

ENTREPRENEURIAL ORIENTATION AND EXTERNAL TECHNOLOGY ACQUISITION: AN EMPIRICAL TEST ON PERFORMANCE OF TECHNOLOGY-BASED NEW VENTURES

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Abstract. This research investigates the effects of entrepreneurial orientation and external technology acquisition on the performance of technology-based new ventures in the context of a transitional economy. An analysis of the cross-sectional data from 123 Chinese technology-based new ventures was conducted. The results of the analysis support the contention that both the acquisition of external technology and entrepreneurial orientation improve new ventures' performance. Additionally, the interaction of entrepreneurial orientation and external technology acquisition positively moderates the relationship between entrepreneurial orientation and performance of technology-based new ventures. Overall, this study contributes to our enhanced understanding of the complex relationship among entrepreneurial orientation, external technology acquisition and firm performance under transitional economic conditions. Firms from emerging economies, especially technology-based new ventures, may find the study findings useful in guiding their decision on external technology acquisition.

Keywords: technology-based new ventures, entrepreneurial orientation, external technology acquisition, performance, transitional economy, China.

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Introduction

For the past three decades, the progress of economic and institutional reforms in China has unleashed the economic potential of millions of enterprising individuals. The 2010 Total Entrepreneurial Activity (TEA) index of 14.4% ranks China the seventh among

24 efficiency-driven economies and 16th among 59 GEM member countries in terms of active entrepreneurship (GEM 2010). This vigorous pace of new venture creation has contributed to an annual GDP growth rate of more than 9.5% for nearly three decades and is an important source of new job creation, organizational innovation, and growth of the private sector in China (People's Daily 2011). Past researches have shown that entrepreneurship influences the social and economic development of a country (Lau, Busenitz 2001; Peng 2001; Ahlstrom, Bruton 2002). Therefore, it is a matter of great concern for public policy since entrepreneurship is very critical for the newly emerging private sector to realize its full performance potential.

Recently, Chinese policy-makers have focused their attention on enhancing the global competitiveness of the economy as it relates to technological development and innovation. The 12th Five-Year Program (2011–2016) highlights an “innovation-oriented nation” and “endogenous innovation” strategies as the foundation of sustainable national competitive advantage for China. In technology-intensive industries, new entrepreneurial ventures are key contributors to the implementation of this ambitious national program, because of their flexibility, constant focus on new technology and market opportunities, as well as their willingness to take risks with innovations (People's Daily 2011).

Technology-based firms often exhibit a character of higher level of social value in comparison to other less technology intensive firms (Roberts 1991a). New entrepreneurial venture firms that take a strategic posture tend to have the characteristics of innovation, proactiveness, and willingness to take risks as well as high level of entrepreneurial orientation (EO) (Lumpkin, Dess 1996; Cai *et al.* 2014). The latter characteristics leads a firm to engage in product market innovation, undertake somewhat risky ventures, and to first come up with proactive innovation, beating competitors to the punch (Pearce *et al.* 2010). Thus, EO is an effective strategic process in pursuing market opportunities, and enhancing organizational performance (Wiklund 1999; Ortega 2010; Bamiatzi, Kirchmaier 2014).

EO is certainly also critical for firms operating in emerging markets. Yet, most of the research on the link between EO and organizational performance focus on the mature market economy and the nature of this relationship in the context of a transitional economy such as China is still relatively under researched (Bruton *et al.* 2000; Bruton, Ahlstrom 2003; Chow 2006). As Covin, Slevin (1989) once point out that EO benefits organizational performance even in hostile environments that are full of precarious industry conditions, intense competition, overwhelming harsh business climates and the relative lack of exploitable opportunities. Hence it is worthwhile to investigate this relationship in the Chinese environment, as China's market and institutional environment are more dynamic and volatile compared to mature market economies. Undoubtedly, an in-depth investigation in this area is urgently needed to fill in the research gap in a more comprehensive understanding of the relationship between EO and organizational performance in an ever-changing dynamic environment.

Furthermore, as China moves from an agriculture-based economy to a manufacture-based economy, internal R&D simply cannot catch up with the fast pace of such transformation. As a result, Chinese firms tend to acquire outside technology resources to

speed up their modernization process. However, no research has ever been conducted to verify whether such a strategy benefits firm performance. The goal of current study is to uncover the relationship between EO and technology-based new ventures' (TBNV) performance, as well as the impact of external technology acquisition (ETA) on this relationship in the dynamic Chinese transitional economy.

1. Literature review and hypotheses development

1.1 Entrepreneurial orientations and firm performance

EO refers to a firm's strategic orientation, focusing on specific entrepreneurial aspects of innovativeness, proactiveness, and risk-taking. "Innovativeness" reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative process as well as a firm's ability to pursue new opportunities (Lumpkin, Dess 1996). "Proactiveness" refers to ability to act and anticipate market changes with a forward-looking perspective and introduces new products or services as a response to those changes (Voss *et al.* 2005). "Risk-taking" is the degree of risky behavior in the strategic entrepreneurial process. Overall, entrepreneurial orientation relates to the entrepreneur's methods, practices and decision-making styles (Cools, Van den Broeck 2008; Alegre, Chiva 2013).

The relationship between EO and firm performance is well established in both conceptual and empirical literature on EO. Since 1980s, scholars (Miller 1987; Zahra, Covin 1995; Jones *et al.* 2000; Wales *et al.* 2013a) argue for a positive and significant relationship between EO and firm performance. The majority of the empirical studies (Wiklund 1999; Covin *et al.* 2006; Avlonitis, Salavou 2007; Soyninen *et al.* 2012; Wales *et al.* 2013b; Real *et al.* 2014) in this area have validated this relationship. While most of the existing empirical evidence emphasizes that a positive relationship exists between EO and organizational performance, studies conducted in emerging markets show mixed results (Boso *et al.* 2013). While some studies (Luo *et al.* 2005; Tsai, Wang 2008) find rather weak relationship between EO and firm performance, especially in state-owned enterprises, others find a positive and significant relationship between EO and firm performance, e.g. the study of 1,100 Chinese enterprises located in Shandong, Inner Mongolia, Hebei and Tianjin by Tang *et al.* (2008). Nevertheless, in a staged model study of entrepreneurship in China, Tan (2005) reports that after 1990 firms in China show distinctive strategic orientation and that they are far more innovative and risk-oriented. Against this background, we hypothesize that:

H1: EO positively improves technology-based new ventures' performance in China.

1.2. External technology acquisition and firm performance

Technological resources, such as non-codified knowledge, investment in R&D and patents, play an important role in growth and development of technology-based firms in transitional economies (Watkins-Mathys, Foster 2006). Although technology-based new ventures tend to become pioneers in introducing new product or technology to the market, a firm's internal R & D often requires not only hefty resource and capability

development investments, but also with high uncertain outcomes (Zahra 1996; Friesl 2012). Therefore, external technology acquisition, including purchasing technology/patents, licensing and technology-based alliances, is often an advantageous strategy for TBNVs as a way to increase their technological knowledge (Cohen, Levinthal 1990; Buckley, Park 2014) and strengthen their technological capabilities (Jones *et al.* 2000; Lichtenthaler 2010) with minimum uncertainty.

During the economic transitional period, China's technological conditions and environmental change are often more volatile and dynamic (Peng 2003; Tan 2007; Lau *et al.* 2008;). In such an environment, new firms tend to be compelled to use external sources of technology (Teece 1986; Shan 1990; Zahra, Bogner 1999, Zhou, Li 2013). Recent research suggests that new ventures that use external technology to create new products and services often acquire additional market shares and have higher levels of performance (Zahra, Bogner 1999). A longitudinal study by Tsai and Wang (2008) supports the argument that external technology acquisition is positively correlated with firm performance. Therefore, we propose:

H2: in the context of China, ETA positively influences technology-based new venture's performance.

1.3. The impact of EO and ETA interaction on firm performance

Although EO and external technology acquisition both have significant influence on the performance of technology-based new ventures, new firms cannot achieve a maximum level of performance if they only utilize one or the other. While the adoption of EO can help TBNVs to take new initiatives in innovation and pursue more business opportunities, this approach is also a resource-consuming strategy that may weaken a firm's resource base quickly (Covin, Slevin 1991). Similarly, while a strategy of ETA can speed up a firm's product development and market expansion, a technology-based new venture may fall into a trap of dependence on the external sources of technology, thus loses its own technological advantage. Therefore, a configuration of EO and ETA may be a more advantageous strategic choice to maximize a firm's performance efficiency.

For TBNVs in China, they face two dilemmas. The first one is the fast pace of economic growth and ever expanding business opportunities coupled with incomplete market and institutional environments (Tan 1996, 2005). The second one is the significant R&D investment at the national level coupled with lower innovation and commercialization capabilities at the industry level. This particular Chinese situation suggests that technology-based new ventures operating in transitional markets with plenty of emerging opportunities can improve their performance by adopting an EO strategy (Liu *et al.* 2014). However, these new firms may not have the capability and the time to develop the necessary resources internally (Peng 2001). Acquiring technology externally can help a firm to eliminate the high cost of internal R & D (Noori 1990) as well as bring new products to market quickly (Capon, Glazer 1987; Lichtenthaler 2010). For this argument, Chinese TBNVs with a clear entrepreneurial orientation strategy may benefit further from external technology acquisition. Therefore, we hypothesize:

H3: the interactive effect of ETA and EO positively moderates the relationship of EO and TBNV's performance in China.

The hypothetical relationship of the study is presented in Fig. 1.

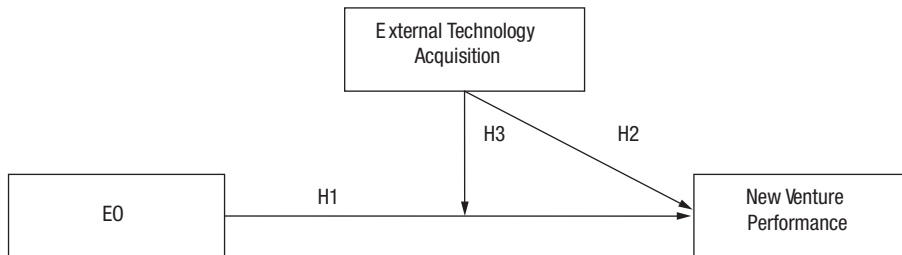


Fig. 1. Conceptual contingency model

2. Data and methods

2.1. Research setting

China's economic transition presents an ideal condition for quasi-experimental study (Meryer, Peng 2005). During China's economic transition from a central planning economy to a market-based economy, the business operational environment is more turbulent and dynamic than ever before (Tan 1996, 2005). With a rapidly growing market, the business competition intensifies while customer needs become more complex.

Several characteristics of China's dynamic economic environment have made the research setting valuable to test the above research hypotheses. These characteristics include: 1) a rapid industrial growth rate that afford firms to utilize an EO strategy to aggressively search for new opportunities; 2) the fast replacement rate of core products in various industries, which helps to raise firms' innovative intention; 3) the increased rate of technological change that helps to shape a firm's technological resource strategy; and finally, 4) the daily change rate of customers' needs, which impacts on a firm's resource acquisition and decision-making. Even though previous researchers have conducted studies on the impact of EO and technology resource, there have been few studies that focus on this particular research setting in a transitional economy. This study on EO and ETA in relationship with TBNV's performance in China's dynamic market is designed to fill in this literature gap.

2.2. Sample

To test the above hypotheses, data were collected from technology-based new firms in China, utilizing a questionnaire-survey approach. The samples were drawn from North-east and Southeast China, including 500 firms from Changchun, Jilin and Tonghua cities in Jilin Province in the North and 300 firms from Fuzhou and Yongan cities in Fujian Province in the South. The reason for selecting the five cities in the two provinces is due to the fact that they are all middle-developed cities with a large number of recently

created high-tech and small-medium-sized firms. While a central planning economy significantly influences the cities in the North, the cities in the South are mainly influenced by market force. This sample selection represents a good balance of China's South and North regions.

The local government of these target cities provided addresses and phone numbers of TBNVs in their region. For each of the five cities, a sample of small-medium sized industrial firms was sought, covering the main industrial regions with all types of private firms and across different industrial sectors. The majority of the firms in the sample are in manufacturing, communication, computer service, software, biology and medicine, which are the likely firms to form high-tech industry in China. This study concentrates on new ventures that are in operations for less than eight years (Zahra, Bogner 1999).

Data collection was implemented in two steps. Trained interviewers first telephoned the sample firms to request their cooperation in the study. Then, the founders of the sample firms were interviewed and asked to fill out the designed questionnaires on site. In total, 800 firms were approached and 123 firms completed the questionnaire, with an effective response rate of 15.38 percent. The reasons for non-participation included: 1) concerns over leakage of internal information; 2) occupied with important affairs at the time of the scheduled interview, hence not having the time to participate. Despite some of the drawbacks in the data collection process, the profile of the respondents and these high-tech firms in Table 1 shows a satisfactory representation of the population of interest. In terms of "The high technology industry typology standard of China" enacted by the National Bureau of Statistics of China, the sample enterprises fall in the high-tech industry code 253, 2665, 27, 368, 376, 40, and 621, including medical manufactory, communicational and electrical equipment manufactory and software service. The study sample truly reflects the characteristics of high-tech industry. The respondents are mostly "Board Chairman, CEO or Senior Managers" (72.4%) who founded the business. Most of the firms (81%) had less than 200 employees and 2010 is the cut-off year in terms of firm age. The sample is a good representation of small, technology-based new ventures in China. To eliminate any possible bias of non-respondent, χ^2 a test was conducted between early respondents and late respondents, no statistically significant differences were found between the two groups across the key variables in the study, supporting the assumption that respondents were not different from non-respondents.

2.3. Measures

TBNV's performance: four items were used to measure TBNV's performance, including growth and financial performance as growth is often used as a proxy for business performance (Brush, VanderWerf 1992; Chandler, Hanks 1994). Meanwhile, firms also choose a trade-off between long-term growth and short-term profitability (Zahra 1991). To measure both aspects of TBNV's performance, we combined measures of financial performance (current net income and market share) and growth (growth rate of net income and growth rate of sales), and used a seven-point scale to measure the statement of items. This performance measure has been extensively used in past studies (Covin *et al.* 2006; Rauch *et al.* 2009). The Cronbach's α of the scale is 0.85 as shown in

Table 2. Taking the sample size and model complexity into consideration the measurement model represents a good fit ($\chi^2/df = 1.08$, GFI = 0.99, AGFI = 0.96, NFI = 0.99, CFI = 0.99, RMSEA = 0.03).

Entrepreneurial orientation: it is widely acknowledged that there are four high quality measures of EO, e.g. (1) Covin and Slevin (1989) EO scale; (2) Miller’s (1983) composite view of EO; (3) the Hughes and Morgan (2007) EO scale; and (4) a “type II” second-order formative EO scale by Diamantopoulos and Sigauw (2006). We chose to use the EO scale by Covin and Slevin (1989) because of its reflective nature and its easiness to administer in the Chinese environment.

For the purpose of the study, EO is employed as a high-order construct (Zahra, Covin 1995; Wiklund 1999; Green *et al.* 2008). Although innovativeness, risk-taking, and proactiveness are important characteristics of entrepreneurial firms, Cooper and Dunkelberg (1986) suggest that various paths to business ownership constitute different degrees of entrepreneurship and the entrepreneurial firms will present significant differences when compared with conservative firms. Thus, a high level of all three characteristics of entrepreneurial firms may be too narrowly defined for explaining some types of entrepreneurial behavior (Lumpkin, Dess 1996).

Table 1. Profile of responding organizations and respondents

| Characteristics of respondents and new ventures | Percent |
|---|---------|
| Respondents | |
| (1). Board Chairman | 31.3 |
| (2). CEO | 27.7 |
| (3). Senior Managers | 13.4 |
| (4). Department Directors | 20.5 |
| (5). Other Insiders | 7.1 |
| Number of Employee | |
| (1). 1–20 | 27.9 |
| (2). 21–50 | 20.7 |
| (3). 51–200 | 32.4 |
| (4). 201–500 | 9.0 |
| (5). 500–1000 | 1.8 |
| Firm Ages | |
| (1). <3 year | 14.9 |
| (2). 4–5 year | 22.4 |
| (3). 6–8 year | 63.7 |
| Industry | |
| (1). Telecommunication/Internet/computer service and software development | 19.5 |
| (2). Manufacture | 35.0 |
| (3). Biology and medicine | 8.9 |
| (4). Others | 36.6 |

Table 2. Factor loadings and reliability

| Factors | Items | Loading | Cronbach's α |
|---|---|----------------------|---------------------|
| EO $\chi^2/df = 1.191$, $p = 0.240$, GFI = 0.951, AGFI = 0.904, NFI = 0.953, CFI = 0.992, RMSEA = 0.040 | 1. First to introduces new line of products/services, techniques and technology | 0.87 0.88 0.74 | 0.85 |
| | 2. Strong emphasis on R&D, innovation and technological leadership. | 0.78 0.79 | |
| | 3. Our innovations are so dramatic that it is difficult to be imitated by our competitors | 0.78 0.77 0.83 | |
| | 4. Strong preference for projects with high risk and high return. | 0.76 | |
| | 5. Adopt bold and active actions to achieve the business objective. | | |
| | 6. Adopt a bold, aggressive posture in order to explore potential opportunities. | | |
| | 7. Adopt a very competitive and market oriented posture. | | |
| | 8. First to take initiative before our competitors. | | |
| | 9. Proactively develop many new lines of products and services. | | |
| ETA $\chi^2/df = 1.122$, $p = 0.326$, GFI = 0.991, AGFI = 0.954, NFI = 0.992, CFI = 0.999, RMSEA = 0.032 | 10. Acquire majority of technology and patents from outside. | 0.72 0.83 | 0.89 |
| | 11. Dependent on other firms to supply us with new technology. | 0.93 | |
| | 12. Using business plan/vision to attract patents or technology. | 0.81 | |
| | 13. Using firm reputation to attract patents or technology. | | |
| Performance $\chi^2/df = 1.081$, $p = 0.339$, GFI = 0.991, AGFI = 0.957, NFI = 0.990, CFI = 0.999, RMSEA = 0.026 | 14. Current net income | 0.66 | 0.85 |
| | 15. Current market share | 0.80 | |
| | 16. Growth rate of net income | 0.77 | |
| | 17. Growth rate of sales | 0.83 | |

Hence, in this article, a second-order confirmatory factor analysis was conducted to test EO construct. After extensive personal interviews with CEOs of local high-tech firms in Changchun city, the nine-item scale by Covin and Slevin (1989)¹ was modified slightly to reflect a better understanding by the Chinese respondents, each of which focusing on innovativeness, risk-taking and proactiveness. One item in the original Covin/Slevin scale (undo-the-competitor posture) was modified as “Adopt a very competitive and market oriented posture” as the Chinese CEOs felt that “undo-the-competitor posture” was too negative. A seven-point Likert scale was used to measure the statements of

¹ An extensive discussion of EO scale can be found in an article by Covin and Wales (2012).

items. In the second-order confirmatory factor, EO items first loaded on three independent constructs in a first-order model, and then these three dimensions load on one dimension in a second-order model. The Cronbach's α is 0.85 as shown in Table 2. This model exceeds an acceptable fit ($\chi^2/df = 1.19$, GFI = 0.95, AGFI = 0.90, NFI = 0.95, CFI = 0.99, RMSEA = 0.04).

External technology acquisition: some researchers argue that TBNVs usually face resources constraint, thus it is very important for these TBNVs to attract external resource by their business plan, entrepreneurial vision and the reputation of the entrepreneurs or team (Brush *et al.* 2001; Roberts 1991b). External technology acquisition includes fully external activities such as fully functional technology from other firms through purchase and licensing (Capon, Glazer 1987; Narula 2001), and quasi-external activities such as technology alliance with other firms (Narula 2001; Schoenmakers, Duysters 2006). In this study, four items were developed based on the previous theoretical research to measure ETA of a TBNV. Two items were designed to measure fully external activities while the other two items were developed to measure quasi-external activities. A seven-point Likert scale was used to measure the statements of items. The Cronbach's α of the scale is 0.89 as shown in Table 2. The model represents an excellent fit ($\chi^2/df = 1.12$, GFI = 0.99, AGFI = 0.96, NFI = 0.99, CFI = 0.99, RMSEA = 0.03).

Control variables: firm size as measured by employees (Zahra, Neubaum 1998; Wiklund, Shepherd 2005; Stam, Elfring 2008), age (Zahra, Neubaum 1998; Wiklund, Shepherd 2005; Stam, Elfring 2008;), education level of the entrepreneur, and firm type (independent investment company or partnership) may influence the TBNV's performance. The respondents were asked the year of their firm foundation to measure firm age. The number of employees was used to measure the scale of the TBNV. The education level was measured by a range from "0 = middle school to 6 = doctoral degree". A dummy variable was used to measure firm type, where 1 = independent investment firm and 0 = partnership.

3. Research findings

3.1. Reliability and validity

Reliability coefficients of 0.70 or higher are considered adequate for purposes of construct validation (Hair *et al.* 2010). Composite reliability is estimated by using Cronbach's α or composite reliability value. The measures used in this paper were adopted from the existing scale, previously validated and strongly grounded in the literature. These adapted measures were also tested in this study. Table 2 shows that the internal validities of the constructs remain strong in the Chinese context. The Cronbach's α of all factors are above 0.80. These results suggest that the theoretical constructs show good psychometric properties within our Chinese study.

3.2. Construct validity and discrimination validity

Confirmatory factor analysis was conducted to test the construct validity and discrimination validity. A loading value of 0.70 is the suggested minimum level for item loadings

on given scales (Hair *et al.* 2010). Table 2 shows that the loadings are all above the 0.70 level, except one performance item, implying a good model fit.

3.3. Hierarchical linear regression

Hierarchical regression modeling was utilized to test the theoretical hypotheses of EO, ETA and firm performance. The descriptive statistics and correlations of the variables are provided in Table 3. The correlation matrix implies that the control variables do not significantly correlate with independent variables. In further testing of the multicollinearity in higher-order models, multicollinearity diagnoses were applied. All of the variance inflation factors (VIF) are below the threshold value of 4.0 (Hair *et al.* 2010).

Table 3. Descriptive statistics and correlations matrix

| | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------|------|------|-------|-------|------|------|-------|-------|
| Firm age | 6.0 | 2.01 | 1 | | | | | |
| Firm size | 2.6 | 1.44 | .41** | 1 | | | | |
| Education | 3.6 | 1.17 | .11 | -.11 | 1 | | | |
| Firm type | 0.2 | 0.43 | -.17 | -.01 | -.14 | 1 | | |
| EO | 5.3 | 0.86 | .09 | .15 | .14 | -.17 | 1 | |
| ETA | 4.2 | 1.47 | -.02 | .10 | .09 | -.05 | .11 | 1 |
| Performance | 5.0 | 0.92 | .12 | .42** | -.07 | -.04 | .33** | .33** |

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Table 4. Results of regression model^a

| Variables | Performance of TBNV (N = 123) | | |
|-------------------------|-------------------------------|----------|---------|
| | Model 1 | Model 2 | Model 3 |
| Controls | | | |
| Firm age | -.04 | -.00 | .05 |
| Firm size | .44*** | .35*** | .34*** |
| Education | -.02 | -.11 | -.08 |
| Firm type | -.04 | .01 | .02 |
| Independent | | | |
| EO | | .29*** | .22** |
| ETA | | .29*** | .19* |
| Interaction | | | |
| EO × ETA | | | .27** |
| R ² | .18 | .36 | .42 |
| Adjusted R ² | .15 | .32 | .37 |
| ΔR ² | .18 | .18 | .05 |
| F Change | 5.35*** | 13.73*** | 8.42** |

^aEach VIF is less than 1.4.

Notes: *, p < .05; **, p < .01; ***, p < .001.

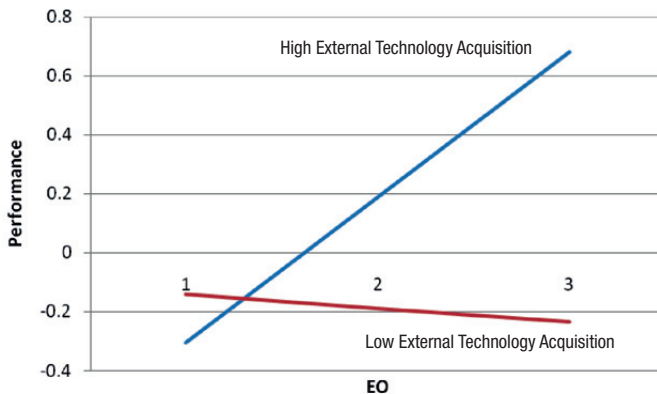


Fig. 2. Effect of interaction of EO and ETA on performance of TBNV

The research hypotheses were tested via three models: control variables, independent variables, and interactive variables as shown in Table 4. First, the effect of control variables on firm performance in Model 1 was tested, with 18.1% variance of firm performance explained by firm size. Second, in Model 2, the independent variables of EO and ETA were added over Model 1. An additional 18.4% variance of firm performance was explained in Model 2 ($p \leq .001$). EO has a significant positive relationship with firm performance ($\beta = .292, p \leq .001$), which supports Hypothesis 1. Meanwhile, ETA is also positively associated with firm performance ($\beta = .291, p \leq .001$), which supports Hypothesis 2. Finally, the interactive terms in Model 3 were tested, where the variation of TBNV's performance is explained further ($\Delta R^2 = 5.2\%, p \leq .01$). The interactive term between EO and ETA is significantly positive in relationship with TBNV's performance ($\beta = .270, p \leq .01$). This finding provides support for Hypothesis 3.

Based on the regression coefficients in Table 4, the relationship was plotted between EO, ETA and TBNV's performance. Given the different value of ETA, two plots were allotted, dealing with interaction of EO and ETA on firm performance in Fig. 2.

4. Discussions

This study examines the relationship between EO and operational performance of technology-based new ventures in China in conjunction with the firms' decision to acquire technology externally. Drawn upon the previous studies, the current empirical investigation deepens our understanding of this complex relationship in a dynamic transitional environment through a contingency modeling. The study hypotheses are all supported.

Several contributions make this research significant. First, although the findings of most western studies suggest that EO as an independent variable significantly influences firm performance when the effects of other variables are controlled (Covin, Slevin 1989; Wiklund 1999; Real 2014), the studies of this relationship under Chinese conditions

remain inconclusive (Luo *et al.* 2005; Tang *et al.* 2008; Tsai, Wang 2008). The current study findings not only validate the findings of the majority of previous studies, but also advance the argument to include TBNVs in this positive relationship. In another word, the current study finds that EO positively influences TBNV's performance. For technology-based new ventures, higher level of EO implies higher level of innovativeness, risk-taking and proactiveness that encourage TBNVs to pursue new opportunities and help achieve a higher performance level even in a dynamic environment in China's transitional economy.

Second, the current study confirms that the external technology acquisition positively moderates the relationship between EO and TBNV's performance. This contribution is especially significant in that no studies had investigated such relationship before, although relationship between EO and firm performance, and relationship between ETA and firm performance were confirmed independently by many previous studies. The current study provides an added value that a contingency approach of EO/ETA and firm performance is superior to simple EO/firm performance or ETA/firm performance model. In China's transitional economy, technology-based ventures usually hold a higher level of EO (Tan 2005). Meanwhile, these firms can at the same time implement an innovation strategy to acquire technology, patents and knowledge externally to help the firms to establish a competitive advantage more quickly. As argued in the previous studies (Covin, Slevin 1991) that entrepreneurial orientation is quite a resource-consuming strategy, external technology acquisition can certainly lessen the resource pressure on the firms as ETA facilitates and reduces the investment of R&D and management risk. Thus, an external technology acquisition strategy can support the entrepreneurial strategy significantly in a technology-based firm.

The third contribution of the research is management related. Although our study has validated the relationship between EO and the performance of technology-based new ventures in China, TBNVs and new entrepreneurs can reach a higher performance level by utilizing both EO and external technology acquisition. TBNVs/entrepreneurs should keep in touch with external technology sources in order to improve the capability of technology acquisition. This approach will not only keep the resource-stressed TBNVs up front in innovation and technology development, but also lessen the resource pressure. A configuration of EO and ETA will certainly benefit TBNV's performance in China's dynamic environment.

5. Limitations and future directions

While the current study furthers research on the relationship between EO and firm performance in a contingency approach, there are some limitations. Firstly, the current study employs a cross-sectional data to test the hypotheses. This approach brings about doubt whether "EO affects performance over an extended period of time, or if it is a 'quick fix' where firm performance is temporarily affected" (Wiklund 1999). Thus a longitudinal research should be encouraged to test the hypothesized relationship between EO and performance of TBNVs.

Further, there are also some limitations relating to conceptual constructs and measurements. The current study treats EO as a one-dimensional construct. Facing criticism from Lumpkin and Dess (1996) and Covin and Wales (2012), a relationship with multi-dimensions should be tested in future.

Finally, this study tests the relationship between EO and firm performance in a contingency model integrated with ETA in a dynamic transitional economy. Although the analysis framework is limited to the confines mentioned above, the results provide foundation for further understanding of the relationship between EO and firm performance in technology-based new firms. Furthermore, although the study findings may provide guidance to other emerging economies, the specific Chinese economic environment may limit the study's generalization. However, the current study does suggest that future research on TBNV's performance should involve the interaction between technological strategy and entrepreneurial strategy.

Conclusions

Although EO is beneficial to the improvement of a firm's performance, the relationship between EO and firm performance is often complicated by the country-specific environment, especially for technology-based firms in the transitional China (Zahra 1991; Smart, Conant, 1994; Tang *et al.* 2008; Liu *et al.* 2014). The following conclusions are drawn from the findings of the current research.

1. From the theoretical point of view, as previously identified in the literature review, EO and firm performance linkage tends to be inclusive due to the fact that this relationship is very much context specific. A conclusion is drawn here that the EO and firm performance relationship does exist in a transitional economy. Of course, this is to some extent to buttress the argument that this relationship is context specific and it is not appropriate to generalize this as a universal phenomenon. Further, this conclusion implies that this findings may be also true in other emerging economies that have similar characteristics as Chinese economy.
2. A second conclusion rests on the findings that EO facilitates TBNVs' performance specifically. Although extensive literature reviews indicate an inconclusive relationship between EO and firm performance, previous findings pretty much rest on empirical data drawn from mature industries. No study has actually dealt with technology based firms in this regard except a relevant study by Ahlstrom and Bruton (2002) which deals with the role of culture in shaping strategic actions by technology based firms. The current research is specifically targeting technology based new ventures in relationship of EO and performance. A positive relationship naturally gives rise to the contention that limited resources possessed by the new venture should not be an impediment to superior performance as long as proper strategies are pursued. This conclusion is especially significant to technology based new venture in emerging economies where resources are often not readily available.
3. A significant conclusion is the empirical support that this study generates in regard to the technology acquisition. Like most developing countries, especially emerging

economies, firms are often faced with the choice of buying or developing technology due to the resource constraints and lower level of research and development capability. Sometimes acquiring external technology may be a better choice for new ventures, especially in developing countries. The empirical findings from the current study actually lends support to the strategic choice that external technology acquisition not only improves the performance of TBNVs, but actually also strengthens the relationship between EO and new ventures' performance. This conclusion is especially important in that the current research provides a solution to the dilemma that ETA may render a firm dependent on outside sources and EO may encounter internal resource constraints. A contingency solution may ultimately be the best way to maximize a firm's performance, especially for TBNVs. Of course, in correspondence with conclusion one, this conclusion may be context specific and applies only to those new ventures in emerging economies.

Overall, the findings of current study enrich the application of entrepreneurial and innovation strategy in managerial practice and offer a new direction for further studies by scholars with an interest in organizational strategy, especially in entrepreneurial strategy orientation and innovation strategy.

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