predictor variables cannot create spurious interactions. Further, given the fact that the questionnaire addressed many issues it is unlikely that the respondents could detect the research agenda and guess the hypotheses. However, this limitation cannot be completely discounted in this type of research. Nonetheless, the validity of the findings will be enhanced if other alternative measures can be adopted in the future research.

Finally, I caution that the cross-sectional data used in the study may not be able to identify the causal relationships among the variables. Researchers have advocated a longitudinal approach to investigate how new venture strategies and performance change over time as a result of environmental changes (Dowling & McGee, 1994; McDougall et al., 1994). It is also important to note that a cross-sectional approach allows the inclusion of a large number of firms at relatively low cost. Nonetheless, due to the exploratory nature of the study, I suggest that the results of this study serve as a foundation for more costly time-lagged studies toward establishing causal relationships in the future.

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