Too Much of Two Good Things:

The Curvilinear Effects of Self-Efficacy and Market Validation in New Ventures

Abstract

Interacting with customers to validate new product offerings is a crucial step in entrepreneurship, yet it requires resources that are limited in new ventures. When entrepreneurs allocate limited resources to acquire market information poses a new question for marketing research, which mainly focuses on its impacts. This paper investigates how entrepreneurs' self-efficacy influences resource allocation to acquire market information and how resources allocated to market information acquisition influence new venture performance. Building on social cognitive theory and perceptual control theory, we propose that entrepreneurs with moderate marketing self-efficacy spend the most resources on market information acquisition. Since acquiring market information consumes resources, a moderate level of market information acquisition is optimal for new venture performance. Regression analyses of a multi-informant three-wave survey with 210 new ventures from Chile, Canada, and China supported our hypotheses. The findings hold important implications for entrepreneurial self-efficacy and market validation in lean startup.

Keywords: information acquisition, market validation, resource allocation, self-efficacy, entrepreneurial self-efficacy, feedback seeking, Lean Startup

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The Key to Startup Success? "Get Out of the Building!"

- Steve Blank interview on INC.com

1. Introduction

"Get out of the building" to validate your product with (potential) customers in the market—popularly known as market validation in the lean startup approach—has become the mantra of millions of entrepreneurs (Blank, 2013; Shepherd, Souitaris, & Gruber, 2021). Indeed, product-market fit represents one of the most foundational sources of uncertainty facing entrepreneurs (McMullen & Dimov, 2013; Packard, Clark, & Klein, 2017), and knowledge about customers' reactions to new product offerings is critical to product innovation (Chatterji & Fabrizio, 2014; Coviello & Joseph, 2012). Customers' feedback helps entrepreneurs test whether their new products or services fit the customer needs (Harrison & Dossinger, 2017; Harrison & Rouse, 2015), so that they can pivot their products to be better accepted by the market (Camuffo, Cordova, Gambardella, & Spina, 2020; Grimes, 2018). Therefore, interaction with customers to acquire market information enhances new product development, technological distinctiveness, and marketing efficiency (Hong, Song Tae, & Yoo, 2013; Yli-Renko, Autio, & Sapienza, 2001).

Despite its importance, previous research has found that new ventures and small-and-medium enterprises tend to have lower market orientation—the generation of market intelligence about current and future needs of customers and utilize it in organizational decisions—than large organizations (Kohli, Jaworski, & Kumar, 1993; Raju, Lonial, & Crum, 2011). A common explanation is that entrepreneurs "do not have the time or resources for marketing" (Stokes, 2000, p. 6). Interaction with potential customers to acquire market

information requires the investment of resources, which are limited and even scarce in new ventures (Ravasi & Turati, 2005). For instance, identifying and approaching potential customers requires resources such as time and people (Guo, 2009). Therefore, it is crucial to understand how new ventures allocate their limited resources to acquire market information. However, previous research has primarily focused on the impact of market orientation (Savabieh, Nayebzadeh, Abghari, & Hatami-Nasab, 2020), whereas there is a dearth of research about its antecedents (Brower & Nath, 2018). Since the generation and dissemination of market intelligence is especially important for new ventures at the earlier stage of life cycle (Engelen, Brettel, & Heinemann, 2010), this study will focus on the antecedent of market information acquisition, which is one of the most resource-consuming market-orientated activities.

In addition, we investigate how many resources allocated to market information acquisition are optimal for new venture performance. Market orientation literature has not generated consistent conclusions about its effect on new ventures (Savabieh et al., 2020). While many studies found market knowledge acquisition to be positively associated with new product development and new venture performance (Baker & Sinkula, 2009; Hong, Song Tae, & Yoo, 2013; Parry & Song, 2010), some studies found non-significant or marginal effects (Keh, Nguyen, & Ng, 2007; Renko, Carsrud, & Brännback, 2009; Sullivan & Marvel, 2011). Furthermore, some studies found that too much focus on the market and customers can undermine knowledge acquisition and new product development (Li, Wei, & Liu, 2010; Morgan, Anokhin, Kretinin, & Frishammar, 2015; Yli-Renko & Janakiraman, 2008). In this study, we take a resource-allocation perspective to investigate how much resource allocated to market information acquisition is optimal for new venture performance.

Overall, we answer two research questions: 1) When will entrepreneurs allocate precious new venture resources to acquire market information? 2) How does resource

allocation to acquire market information influence new venture performance? Previous research has found that the role of top managers in market information collection is especially important for the innovativeness and business performance of smaller and high-tech firms (Harmancioglu, Grinstein, & Goldman, 2010; Mostafiz, Sambasivan, & Goh, 2021). To answer the first question, we will investigate whether the cognition of entrepreneurs—the key decision-makers in new ventures—influences their resource allocation to acquire market information. We answer these questions with a multi-informant three-wave survey of entrepreneurs and their co-founders from incubators in three countries.

Our research makes important contributions to market orientation research and entrepreneurial marketing practices. First, this study contributes to understanding the antecedents of market validation as a key market-oriented behavior proposed by the lean startup movement. Previous research has mainly focused on the organizational factors that facilitate market orientation in large organizations but paid little attention to new ventures that are constrained by resources for market-oriented activities (Amjad, Abdul Rani, & Sa'atar, 2020; Raju, Lonial, & Crum, 2011). This study investigates which entrepreneurs allocate resources to a market-oriented activity—intelligence generation. Secondly, this study explores the effect of market information acquisition on new venture performance. We address previous inconsistencies about the effect of market knowledge acquisition on firm performance by taking a resource-allocation perspective and exploring how much resource allocated to market knowledge acquisition is beneficial to new venture performance.

In addition, this study generates new insights into entrepreneurial marketing practices. Although market validation plays a central role in the lean startup approach (Cohen, Bingham, & Hallen, 2018; Shepherd & Gruber, 2021), there is considerable heterogeneity in whether new ventures adopt the advice and put it into practice (Albort-Morant & Oghazi, 2016; van Weele, van Rijnsoever, Groen, & Moors, 2020). This paper addresses this

challenge by exploring what kind of entrepreneurs are less likely to acquire market information so that targeted support and services can be provided to enhance the market orientation of new ventures. Furthermore, by investigating how many resources allocated to acquire market information are optimal for new venture performance, this study sheds light on entrepreneurial marketing using the lean startup approach.

2. Theory and hypotheses

Acquiring market information requires the investment of resources. Since new ventures are still developing business models, they need to identify potential customers and access them to acquire market information (Hopp, 2012). The need to identify and access potential customers requires resources such as time and effort. Interacting with customers also consumes cognitive resources to answer questions such as who may be potential users, what questions to ask, and how to solicit their cooperation (Andries, Clarysse, & Costa, 2021). In addition, since new products and services are still under development, new ventures often need to build a prototype for the sake of engaging with customers (Shepherd & Gruber, 2021), which also consumes extra resources. Integrating customer knowledge into innovation is a nonconventional new product development process (Coviello & Joseph, 2012), which requires establishing new organizational practices, such as interdepartmental communication, reward system, and personnel delegation (Foss, Laursen, & Pedersen, 2011), creating further strain on the limited resources of new ventures.

Since market information acquisition requires resource investment, it generates an essential challenge for new ventures about how to allocate resources between market information acquisition and other entrepreneurial tasks, such as new product development. For new ventures, a central task is to build technological capacity and develop new products (Renko, Carsrud, & Brännback, 2009). New ventures need to pursue multiple activities with scarce resources (e.g., financial resources, time, and human resources)(Ravasi & Turati,

2005)[1]. Previous research about resource allocation suggests that individuals' self-efficacy plays a central role in their decisions about how to allocate resources to achieve their goals (Kanfer & Ackerman, 1989; Yeo & Neal, 2006). Given that entrepreneurs play a central role in the decision-making and resource allocation of new ventures (Dunne, Aaron, McDowell, Urban, & Geho, 2016), we investigate how entrepreneurs' self-efficacy influences the allocation of resources to acquire market information.

2.1 Social Cognitive Theory

Self-efficacy is an important social cognition for entrepreneurial behaviors (Frese & Gielnik, 2014). Self-efficacy denotes individuals' belief in their capabilities to achieve specific levels of attainment (Bandura, 1982). To best predict behaviors, Bandura (2006) emphasizes using self-efficacy specific to each domain of activity instead of general self-efficacy, which is individuals' perception of their ability to perform across various situations (Gilad Chen, Gully, & Eden, 2004). Accordingly, entrepreneurship scholars have developed entrepreneurial self-efficacy specific to entrepreneurial activities, such as marketing, innovation, and financing (C. C. Chen, Greene, & Crick, 1998). Since this paper focuses on market information acquisition, we will use marketing self-efficacy—entrepreneurs' confidence about successfully conducting marketing activities and meeting marketing goals—as the focal predictor[2] (See Appendix A for a summary of self-efficacy effects).

Social cognitive theory suggests high self-efficacy is essential for generating motivation to pursue an activity (Bandura, 1991). Individuals allocate resources to an activity only when they believe that they can successfully perform that activity. For instance, entrepreneurs with high entrepreneurial self-efficacy are more likely to allocate resources to develop formal business plans (Brinckmann & Kim, 2015). Self-efficacy is especially important for overcoming challenges and difficulties prevalent in entrepreneurship (C. C. Chen, Greene, & Crick, 1998). Therefore, people who believe in their competence to carry

out entrepreneurial activities are more likely to become entrepreneurs (C. C. Chen, Greene, & Crick, 1998; Zhao, Seibert, & Hills, 2005) and set difficult goals (Baron, Mueller, & Wolfe, 2016). Self-efficacy can also help entrepreneurs cope with the stress involved in business creation (Baron, Franklin, & Hmieleski, 2016) and persevere in the new venture creation process (Hechavarria, Renko, & Matthews, 2012). Thus, self-efficacy has a positive effect on the effort and resources invested in venture creation (Cassar & Friedman, 2009), new venture growth (Baum & Locke, 2004), and innovation (Schenkel, McDowell, & Brazeal, 2024).

2.2 Perceptual Control Theory

Perceptual control theory explains how individuals regulate their efforts to achieve goals and suggests a more complicated role of self-efficacy in directing resource allocation (Vancouver & Putka, 2000). Perceptual control theory posits that individuals allocate resources based on the gap between perceived performance and their goals (Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001). When performance is ambiguous, individuals resort to their self-efficacy as a signal of how well they are progressing toward their goals, with higher self-efficacy signaling satisfactory progress (Bledow, 2013). As a result, higher self-efficacy leads individuals to reduce resource allocation to the task, further undermining their task performance (Schmidt & DeShon, 2010). The negative effect of self-efficacy on resource allocation is more likely to emerge when the resource is scarce, i.e., resource allocation to one task means fewer resources available for other tasks (Beck & Schmidt, 2018). In such situations, individuals reduce resources allocated to the task they feel confident about to conserve resources for other tasks (Vancouver, More, & Yoder, 2008).

Later research integrates social cognitive theory and perceptual control theory and suggests that self-efficacy has a non-linear effect on resource allocation. Specifically, social cognitive theory is more applicable at low to moderate levels of self-efficacy, where

individuals perceive high obstacles to take action. In this range of self-efficacy, its role in generating motivation to initiate actions and overcome obstacles is especially important. At moderate to high levels of self-efficacy, increasing self-efficacy leads individuals to perceive their goals as readily achievable and reduce resource allocation to the task (Beck & Schmidt, 2018). In support of this reasoning, previous research has found that within-individual change in self-efficacy positively increases the effort of individuals with low self-efficacy but reduces the effort of those with high self-efficacy (Beck & Schmidt, 2012). Entrepreneurship research found an inverted-U-shaped effect of entrepreneurial self-efficacy on the likelihood of business ownership (Gielnik, Bledow, & Stark, 2020) and seeking feedback from mentors at the within-person level (Uy et al., 2024).

2.3 The Effect of Self-Efficacy on Market Information Acquisition

In this paper, we argue that marketing self-efficacy will similarly have a curvilinear effect on entrepreneurs' resource allocation to generate market intelligence. Since entrepreneurs need to allocate limited resources to multiple tasks, they will only allocate resources to a task when this task has gained enough confidence but still presents a necessity for further resource investment. Specifically, entrepreneurs with low marketing self-efficacy may find it difficult to identify potential customers and confront a high obstacle to initiating actions (Morrison & Vancouver, 2000). Even if they can identify potential customers, their low self-efficacy may make them doubt their ability to utilize the information to achieve market goals. In addition, entrepreneurs with low self-efficacy may expect negative feedback from customers, which further refrains them from taking action (Anseel, Beatty, Shen, Lievens, & Sackett, 2015; Ashford, Blatt, & Walle, 2003). Since seeking market information requires resources, entrepreneurs need to perceive the value of customer feedback to invest resources to obtain it. In this situation, higher self-efficacy will help entrepreneurs overcome these obstacles and invest resources to acquire information. When self-efficacy is at moderate

to high levels, entrepreneurs with higher self-efficacy may feel confident about obtaining marketing goals and perceive less need to seek information and knowledge from customers. Instead, they may allocate the limited resources to other tasks which require more resources.

In order to test the effect of self-efficacy on resource allocation, we will investigate not only the frequency of information acquisition, as studied mostly in previous literature (Kohli, Jaworski, & Kumar, 1993; Uy et al., 2024) but also the magnitude of resources allocated to market information acquisition. Specifically, we investigate the time new ventures allocate to market information acquisition—following the example of previous studies on resource allocation (Beck & Schmidt, 2018; Vancouver, More, & Yoder, 2008). In addition, we measure the effort spent on market information acquisition via the number of contacts they make to generate market intelligence. Previous research has used the number of pieces of information collected as a measure of resource allocation (Beck & Schmidt, 2012). As such, we hypothesize that:

Hypothesis 1a. Entrepreneurs' marketing self-efficacy has an inverted-U-shape relationship with the frequency of market information acquisition.

Hypothesis 1b. Entrepreneurs' marketing self-efficacy has an inverted-U-shape relationship with the time allocated to market information acquisition.

Hypothesis 1c. Entrepreneurs' marketing self-efficacy has an inverted-U-shape relationship with the number of contacts for market information acquisition.

2.4 The Effect of Market Information Acquisition on New Venture Performance

Besides how entrepreneurs allocate resources to acquire information, we also explore how many resources allocated to market information acquisition will achieve optimal new venture performance. Based on previous research (Boso, Story, & Cadogan, 2013), we argue that a certain level of market information acquisition can facilitate new venture performance. Active search for knowledge and information helps entrepreneurs identify opportunities

(Gielnik, Krämer, Kappel, & Frese, 2014) and design new products in synergy with customer needs (Atuahene-Gima & Ko, 2001; Bodlaj & Čater, 2022; Hong, Song Tae, & Yoo, 2013). Even for radically new products, market information acquisition helps entrepreneurs resolve a key source of uncertainty—whether their new products or services will be well received in the market (Packard, Clark, & Klein, 2017)—and avoids pursuing ideas that eventually fail in the market (Camuffo et al., 2020). Previous research has found that market information acquisition is equally important for technology-driven and market-driven new ventures (Parry & Song, 2010), for both incremental and radical innovations (Baker & Sinkula, 2007), and especially important for new ventures serving emerging markets (Song, Di Benedetto, & Parry, 2009; Song, Wang, & Parry, 2010). Therefore, we suggest that a certain level of market information acquisition is necessary to enhance new venture performance.

However, since acquiring market information consumes resources, we argue that its effect will be positive up to a limit, beyond which its effect will turn negative. According to resource allocation theory (Kanfer & Ackerman, 1989), individuals' cognitive resources are limited and have to be allocated between tasks, self-regulation, and off-task activities. Engaging with customers and collecting market information is a kind of self-regulation activity that generates feedback about new ventures' products and services. This kind of activity costs the cognitive resource that is available for task activities, such as new product development in new ventures. Besides market information acquisition, new ventures also need to be proactive and take risks to develop new products (Lumpkin & Gregory, 1996). As the difficulty and novelty of new product development increases, the requirement for cognitive resources also increases (Kanfer & Ackerman, 1989), intensifying the resource competition with market information acquisition.

As acquiring market information reduces cognitive resources available for other activities, overall venture performance may suffer. Previous research has found that receiving

too frequent feedback reduces the effort devoted to the task and hurts learning and task performance (Lam, DeRue, Karam, & Hollenbeck, 2011). Since resources allocated to a task have a diminishing marginal return on performance, under resource scarcity, a moderate level of resource allocation to one task leads to the best overall performance of multiple tasks (Beck & Schmidt, 2018). Thus, too frequent market information acquisition may burden the limited resources of entrepreneurs and their partners and undermine new venture performance. Similarly, too much time spent on information acquisition may compete for the limited time available for other tasks, such as new product development, and further undermine new venture performance. Therefore, we argue that the resources allocated to market information acquisition will have a curvilinear effect on new venture performance.

In addition, information overload drains the pool of cognitive resources and undermines the quality of decisions made (Norman & Gary, 1974; O'Reilly III, 1980). The tasks of new product development and new venture creation are both difficult and novel, requiring the investment of effort and cognitive resources (Vuong, 2023). Because information about the potential needs of customers may be ambiguous or conflicting, acquiring market information distracts new ventures from developing radically new products (Morgan et al., 2015). As the innovativeness of a product increases, the effect of market orientation on product innovation turns from positive to negative (Verhees & Meulenberg, 2004). Because acquiring information from a large number of customers consumes managerial attention, customer portfolio size has an inverse U-shaped relationship to the number of new products developed (Yli-Renko & Janakiraman, 2008). In addition, since market orientation focuses managerial attention on satisfying current and existing customer needs, it has an inverted U-shape effect on knowledge acquisition about potential customer needs and firm performance (Jaeger, Zacharias, & Brettel, 2016; Li, Wei, & Liu, 2010). In this paper, we argue that too frequent information acquisition and a broad search for feedback

may generate information overload, which occupies the cognitive resource of entrepreneurs and their team members and undermines new venture performance. Taken together, we hypothesize that:

Hypothesis 2a. The frequency of market information acquisition has an inverted-U-shape relationship with new venture performance.

Hypothesis 2b. The time allocated to market information acquisition has an inverted-U-shape relationship with new venture performance.

Hypothesis 2c. The number of contacts for market information acquisition has an inverted-U-shape relationship with new venture performance.

3. Method

3.1 Sample and Procedure

To test the hypotheses, we targeted new ventures in incubators because these ventures are usually at an early stage and need intelligence from potential customers. These early-stage ventures are also constrained in their resources, qualifying them for the paper's theorized situation[3]. We included five incubators in three countries, including three at Waterloo (Canada), one in Beijing (China), and one in Santiago (Chile). The selection of Chile, Canada, and China as the focal countries for our study is founded upon their recognized status as entrepreneurial hotspots within their respective regions. Specifically, we focus on Santiago, Waterloo, and Beijing, which are also among the leading hubs of innovation on their continents. Santiago, known as 'Chilecon Valley,' has emerged as a dynamic platform for startup growth in Latin America, propelled by progressive policies like Start-Up Chile. Waterloo, often referred to as 'Canada's Silicon Valley,' boasts a dense concentration of tech firms and a robust support network for entrepreneurs, including accelerators and university-led incubators. Beijing, as the capital city of the world's second-largest economy, hosts a vibrant startup scene with a plethora of venture capital activity and unicorns, making it a

linchpin of entrepreneurship in Asia. This sample also increases the generalizability of our findings[4]. All five incubators were affiliated with top universities in their respective countries, which ensured that we were sampling from a similar population. Interviews with the incubator managers in the sample confirmed that the entrepreneurs there were made aware of the importance of acquiring market information for market validation. Thus, the variance of market information acquisition, if any, would not be because of entrepreneurs' lack of awareness or institutional requirements but as a result of their decisions[5].

The incubator managers contacted the founder-CEOs of new ventures about the study. We explained to all the participants that the survey was for academic research only and their responses would not be disclosed to the incubator. We administered the survey in a multi-wave and multi-informant format, collecting data from two respondents per venture: the founder-CEO and a co-founder or top manager. For each venture, in the first wave, we collected data from the founder-CEOs about their entrepreneurial self-efficacy and control variables and asked them to provide the contact information of a co-founder or a top manager who was fully aware of their venture activities. One month later, we sent the survey to these key informants, who reported the market information acquisition of their ventures[6]. Three months later, the founder-CEO filled out a survey on new venture performance. The temporal separation and multiple informants helped alleviate the common method bias and strengthened causal inference about the relationships between variables (Podsakoff, MacKenzie, Jeong-Yeon, & Podsakoff, 2003).

The five incubators hosted 276 new ventures in total at the time of the study. In the first wave, 210 founder-CEOs responded to the survey, and 206 co-founders participated in the second wave (response rate: 74.6%). In the third wave, one incubator with 26 new ventures could not participate for logistical reasons, and 110 out of the 180 eligible founder-CEOs in the remaining four incubators responded to the final survey (response rate: 61.1%).

This was higher than the overall response rate in business and management research (44.7%, median = 40%, mode = 50%) (Mellahi & Harris, 2016). The average age of the new ventures was 2.60 years, and the average age of the founders was 28.93 years. The sample consisted of 19% female founder-CEOs. Regarding educational level, 38.0% of the entrepreneurs attended universities, 27.5% of the sample held bachelor's degrees, and the remaining 34.5% held postgraduate degrees. The new ventures covered a wide range of industries, and the most prevalent industries were manufacturing (24%), real estate (16.2%), agriculture (10.9%), services (10.5%), and IT and others (28.4%). We used T-test to compare our final sample with those who dropped out in the last survey and found no significant differences in firm age (t (129) = 1.41; p = .16, ΔSE = .34), firm size (t (182) = .32; p = .75, ΔSE = .16), founders' age (t (87) = -.57; p = .57, ΔSE = 1.94), or gender ($\chi^2(1) = 1.12$; p = .29), suggesting that the attrition did not bias the sample in a significant way.

3.2 Measures

We designed the questionnaire in English and translated it to Spanish and Chinese for the entrepreneurs in Chile and China using the back-translation procedure (Brislin, 1980). Specifically, two research assistants fluent in both English and Spanish/Chinese independently translated the original English survey into Spanish/Chinese, and another two research assistants fluent in both languages independently back-translated the surveys to English, which were compared to the original scales to ensure the accuracy of the translation.

Self-efficacy (reported by the founder-CEO in wave 1). We followed the suggestion of Bandura (2006) to assess self-efficacy in accordance with the specific behavior of interest. Since we are interested in market information acquisition, we focused on the marketing dimension of the entrepreneurial self-efficacy scale (C. C. Chen et al., 1998). Participants were asked to indicate the degree of certainty they felt in performing six marketing tasks, as indicated in Appendix B (1 = *completely unsure*, 5 = *completely sure*, α = .89). We also used

the full entrepreneurial self-efficacy (22 items, α = .92) as robustness check and obtained similar results.

Market information acquisition (reported by a co-founder in wave 2). To measure market information acquisition, we adopted the measure of intelligence generation in the market orientation scale, which focused on collecting information from customers (Kohli, Jaworski, & Kumar, 1993). Since the market orientation scale was developed for the context of large companies (Raju et al., 2011), we followed the example of previous research and adapted four items that fit the setting of new ventures (Boso, Story, & Cadogan, 2013). The four items were: how often does your startup "meet with customers to find out what products or services they will need," "interact directly with customers to learn how to serve them better," "assess the quality of your products, services, and ideas to the users," and "talk with those who can influence your end users' purchases (e.g., retailers, distributors)" (1 = *less than once a year*, 2 = *a few times a year*, 3 = *monthly*, 4 = *weekly*, 5 = *daily*, α = .86).

To measure the magnitude of resources allocated to market information acquisition, we followed the example of previous research on resource allocation (Beck & Schmidt, 2018; Vancouver et al., 2008) and asked the total hours their ventures had allocated to each of the behaviors mentioned above. We also measured the number of contacts they had made for each behavior, following the example of previous research (Sawyerr et al., 2003; Yli-Renko & Janakiraman, 2008). As the number of hours and contacts were measured as count variables, we log-transformed them to obtain normal distributions. The log-transformed items for hours and contacts both achieved high reliability (α = .97 for hours, α = .92 for contacts). We calculated the average logged hours and average logged contacts to represent the time and effort allocated to market information acquisition.

Scale validation pilot study. To validate the scale of market information acquisition of new ventures, we conducted a pilot study with a sample of 110 new ventures in China

(distinct from our main sample). The new ventures were from various industries, including service (26.4%), retail (12.7%), and finance and insurance (6.4%), with an average firm age of 2.4 years. Exploratory factor analysis found that three factors (frequency, hours, contacts) with Eigen values higher than 1.0 emerged and explained 69.3% of the total variance. Furthermore, all 12 indicators (four on frequency, four on hours, and four on contacts) had the highest loadings (all > .50) on the factors they were theorized to measure, showing that the three factors of market information acquisition had good construct validity. The Cronbach's alphas of frequency, hours, and contacts were 0.78, 0.97, and 0.92, respectively, indicating good reliability of the measures.

To test the convergent and discriminant validity of our measure of market information acquisition, we asked entrepreneurs to fill in an established scale that measured information search frequency from various sources (McGee & Sawyerr, 2003). The correlation between our measure of frequency and information search from customers ($r = .41$) is significantly higher than its correlation with information search from families and friends ($r = .18$, $p = .002$), from owners of other businesses ($r = .30$, $p = .09$), as well as from company reports and database ($r = .26$, $p = .02$), showing that our measure has good discriminant validity. In addition, the correlation coefficient between market information acquisition and information search from customers was not significantly different from its correlation coefficients with information search from periodicals, newspapers, websites, and reports ($r = .35$, $p = .21$), consultants or mentors ($r = .34$, $p = .18$), or employees and partners ($r = .39$, $p = .42$), demonstrating that the measure of market information acquisition is convergent with the information sources frequently used by entrepreneurs in previous research (Cohen, Bingham, & Hallen, 2018; McGee & Sawyerr, 2003; Sawyerr, McGee, & Peterson, 2003).

New venture performance (reported by the founder-CEO in wave 3). An important indicator of new venture performance is how well they are progressing in comparison to other

similar new ventures (Uy, Foo, & Ilies, 2015). Therefore, we adopted the established scale to measure new venture performance (Keith, Unger, Rauch, & Frese, 2016; van Dyck, Frese, Baer, & Sonnentag, 2005), which has been found to be strongly predictive of subsequent firm performance in terms of return on assets (Baer & Frese, 2003). The measure contains three questions: "How successful is your startup in comparison to other startups in the same industry and of about the same size?" (1 = *not at all successful*, 7 = *very successful*); "To what degree has your startup achieved its most important goals?" (1 = *not at all*, 7 = *completely*); and "Which of the following statement best describes how successful you are in comparison to your competitors?" (1= *I belong to the less successful half of competitors*, 7= *I am the most successful competitor*) (α = .66). The respondents' responses to the indicators were averaged to form a single index, with a higher index representing better performance of a new venture. Such a performance measure was especially suitable for our sample of new ventures from different industries and countries with diverse goals. By comparing the performance of a focal venture to that of the most relevant referent, this measure provided a common standard to evaluate all the ventures in the sample across industries and countries (Singh, Darwish, & Potočnik, 2016).

Control variables. We controlled for the age and size (number of employees) of the new ventures because the age and size of the firm may influence the importance of market information acquisition and the resources available for it. We also controlled for the gender and education of the founders, which have been found to be related to their firms' market orientation (Davis, Babakus, Englis, & Pett, 2010). In addition, we included dummy variables to control for incubator effects, as the incubators might differ in how they coached the entrepreneurs.

4. Results

4.1 Confirmatory factor analysis

First, we conducted confirmatory factor analyses of the measurement model. The five-factor model composed of marketing self-efficacy, market information acquisition frequency, logged items of hours, logged items of contacts, and new venture performance achieved a good fit with the data ($\chi^2(195) = 386.12$, $p < 0.001$, *CFI* = .92, *TLI* = .90, *RMSEA* = .055). All the factor loadings were higher than .50. This model fit significantly better than the models that combine hours and contacts, frequency and contacts, frequency and hours, or self-efficacy and new venture performance (all $\Delta \chi^2$ (4)'s > 72.18, all p's <.001), suggesting these factors are different from each other. The means, standard deviations, and correlations among variables are presented in Table 1**.** The correlation between hours and contacts (*r* = .66) was lower than the .70 correlation coefficient cut-off, suggesting that they are distinguishable and capture different aspects of market information acquisition (Nunally & Bernstein, 1978).

INSERT Table 1 HERE

4.2 Hypotheses testing

In order to test the curvilinear effect of self-efficacy on market information acquisition (Hypotheses 1a, 1b, and 1c), we standardized self-efficacy for testing its second-order effect in the regression (Aiken & West, 1991). The results of market information acquisition are presented in Table 2. We entered control variables in Model 1, and firm size positively predicted market information acquisition frequency. We added self-efficacy and its square term in Model 2 and Model 3, respectively. Model 3 shows that the squared self-efficacy had a significant negative relationship with market information acquisition. We plotted the curvilinear effect of self-efficacy in Figure 1, which shows that self-efficacy had an inverted-U-shape relationship with the frequency of market information acquisition. Following the recommended procedure (Pierce & Aguinis, 2013), we calculated the inflection point, where the inverted U shape bends. The inflection point of self-efficacy (4.30)

was at .84 SD, which falls within the range of self-efficacy (-2.24—1.85SD). These results supported Hypothesis 1a.

In order to test the effect of self-efficacy on the resources allocated to market information acquisition, we conducted the same analysis with hours spent on market information acquisition (Hypothesis 1b) and the contacts made for market information acquisition (Hypothesis 1c). In Model 6 of Table 2, the curvilinear effect of self-efficacy was marginally significant (p = .086) on hours, partly supporting Hypothesis 1b. The results were plotted in Figure 2, which shows that self-efficacy had an inverted-U-shape effect on hours spent on market information acquisition, with an inflection point at 3.97 (.37 SD), which also falls within the range of self-efficacy (-2.24—1.85 SD). We conducted a similar analysis on the number of contacts for feedback seeking. Marketing self-efficacy had a significant and positive effect on contacts in Model 8, but its curvilinear effect was non-significant in Model 9. Therefore, Hypothesis 1c was not supported.

INSERT Table 2 and Figure 2 HERE

Next, we tested the curvilinear effects of market information acquisition frequency, hours, and contacts on new venture performance (Hypotheses 2a, 2b, and 2c), and the results are presented in Table 3. In Model 1, we regressed new venture performance on the control variables and marketing self-efficacy, which had a positive effect on new venture performance[7]. We added market information acquisition frequency in Model 2 and its square term in Model 3. Model 3 shows that the squared market information acquisition frequency had a significant negative relationship with new venture performance with its infection point at 3.05 (-.21 SD), which falls within the range of standardized market information acquisition frequency (-2.64—2.10 SD) (See Figure 3). These results supported Hypothesis 2a. We further tested Hypothesis 2b regarding the curvilinear effect of hours spent on market information acquisition on new venture performance. Neither the main effect (in Model 4)

nor the curvilinear effect on new venture performance was significant (in Model 5), so Hypothesis 2b was not supported. To test Hypothesis 2c, we conducted the same analysis with the contacts for market information acquisition, which showed a significant curvilinear effect on new venture performance in Model 7. Its infection point was at 4.33 (-.13 SD), which falls within the range of logged contacts (-1.51—2.34 SD) (see Figure 4), supporting Hypothesis 2c. The curvilinear effects of market information acquisition frequency (p =.085) and contacts (p =.018) remained robust when entered into the model together (Model 8).

INSERT Table 3, Figure 3, and Figure 4 HERE

4.3 Robustness Checks

We conducted additional analyses to check the robustness of the findings. First, we ran the models with three alternative sets of control variables, such as using countries (replacing incubator dummies which were highly correlated with countries), adding industrial dummies, or without any controls, and the results remained robust[8]. Second, we replicated the tests with entrepreneurial self-efficacy to explore whether their confidence in their new venture may influence their market information acquisition. Entrepreneurial self-efficacy correlated highly (r = .82) with marketing self-efficacy. When using entrepreneurial self-efficacy as the predictor, the main findings were corroborated. Third, we aggregated market information acquisition frequency, hours, and contacts (all standardized, $\alpha = .91$) into a single index, and both the curvilinear effects of self-efficacy on this index and its curvilinear effect on new venture performance remained significant.

5. Discussion

In this study, we integrate social cognitive theory and perceptual control theory to theorize that entrepreneurs' self-efficacy has a curvilinear relationship with market information acquisition. Furthermore, because market information acquisition consumes cognitive and time resources, it has a curvilinear effect on new venture performance. We

tested these hypotheses with entrepreneurs from multiple incubators in three countries on different continents. The results supported our hypotheses. Specifically, self-efficacy has an inverted-U-shaped effect on the frequency of market information acquisition and time spent on it. The frequency and contacts of market information acquisition had an inverted-U-shape effect on new venture performance.

It is noteworthy that the effect of self-efficacy on hours of market information acquisition is marginally significant, whereas the effect of hours on new venture performance is not. In contrast, the contacts of market information acquisition show the opposite patterns, i.e., it is not influenced by self-efficacy but has a significant curvilinear effect on new venture performance. These results suggest that the hours spent on market information acquisition differs from the contacts made for it and capture different types of resources consumed, which can explain their various roles in the prediction and outcomes of market information acquisition. When deciding how many resources to allocate to market information acquisition, entrepreneurs mainly consider their time rather than how many people to contact. However, the time devoted to market information acquisition does not create a bottleneck for new venture performance, as indicated by its null effects on new venture performance. Given that the number of contacts mainly consumes cognitive resources and is not a tangible resource to be allocated, it is not considered in allocating resources but plays a role in the effect of market information acquisition. Both the frequency of market information acquisition and its number of contacts can influence the amount of information collected and consume cognitive resources to process. Hence, too frequent or too many contacts for market information acquisition can undermine new venture performance.

5.1 Theoretical Contributions

These findings make important contributions to research on market orientation and knowledge acquisition, self-efficacy theories, and entrepreneurship literature and hold

significant implications for marketing practices and entrepreneurship education. First, we investigate when new ventures allocate limited resources to generate market intelligence. This is an important question in organizations with constrained resources such as new ventures. Our findings suggest that when resources are limited, as exemplified in entrepreneurship, leaders' self-efficacy plays a crucial role in directing resource allocation to marketing activities. In particular, entrepreneurs with a moderate level of self-efficacy are most likely to acquire market information and devote most time to it. This paper discovers a new antecedent of market-oriented behaviors, which have primarily been predicted by organizational factors (Savabieh et al., 2020). Research based on large organizations, which are relatively unconstrained in resources, finds that the marketing background of top management teams enhances the market orientation of the company (Brower & Nath, 2018). In new ventures, we show that leaders' self-efficacy directs allocating organizational resources to acquire market information. When leaders' self-efficacy is too low, they may be concerned with the possibility of receiving negative feedback and not perceive the value of interacting with customers. When leaders' self-efficacy is too high, they believe in their capability to obtain marketing goals and do not regard it worthwhile to allocate limited resources to acquire market information. This finding highlights the motive driving market information acquisition, beyond the role of capability and training.

Moreover, the need for resource allocation also sheds new insights into the effect of market knowledge acquisition. Previous research has recognized the importance of market knowledge for both new product development and new venture performance (Parry & Song, 2010; Song, Wang, & Parry, 2010). However, a few studies suggest that too much focus on the market and too many existing customers may constrain knowledge acquisition and new product development (Li, Wei, & Liu, 2010; Yli-Renko & Janakiraman, 2008). This study addresses this issue from the perspective of resource allocation and finds the effect of market

information acquisition on new venture performance curvilinear rather than linear. Furthermore, curvilinear effects occur among both the frequency and contacts of market information acquisition, but not with the time allocated to it. The results suggest that the primary mechanism is the cognitive resource required for processing information. Frequent and broad search increases the amount of information received, which demands cognitive resources to process. This demand for cognitive resources is especially challenging for new ventures because their creative tasks require significant cognitive resources. Thus, too much market information increases rather than decreases the cognitive load for entrepreneurs, rendering it "too much of a good thing" (Grant & Schwartz, 2011).

In addition, we reconcile the heated debate on whether self-efficacy has positive or negative effects on individual effort and resource allocation (Bandura, 2015; Vancouver & Purl, 2017). Social cognitive theory and control theory have debated self-efficacy's positive vs. negative effects on resource allocation (Bandura, 2012; Vancouver, 2012). This debate has been explained via the level of analysis (positive at the between-person level and negative at the within-person level, see Yeo & Neal, 2006), the outcome of interest (positive on the direction of resource allocation and negative on the magnitude of resource allocation, see Vancouver et al., 2008; Vancouver & Purl, 2017), availability of feedback (positive if feedback is available but negative if not, see Schmidt & DeShon, 2010), and resource scarcity (positive when resource is abundant and negative when resource is scarce, see Beck & Schmidt, 2018). Our findings show that both the positive and negative effects can emerge at the between-person level, on both the direction (frequency) and magnitude (hours) of resource allocation, when feedback is unavailable (hence the need to seek), and when resource is assumably scarce (for new ventures). Complementing previous research at the within-person level (Beck & Schmidt, 2012; Gielnik et al., 2020; Uy, et al., 2024), we show that self-efficacy has a consistent curvilinear effect on resource allocation at the between-

person level. These findings suggest that social cognitive theory and perceptual control theory apply to different ranges of self-efficacy.

This study also contributes to a more balanced view of self-efficacy in entrepreneurship research, which has mostly theorized and found its positive effects (see Hechavarria, Renko, & Matthews, 2012; Newman, Obschonka, Schwarz, Cohen, & Nielsen, 2019; Rauch & Frese, 2007 for reviews). However, self-efficacy has a negative effect on firm performance when entrepreneurs are highly optimistic because it leads them to set unattainable goals (Baron, Mueller, & Wolfe, 2016; Hmieleski & Baron, 2008). Recent research at the within-person level finds that self-efficacy has a curvilinear effect on business ownership and seeking feedback from mentors (Gielnik, Bledow, & Stark, 2020; Uy et al., 2024). In this paper, we suggest a curvilinear effect of self-efficacy on seeking feedback from customers—a key stakeholder determining venture success. Future research can explore whether the curvilinear effect of self-efficacy applies to other entrepreneurial behaviors.

Last but not least, in light of a reviewer's suggestion, we invoke the Mindsponge Theory as a theoretical lens to further expound our findings. This theory, postulating the mind as a dynamic information collection-cum-processor, reinforces our model concerning the information acquisition behaviors of entrepreneurs. As proposed by Vuong (2023), the entrepreneurial mind, akin to a sponge, selectively absorbs and processes information based on environmental conditions and psychological states, which includes the degree of self-efficacy. This selective absorption and processing underscore the inverted-U-shaped relationship we observe in market information acquisition and its impact on new venture performance. The Mindsponge Theory similarly suggests that an entrepreneurial mind operates optimally within a certain threshold of information load, beyond which cognitive resources become overtaxed, leading to diminishing returns on performance. Our empirical findings also resonate with this view, revealing that moderate self-efficacy leads to the most

effective information-processing behaviors. Entrepreneurs with either deficient or excessive self-efficacy may not optimize their cognitive 'sponge' by underutilizing their information processing capabilities.

5.2 Practical Implications

Besides the theoretical contributions, our research also generates important implications for entrepreneurship and marketing practices. Seeking feedback from potential customers echoes the key suggestion for entrepreneurs to "go out of the building" to validate their assumptions about customer needs from the lean startup methodology (Ries, 2011)—a highly influential approach in the practice of entrepreneurs and incubators (Shepherd & Gruber, 2021). This study uncovers what kind of entrepreneurs are not active in product-market validation. We suggest that incubators can assess entrepreneurs' self-efficacy and adopt individualized interventions based on that assessment. Entrepreneurs with low self-efficacy (lower than 4 on a 5-point scale) may deem market information acquisition as too threatening and costly. For these entrepreneurs, incubators could adopt interventions to boost their self-efficacy, such as vicarious learning to reduce the threat of seeking feedback. In contrast, entrepreneurs whose self-efficacy is too high (those choosing "very confident" or "completely sure") may not view market information acquisition as necessary. In this situation, mentors and marketing professionals should probe the evidence of these entrepreneurs' confidence and emphasize the value of customer feedback in challenging even deeply held convictions. Given that engaging with customers and generating intelligence about the market is an essential process of new venture creation, this study lays a new foundation for entrepreneurship education and marketing practices.

This study also bears important implications for the optimal level of market information search for new ventures. Previous literature has found that different forms of market orientation have different curvilinear effects for large companies (Jaeger, Zacharias,

& Brettel, 2016). This study found that market information acquisition has an inverted-U shape effect on new venture performance. Too much market information may divert cognitive resources from new product development and undermine overall performance because the tasks of new ventures are difficult and novel tasks, requiring tremendous cognitive resources. Our results suggest entrepreneurs conduct a moderate level of market validation (monthly frequency, on average 4.33 contacts) to reduce uncertainty and save cognitive resources simultaneously.

5.3 Limitations and Future Research

The scope of our study leads to some limitations, which await future research to address. First, despite our effort to adopt a longitudinal design to strengthen our capability to make causal arguments, the study design precludes strong causal arguments between the variables. For instance, some may argue that the feedback received may influence entrepreneurs' self-efficacy. However, since the valence of feedback has a linear effect on self-efficacy (Dimotakis, Mitchell, & Maurer, 2017), the reverse causality does not support a curvilinear effect of self-efficacy on information acquisition. Furthermore, given the potential reverse causality between marketing self-efficacy and new venture performance, we adopted temporal separation for measuring these variables. Although this design enhances the internal validity of the study findings, this approach unavoidably leads to attrition between different waves. Future research can adopt an experimental approach to establish further the causal relationships found in this study while avoiding the potential attrition bias. In addition, we chose a subjective measure of new venture performance, which is more applicable to new ventures across industries and countries. Future research can use objective measures—such as revenue growth and profit growth—to examine how market information acquisition influences new venture performance. Future research can explore whether the findings of this study extend to other market-oriented behaviors, such as information utilization. For instance,

future research could investigate how market intelligence influences new venture responses. Previous research has shown that overconfident CEOs fail to learn from feedback (Guoli Chen, Crossland, & Luo, 2015). Given that entrepreneurs are more overconfident than professional CEOs (Lee, Hwang, & Chen, 2016), it is important to investigate whether entrepreneurs utilize the market information they acquire.

5.4 Conclusion

Overall, we found that both marketing self-efficacy and market information acquisition—constructs commonly deemed positive in marketing literature—can be too much of a good thing. The findings of this study contribute to a new understanding of market validation of new ventures and shed new light on antecedents of market-oriented behaviors. We hope our findings provide a stepping-stone for further research on antecedents of market validation and market-oriented behaviors, which are crucial but resource-consuming for new ventures.

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Table 1

Means, Standard Deviations, and Correlations among Variables

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Gender	0.19	0.39									
2. Education	4.06	1.07	-0.00								
3. Firm age	2.60	2.20	-0.02	0.15							
4. Firm size	2.26	1.06	-0.11	0.14	0.42***						
5. Marketing self-efficacy	3.78	0.62	0.09	-0.03	-0.01	0.11	0.89				
6. Market information acquisition hours	2.84	1.95	-0.07	0.05	0.07	-0.00	0.06	0.97			
7. Market information acquisition contacts	3.08	1.64	-0.01	-0.01	0.21*	0.04	0.12	0.66***	0.92		
8. Market information acquisition frequency	3.22	0.88	0.03	0.14	-0.04	0.17*	0.35***	0.05	0.02	0.86	
9. New venture performance	3.77	1.16	0.08	-0.07	-0.22	-0.13	0.09	-0.10	-0.04	-0.06	0.66

Note. For gender, 1 = female, 0 = male. For education, 1 = Primary school, 2 = Middle school, 3 = College, 4 = Bachelor, 5 = Master, 6 = Doctor. The Cronbach's alphas were presented on the diagonal.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2

Regression Analyses of Market Information Acquisition Frequency, Hours, and Contacts

	Frequency (n=171)						Hours (n=138)						Contacts (n=140)					
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Constant	2.81***	0.34	2.64***	0.34	2.74***	0.33	0.67	0.73	0.57	0.74	0.71	0.74	1.57*	0.63	1.42*	0.63	1.44*	0.64
Gender	0.12	0.17	0.04	0.17	-0.01	0.16	-0.26	0.35	-0.31	0.35	-0.38	0.35	-0.10	0.30	-0.18	0.30	-0.19	0.30
Education	0.04	0.09	0.08	0.09	0.10	0.09	0.16	0.19	0.19	0.19	0.20	0.19	0.03	0.17	0.06	0.16	0.07	0.16
Firm Age	-0.06†	0.03	-0.06†	0.03	-0.05	0.03	0.13	0.08	0.13†	0.08	0.15†	0.08	0.17*	0.07	0.18**	0.07	0.18**	0.07
Firm Size	0.16*	0.07	0.13†	0.07	0.13†	0.07	0.01	0.15	-0.01	0.15	-0.02	0.15	-0.02	0.13	-0.05	0.13	-0.05	0.13
Incubator 2	0.11	0.21	0.13	0.21	0.03	0.20	1.05†	0.62	1.29†	0.66	1.45*	0.66	0.48	0.52	0.85	0.55	0.88	0.56
Incubator 3	0.15	0.41	-0.08	0.39	0.03	0.38	1.28*	0.53	1.34*	0.54	1.34*	0.53	1.10*	0.47	1.19*	0.46	1.20*	0.46
Incubator 4	-0.41†	0.24	-0.04	0.25	0.09	0.25	2.14***	0.44	2.15***	0.44	2.03***	0.44	1.72***	0.38	1.74***	0.37	1.72***	0.38
Incubator 5	-0.11	0.26	0.08	0.26	0.04	0.25	0.10	0.76	-0.04	0.77	0.14	0.77	0.97	0.67	0.76	0.67	0.79	0.68
Marketing self-efficacy			0.32***	0.08	0.32***	0.08			0.20	0.18	0.19	0.18			0.31*	0.16	0.31†	0.16
Marketing self-efficacy squared					-0.19**	0.06					-0.26†	0.15					-0.05	0.13
F	1.85†		3.75***		4.52***		8.67***		7.85***		7.47***		7.39***		7.15***		6.41***	
ΔF			16.80***		9.62**				1.21		2.99†				3.95*		0.13	
R^2	0.08		0.17		0.22		0.35		0.36		0.37		0.31		0.33		0.33	
ΔR^2			0.09		0.05				0.01		0.01				0.02		0.00	

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3

Regression Analysis of New Venture Performance

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Constant	2.93**	0.87	2.92**	0.90	2.59**	0.90	4.46***	0.67	4.61***	0.68	2.80*	1.12	2.56*	1.08	2.71*	1.11
Gender	0.31	0.27	0.26	0.27	0.31	0.27	0.38	0.30	0.32	0.30	0.35	0.29	0.42	0.28	0.40	0.29
Education	-0.04	0.15	-0.02	0.15	0.02	0.15	-0.16	0.18	-0.16	0.18	-0.12	0.18	-0.03	0.17	0.01	0.17
Firm Age	-0.05	0.06	-0.06	0.06	-0.08	0.06	-0.03	0.07	-0.03	0.07	-0.01	0.07	-0.01	0.07	-0.04	0.07
Firm Size	0.14	0.10	0.14	0.10	0.17	0.10	0.11	0.12	0.09	0.12	0.10	0.12	0.14	0.11	0.15	0.11
Marketing self-efficacy	0.30†	0.18	0.28	0.18	0.36*	0.18	0.25	0.15	0.26†	0.15	0.40†	0.22	0.44*	0.21	0.39†	0.22
Incubator 3	0.50	0.50	0.53	0.50	0.42	0.49	0.86	0.56	0.84	0.55	0.76	0.54	0.45	0.54	0.43	0.54
Incubator 4	-1.16***	0.32	-1.08**	0.32	-1.11**	0.32	-1.00*	0.39	-0.93*	0.39	-1.11**	0.37	-1.21**	0.36	-1.14**	0.36
Incubator 5	-0.86*	0.50	-0.78	0.50	-0.95†	0.49	-0.91†	0.52	-0.94†	0.52	-0.94†	0.52	-1.06*	0.50	-1.07*	0.50
Frequency			0.02	0.12	-0.07	0.12									0.01	0.14
Frequency squared					-0.17*	0.08									-0.18†	0.10
Hours							-0.21	0.13	-0.20	0.13						
Hours squared									-0.15	0.13						
Contacts											-0.22	0.14	-0.11	0.14	-0.09	0.14
Contacts squared													-0.40**	0.15	-0.36*	0.15
F	4.75***		3.86***		4.11***		3.45**		3.24**		3.50**		4.11***		3.44***	
ΔF			0.04		4.92*		2.55		1.23		2.41		7.21**		3.04†	
R^2	0.27		0.27		0.30		0.29		0.30		0.28		0.35		0.36	
ΔR^2			0.00		0.03		0.02		0.01		0.01		0.07		0.01	

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

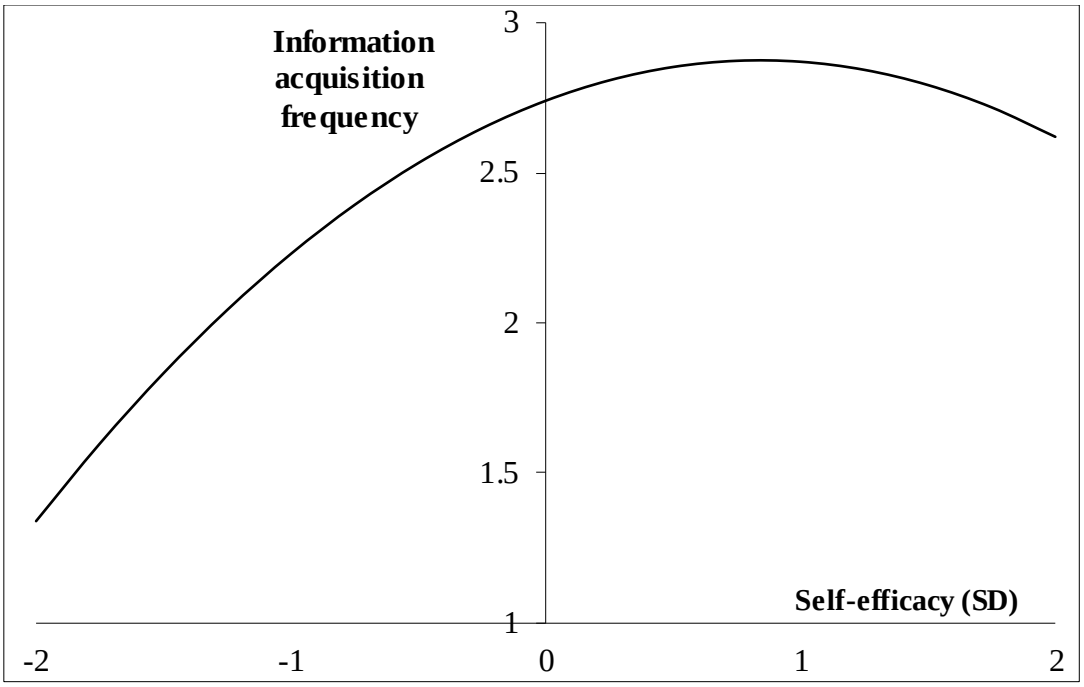

Figure 1. The Curvilinear Effect of Self-efficacy on Market Information Acquisition Frequency (Model 3 of Table 2)

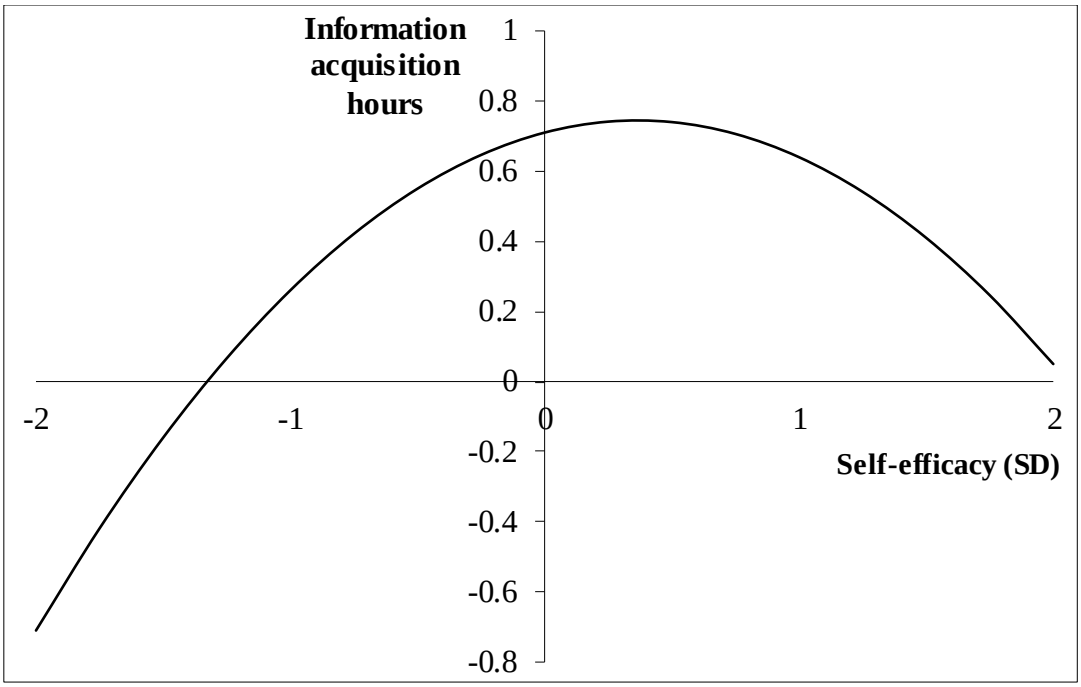

Figure 2. The Curvilinear Effect of Self-efficacy on Market Information Acquisition Hours (Model 6 of Table 2)

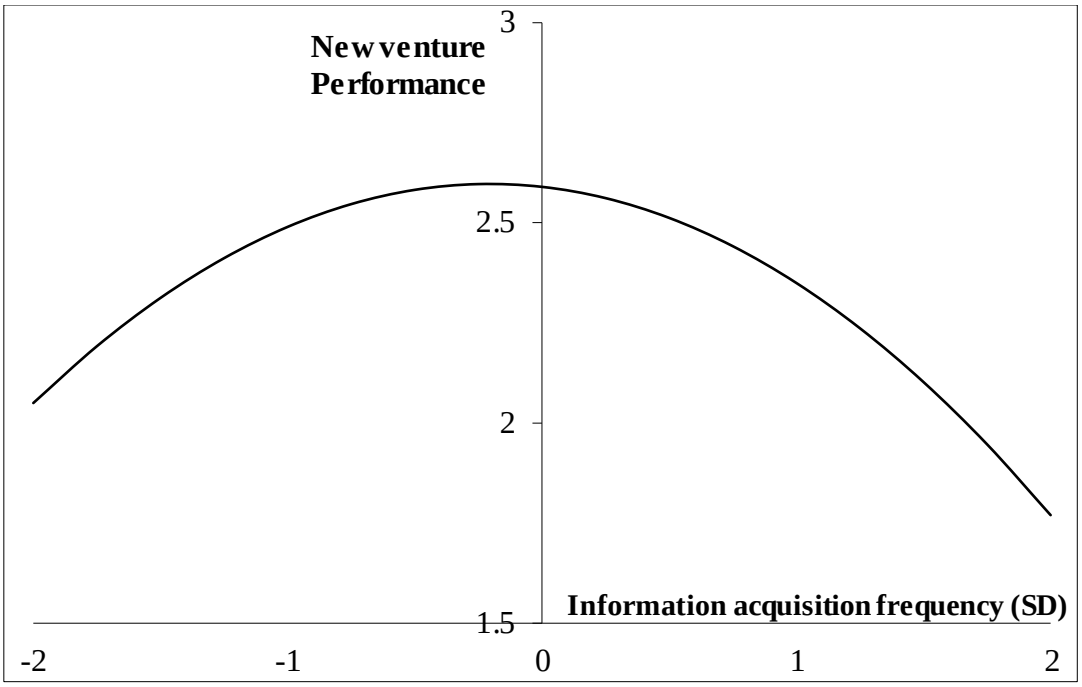

Figure 3. The Curvilinear Effect of Market Information Acquisition Frequency on New Venture Performance (Model 8 of Table 3)

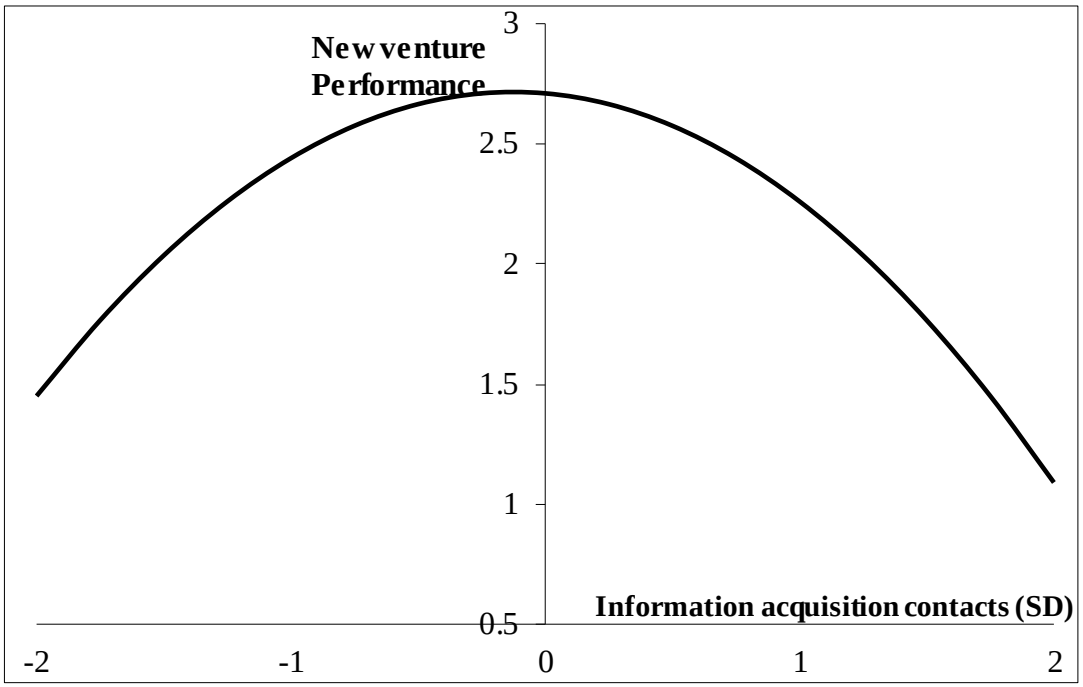

Figure 4. The Curvilinear Effect of Market Information Acquisition Contacts on New Venture Performance (Model 8 of **Table *3***)

Appendix A Summary of self-efficacy effects in previous literature

Self-efficacy effects	Dependent variables
Positive	Become entrepreneurs (C. C. Chen, Greene, & Crick, 1998; Zhao, Seibert, & Hills, 2005) Business plan development (Brinckmann & Kim, 2015) Goal difficulty (Baron, Mueller, & Wolfe, 2016) Cope with stress (Baron, Franklin, & Hmieleski, 2016) Persist new venture creation (Hechavarria, Renko, & Matthews, 2012) New venture growth (Baum & Locke, 2004)
Negative	Task performance (Vancouver et al., 2002; Vancouver, Thompson, & Williams, 2001) Effort (Vancouver, More, & Yoder, 2008)
Inverted U-shaped effect	Effort change (Beck & Schmidt, 2012) Business ownership (Gielnik, Bledow, & Stark, 2020) Feedback seeking from mentors (Uy et al., 2024)

Appendix B Standardized loadings of survey items in confirmatory factor analysis

Items	loading
Marketing self-efficacy	
Set and meet market share goals	0.80
Set and meet sales goals	0.84
Set and attain profit goals	0.83
Establish a position in the product market	0.69
Conduct market analysis	0.62
Expand business	0.74
Market information acquisition frequency	
meet with customers to find out what products or services they will need in the future.	0.88
interact directly with customers to learn how to serve them better.	0.79
survey end users to assess the quality of your products, services, and ideas.	0.72
talk with those who can influence your end users' purchases (e.g., retailers, distributors)	0.71
Market information acquisition time (total hours)	
meet with customers to find out what products or services they will need in the future.	0.97
interact directly with customers to learn how to serve them better.	0.96
survey end users to assess the quality of your products, services, and ideas.	0.92
talk with those who can influence your end users' purchases (e.g., retailers, distributors)	0.92
Market information acquisition contacts (number of people)	
meet with customers to find out what products or services they will need in the future.	0.95
interact directly with customers to learn how to serve them better.	0.91
survey end users to assess the quality of your products, services, and ideas.	0.78
talk with those who can influence your end users' purchases (e.g., retailers, distributors)	0.80
New venture performance	
How successful is your startup in comparison to other companies in the same industry and of about the same size?	0.58
To what degree has your startup achieved its most important goals?	0.87
Which of the following statements best describes how successful you are in comparison to your competitors?	0.61

Endnotes

[1] Since acquiring market information can be conducted by all members of a new venture, we focus on market information acquisition at the venture level.

[2] We reason that entrepreneurial self-efficacy, which captures entrepreneurs' confidence about their new venture success, may also influence the frequency of interacting with customers to acquire information. Nevertheless, it may not influence resource allocation between tasks of new ventures. Therefore, we chose domain-specific self-efficacy to predict resource allocation to market information acquisition. We will replicate our analyses with entrepreneurial self-efficacy in a robustness check.

[3] We acknowledge that product-market validation may be more emphasized in incubators due to the popularity of the lean startup movement (Cohen, Bingham, & Hallen, 2018). However, we argue that this provides a stringent test of our theories because the variance of market information acquisition may be constrained due to institutional encouragement, making it harder to observe the effect of self-efficacy in explaining this behavior.

[4] Meta-analysis based on research across 23 countries of five continents found that country differences in economic and social development and cultural values did not moderate the effect of market orientation (Cano, Carrillat, & Jaramillo, 2004).

[5] The surveys were conducted (2014-2015) after the lean startup movement started.

[6] We also collected some founders' reports of market information acquisition using the same measures. The founders and co-founders showed high consistency in the reports of their ventures' market information acquisition ($r = .72$ for frequency, $r = .79$ for hours, and $r = .78$ for contacts, all correlation coefficients were significant at $p < .05$ level).

[7] We also re-ran the model with the square term of marketing self-efficacy or entrepreneurial self-efficacy included, which did not have a significant effect on new venture performance. The curvilinear effects of market information acquisition frequency and contacts remained significant in both cases.

[8] We also ran the models with each country separately, and all the results were replicated with at least one country. We reported the results based on aggregate data to conserve the power of the analyses.