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The impact of product features on market orientation in technology-based new ventures

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ABSTRACT

Little is known about the role of product features in shaping market orientation as most research focuses on organizational features, such as interdepartmental connectedness, centralization in the strategy formation process, and the nature of top management teams. In this study we draw on the theory of resource orchestration and hypothesize that the protect-ability and the scalability of new products relate positively to market orientation in technology-based new ventures. We also predict that the entrepreneurial experience of founders interacts positively with these product features in driving market orientation strategies. On the basis of original field data from 156 technology-based startups, we find support for the positive relationship between product features and market orientation and the proposed interaction. These findings contribute to the ongoing research on the antecedents of market orientation by showing how founders' experience and product features shape the resource orchestration process within technology-based new ventures.

1. Introduction

Market orientation represents a firms' strategic intent that focuses on understanding and meeting the needs of customers in order to gain competitive advantage (Hult, Ketchen Jr, & Slater, 2005). It constitutes the ability to sense customer demands and integrate these into new products and related marketing programs and it provides directions for firms to manage resources. Market oriented firms are positively related to firm performance (Raju, Lonial & Crum, 2011). For instance, as research indicates frequent interactions with the market would bring new product and services and increase the innovativeness of such firms (Morgan & Anokhin, 2020; Zhao, Song, & Storm, 2013; Zhou, Yim & Tse, 2005). This implies that firms should follow a market-pull approach in order to develop new products and services.

Despite the overall positive impact of market orientation, research in the context of new ventures shows that not all firms rely on the interactions with market alone but tend to take a hybrid strategy involving both technology-push and market-pull approaches in order to develop new products or services (Guo, Wang, Su, & Wang, 2020). Entrepreneurs following a hybrid approach may experiment with their product prototype based on their initial business model hypothesis. At the same time, they learn from these experiments and incorporate market feedback in the

further development of new products and services. They adopt such an approach as a high market orientation alone may lead to information overload from the input of customers (Moorman, 1995). At the same time, managerial attention and resources are required to effectively implement the market orientation, which becomes then a challenge for new ventures, typically constrained by the availability of resources (Baker & Nelson, 2005). This hybrid approach is often used in industries where there is a high degree of technological change and where firms are at the cutting edge of technology. Such firms often invest in science and technology in order to enable the continuous development of novel things to meet the ever-changing needs of customers (Rubera & Kirca, 2012).

Rather than viewing product as the outcomes of market orientation, the relationship between product and market orientation is complex and should be treated with a degree of nuance, especially for the high-tech industry where changes occur at a fast pace (Kim, Im, & Slater, 2013; Story, Boso & Cadogan, 2015). The different features of the product may either enable or constrain the implementation of different strategies and influence venture performance. For example, Klingebiel and Joseph (2015) show that the timing of market entry in the mobile handset industry is closely correlated with product features. Early movers produce handsets with a broader set of product features, while later entry

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strategies are associated with handsets with fewer features. In other words, also the product itself determines the timing and probability of a market orientation strategy. In the context of new ventures, strategies are the results of individual-opportunity nexus, shaped by both the founders' characteristics and the features of business opportunities, such as opportunity riskiness (Dencker & Gruber, 2015). Scholars have extensively studied the impact of founders and new ventures teams on firm performance (see for example the literature review by Klotz, Hmieleski, Bradley and Busenitz (2014)). Not surprisingly, a growing number of studies also shed light on the relation between the nature of the top management team and market orientation. For example, Brower and Nath (2018) found that appointing a CEO with a marketing background is directly associated with an increase in market orientation of the firm. However, these studies along with other research on the antecedents of market orientation tend to focus on direct effects rather than to pay attention to the interaction of these factors. Although the professional background, experience and personality of entrepreneurs do have an impact on strategic choice, understanding the broader contingences related to the overall strategy formation process is an important area to explore (Crook et al., 2008; Symeonidou & Nicolaou, 2017). This is further aligned by the argument that entrepreneurial strategies are not only shaped by business achievements, such as product and technology, but also by the insights of aspiring entrepreneurs, who are learning from experience (Ott et al., 2017). Therefore, we propose to take both product features and the nature of entrepreneurs into account in order to increase the precision and accuracy of studying the strategy making process in new high-tech ventures.

Drawing on the theory of resource orchestration, we focus on two questions. First, to what extent do product features (i.e., scalability and protect-ability) influence market orientation? Scalability is defined as the degree to which the new venture has the potential to scale up in terms of serving larger number of customers through the use of technologies and equipment. Protect-ability refers to the degree to which the product includes proprietary technology and complex knowledge and assets (Zhao, Song & Storm, 2013). We specifically propose that both scalability and protect-ability are positively related to market orientation in the context of technology-based startups.

The second question we aim to answer is how entrepreneurial experience influences the relationship between product features and market orientation. The resource orchestration theory focus on the "fit" between resources and founders' strategic decisions and highlight the essential role of managers in decision making and turning resources into competitive advantages (Sirmon et al., 2011). We specifically focus on the entrepreneurial experience of founders as many new ventures are created by those who have had previous entrepreneurial experience (Ucbasaran et al., 2010) and more research to better understand serial entrepreneurship is strongly encouraged (Dabić et al., 2021). In this study, we expect to find a positive interaction effect between the entrepreneurial experience of the founder and product features (i.e., scalability and protect-ability) in driving market orientation strategies. This is in line with the work on experiential learning in the entrepreneurial process, which shows that entrepreneurial experience could augment the ability of entrepreneurs to form and implement strategies by avoiding inappropriate decisions and to safeguard possible technology misappropriation (Corbett, 2005). Rather than viewing product features and entrepreneurial experience as single antecedents, we expect that entrepreneurial experience positively moderate the relation between product features (i.e., protect-ability and scalability) and market orientation.

This study makes several contributions to the literature. First, we show that product features play an important role in the development of market orientations in new ventures. Although previous studies show that there are three categories of factors responsible for market orientation choices: top management team features, interdepartmental factors, and organizational systems (Jaworski & Kohli, 1993; Kirca, Jayachandran & Bearden, 2005), our results further the discussion on

the antecedents of market orientation by including features of products in the equation, which is quite important but largely ignored in previous entrepreneurship literature. Through investigating the effects of product features and founder's entrepreneurial experience simultaneously, we further propose a more complex model for strategy formation within technology-based ventures. Our second contribution is our response to the call to investigate the contingencies of resource orchestration process in start-ups (Sirmon et al., 2011; Zahra, 2021). New ventures often face resource constraints that limit their ability to implement certain strategies. Adopting market orientation is generally promising yet challenging, as it necessitates significant resources investment and managerial expertise. There is a need to understand how managers orchestrate limited resources for certain strategies but not others. Specifically, we examine the interaction effects of product features and entrepreneurial experience on market orientation. In doing so, our research helps to establish a better understanding of the conditions under which market orientation is prioritized by the entrepreneur in technology-based ventures.

2. Theoretical framework and hypotheses

2.1. Market orientation

In this study, we focus on the market orientation (MO) as a strategic intent, which provide directions for firms to manage resources to sense and integrate customer demands into new products and related marketing programs (Hult, Ketchen, & Slater, 2005). Specifically, market-oriented firms rely on market information about competitors and customers in order to respond to changing needs and demands (Hernández-Linares, Kellermanns & López-Fernández, 2022). Such firms continuously gather, evaluate and disseminate this information among relevant organizational units. As such, MO is regarded as key to the success of technology-based firms (Im & Workman, 2004).

To implement market orientation, firms require a specific set of managerial activities in order to acquire information on customer needs and to implement and execute strategic decisions efficiently and effectively. It also pertains to an organizational culture that emphasizes aspects such as customer alignment, competitor orientation, inter-functional coordination, and responsiveness as keys to organizational success (Narver & Slater 1990; Raju, Lonial & Crum, 2011). Despite of the positive outcome revealed by the previous study, we have to admit that MO poses both opportunities and challenges, especially in the context of new ventures. On the one hand, MO may help firms to identify new ideas for products or services and to create superior customer value. On the other hand, it is difficult to make the MO a reality since this does not only require the attention and commitment of entrepreneurs but also demands resources and the capabilities for acquiring, disseminating and using market information. Moreover, the information generated from market orientation may lead to information overload problem (Moorman, 1995).

2.2. Resource orchestration theory

The resource orchestration theory is rooted in the literature on asset orchestration (Helfat et al., 2007) and resource management (Sirmon, Hitt, & Ireland, 2007), emphasizes the critical role of managers in turning resources into resource-based competitive advantage (Sirmon et al., 2011). Besides assembling resources, managers are also involved with the valuation, selection, orchestration and deployments of resources (Augier & Teece, 2009; Zahra, 2021). In essence, this framework is a contingency model focusing on the "fit" between resources and founders' strategic decisions. Specifically, it describes that the firm performance is influenced by the structuring resources in order to build a resources portfolio, bundling resources in order to develop capabilities and leveraging resources so the firm will deploy firm's resource and capability to take advantage of perceived market opportunities (Sirmon,

Hitt & Ireland, 2007).

The resource orchestration theory provides a rich framework for understanding why some firms survive while other firms with similar resources do not succeed. This theory has attracted the attention of entrepreneurship researchers in past years (e.g., Symeonidou & Nicolaou, 2017; Yu & Wang, 2021). In the context of new ventures, entrepreneurs typically lack resources, are constrained in their access to key resource providers, and even have limited experience in managing resources. Under such circumstance, efficient resource management is as important as, if not more important, than resources they have for new venture survival and success (Yu & Wang, 2021). As Baker and Nelson (2005, p333) suggest, 'making do by applying combinations of the resources at hand to new problems and opportunities provides an important pathway to achieve innovation for new resource-constrained firms.' Structuring the firm's resource portfolio and bundling resources to form the capabilities in the start-up stage are important (Sirmon, et al., 2011). However, leveraging resources is also critical for a firm's survival and success (Chirico et al., 2011; Symeonidou & Nicolaou, 2017). Leveraging resources is a process of harnessing the firm's capabilities to take advantage of specific business opportunities in the market. It constitutes three different elements: mobilization, coordination, and deployment. Of these three elements, mobilization plays a key role for the management of resources in new ventures as this includes the plan for the use of resources (Sirmon et al., 2011). In the framework of resource orchestration, mobilization (a plan for the use of resources) is one of the critical elements for effective leveraging (Sirmon et al. 2011). In carrying out different resource management activities, entrepreneurs form their judgement in applying their experience, as well as vision of business they might want them to be. As we described in the section of market orientation, MO provides a set of managerial practices that offers direction for the use of resources. As such, in this study, we propose that MO provides the mobilizing plan to use resource for acquiring, disseminating and using market information in the entrepreneurship process.

2.3. Hypotheses

2.3.1. Opportunities, product features and market orientation

A study by Ott, Eisenhardt and Bingham (2017) suggests that strategy making in new ventures involves both "doing" and "thinking". On the one hand, entrepreneurs must use experiential processes to test and learn (Bingham & Eisenhardt, 2011). By doing so, opportunity development is pushed forward in terms of receiving market feedback, and by making some necessary changes in relation to product development (Alvarez & Barney, 2007). On the other hand, entrepreneurs must use their judgement in applying their understanding of business development to form a strategy for the next product service, or business model (Zahra, 2021). In other words, the entrepreneurial strategy formation is the result of the entrepreneur's thinking of developing perceived business opportunities and the current status of business development. In this study, we argue that the characteristics of opportunities are the result of "doing" and are an important factor for strategy formation.

Previous studies suggest that including opportunity features in understanding the overall strategy development process in new ventures would allow for a more elaborate view (Dencker & Gruber, 2015; Scheaf, Loignon, Webb, Heggestad & Wood, 2020). These works highlight different measures for opportunity characteristics, such as riskiness (Dencker & Gruber, 2015), imitability, and innovativeness (Young, Welter, & Conger, 2018). Dencker and Gruber's (2015) research shows that the venture performance is the result of a combination of the level of riskiness of opportunities and the experience of founders. High-risk opportunities favor founders who have ample managerial experience, whereas low-risk opportunities favor founders having ample industry experience. These studies clearly indicate the impact of opportunity attributes and founder's experience on the overall resource orchestration process.

Although the characteristics of both founders and opportunities shape the entrepreneurship process, it proves hard to measure the features of opportunities in entrepreneurship research. Thus far, there are only a few attempts to measure opportunities (e.g., Dencker & Gruber, 2015; Young, Welter, & Conger, 2018) as most researchers prefer to measure the features of products or services (e.g., Story, Boso & Cadoogan, 2015; Zhao et al., 2013). Here we focus on two main product features (i.e., protect-ability and scalability) and examine their impact on entrepreneurial strategy making. We do so because the protect-ability and scalability of products are closely related to the concern of entrepreneurs of technology-based ventures. Such concerns are, technical knowledge misappropriation (Katila, Rosenberger, & Eisenhardt, 2008), the potential to scale up to serve larger numbers of customers, the use of technologies, equipment, and centralized facilities to decrease costs (Bigdeli, Li, & Shi, 2016; Patel, Fiet, & Sohl, 2011). These concerns are critical to the decision making process of entrepreneurs of technology-based ventures and are important drivers of commercialization strategies (Gans & Stern, 2003), as they may have diverse implications involving resources allocation, pro and con of strategy orientation.

Product protect-ability refers to the degree to which the product includes proprietary technology, complex knowledge, and assets (Zhao et al., 2013). It is generally connected to putting up all kinds of imitation barriers (Bharadwaj, Varadarajan, & Fahy, 1993). Products with higher protect-ability are more difficult to imitate so it is more likely that the venture will gain competitive advantage. Barriers for imitation also depend on other non-R&D related efforts, such as the use of Intellectual Property Rights protection (Delmar & Shane, 2004), and the development of complementary assets (Teece, 1986, 2006). All of these efforts to build imitation barriers will require more resources.

Entrepreneurs of technology-based ventures are pushed to acquire resources including both technological and commercial knowledge in order to capture the value created from the entrepreneurial process (Hsu, 2008). However, engaging in market development also raises the risk of imitation of innovations by competitors (Lieberman & Montgomery, 1998). As the imitation barrier increases, the risk of technology misappropriation goes down. This will impact the development of market orientation in technology-based ventures in at least two ways. First, as the product protect-ability increases, the resources required for building imitation barriers are lower than for products with lower protect-ability. As a result, the new venture could for instance allocate more resources for market development. Second, although engaging in market development will raise the potential attention of competitors, the product protect-ability will reduce the risk of being imitated. Therefore, entrepreneurs will tend to engage in building customer relationships in order to profit from technology-based innovation.

To summarize, we argue that the strategy development process in technology-based new ventures is the result of entrepreneurial intentions and is constrained by the availability of resources. As the protect-ability of new products increases, entrepreneurs are more likely to form a mobilizing plan to engage in market development activities as the venture will have more resources for strategy implementation. Therefore, we propose,

H1: Product Protect-ability is positively related to market orientation in technology-based new ventures

Scalability is defined as the degree to which the new venture has the potential to scale up to a larger number of customers through the use of technologies and equipment (Zhao et al., 2013). The higher the level of scalability of a product or service, the more likely it is that the venture could serve bigger markets by lowering the cost and increasing the volume of production. This may make the business opportunity more attractive to competitors and motivate them to enter these prospective markets. And like the development of technology, accessing market is an integral part of the technology-based entrepreneurship process as it is uncertain to what extent the market will be reached eventually. Even if

both the market uncertainty and technology uncertainty have been addressed by the company, the competitive uncertainty remains as a competitor could potentially enter the market and offer better products at lower prices (Lazonick, 2010). The pressure emerges from above mentioned uncertainties will drive the entrepreneur to move faster in pursuing a market orientation strategy and to capture the value by becoming the first entrant in the field. This would enable the venture to gain competitive advantage by having control over scarce resources and by keeping competitors at bay (Kuratko & Audretsch, 2009).

Even though, first mover advantage does not necessarily guarantee superior performance (Lieberman & Montgomery, 1998), product scalability could still increase the market orientation. Like the process of technological diffusion, the entrepreneurial process is highly discontinuous. There is a time period (or a window of opportunity) in which a firm can realistically enter a new market (Tyre & Orlikowski, 1994). Once the market for a new product is established, its window of opportunity opens and as the market grows, firms enter and try to establish a profitable position. At some point in time, the market matures, and the window of opportunity closes. We argue that entrepreneurs are more likely to emphasize a market orientation as the product scalability increases the entrepreneur's concern on both market uncertainty and competitive uncertainty. They do so in order to move faster in the market when a window of opportunity opens. Therefore, we propose:

H2: Product scalability is positively related to market orientation in technology-based new ventures

2.3.2. The moderating role of founder entrepreneurial experience

Founders of new ventures differ in the extent they possess the necessary knowledge and skills for successful opportunity exploitation (Shane, 2012). These attributes allow them to envision new directions and to explore areas others may fail to recognize (Zahra, 2021). Rather than to examine the direct impact of the characteristics of entrepreneurs (in terms of background, personality, religion) on strategy formation, we explore the impact of entrepreneurial experience of founders of technology-based ventures. The entrepreneurial experience in managing resources can be critical for start-up performance (Ucbasaran, Westhead, & Wright, 2009). We argue that this experience impacts the relationship between product features (i.e., scalability and protect-ability) and market orientation. Different strategic orientations may have different foci but all imply some stable managerial intentions, as well as managerial actions and resources that are necessary for the implementation of the strategy of choice (Cheng & Huizingh, 2014). The development of a market orientation is not only the result of entrepreneur's intention but this is constrained by the resources and capability of implementing the market orientation. For example, the entrepreneurs may reallocate limited resources from technology development to hire new employees or build a team to acquire, disseminate and use market information.

In comparison to novel entrepreneurs, serial entrepreneurs usually have more (entrepreneurial) skills acquired from previous experience with venture creation and development (Corbett, 2005). More experienced entrepreneurs are also likely to have more social connections than beginners (Zhang, 2011). This can help entrepreneurs to develop products and services that meet the needs of customers more effectively, which helps to gain competitive advantage. These differences in skills and connections will impact the relationship between product features and market orientation in at least three ways. First, we expect serial entrepreneurs to have a stronger ability for managing the challenges that emerge in the entrepreneurship process (Toft-Kehler, Wennberg, & Kim, 2014), and are better equipped to match their available resources with their strategic decisions. Serial entrepreneurs may have a greater understanding of the technological aspects of product development and are usually familiar with the latest advancements in technology. The entrepreneurial experience enables them to better anticipate and manage the entrepreneurial challenges, such as technology

misappropriation. As a result, the concern of technology misappropriation would be alleviated. Second, the social connections could facilitate the implementation of the chosen strategy and market orientation in particular (Stam & Elfring, 2008; Westhead, Ucbasaran, Wright, & Binks, 2005). As the study of Westhead, Ucbasaran, Wright, & Binks (2005) shows, a larger proportion of serial entrepreneurs in comparison to novel entrepreneurs reported to actively use information from customers and clients, personal friends, financiers, and employees. Third, serial entrepreneurs may also have more developed marketing skills, such as knowing how to get access to market research, and how to do customer profiling. This may enhance the ability to create, develop and deliver products that meet or exceed customer expectations, leading to customer satisfaction. Therefore, we argue that entrepreneurial experience will positively moderate the product features and market orientation by augmenting the ability to form and implement strategies. This will also alleviate the concern of technology misappropriation. We propose the following hypotheses:

H3A: Entrepreneurial experience positively moderates the relationship between product Protect-ability and market orientation in technology-based new ventures

H3B: Entrepreneurial experience positively moderates the relationship between product scalability and market orientation in technology-based new ventures

The conceptual model as outlined in Fig. 1 summarizes our hypotheses.

3. Method

3.1. Data and sample

We collected data through a survey among founders of startups, who applied for the Innovation Fund (Innofund) grant in Shanghai, 2016. Innofund may be compared with the Small Business Innovation Research Program (SBIR) in The United States. The fund is specifically designed to support innovative ventures at their early stages of development. According to the funding procedure, all applicants were invited to pitch their ventures in May and July 2016. As part of this visit, entrepreneurs were asked by the researchers of this project to fill out a questionnaire. A total of 341 questionnaires were handed out and we received a total of 220 filled out questionnaires. The sample was constructed as follows. First, we defined the nature of a new venture according to comparable entrepreneurship studies (Shepherd, 1999). This implied that firms were selected that were founded no longer than 10 years ago. Any older firms were excluded. Second, we removed firms for which information on product scalability, product protect-ability, market orientation and founder's entrepreneurial experience were missing. Third, we dropped firms with missing information on individual-level and firm-level control variables. For each step of removing missing data, we conducted an unpaired *t*-test and found no significant differences in product scalability, product protect-ability, market orientation and founder's entrepreneurial experience between the sample of included versus excluded firms. The final sample contained a total 156 new venture firms. As a final step, the companies in the sample were matched with the venture capital database (CVSource) and State Intellectual Property Office (SIPO) in China.

3.2. Measures

3.2.1. Measurement of the dependent variable

Market Orientation. The 17 item scale developed by Morgan, Vorhies, and Mason (2009) was used to measure MO. This measure is structured in three dimensions: market intelligence generation, market intelligence dissemination, and responsiveness to market intelligence. Sample items included: "we do a lot of in-house research (market intelligence

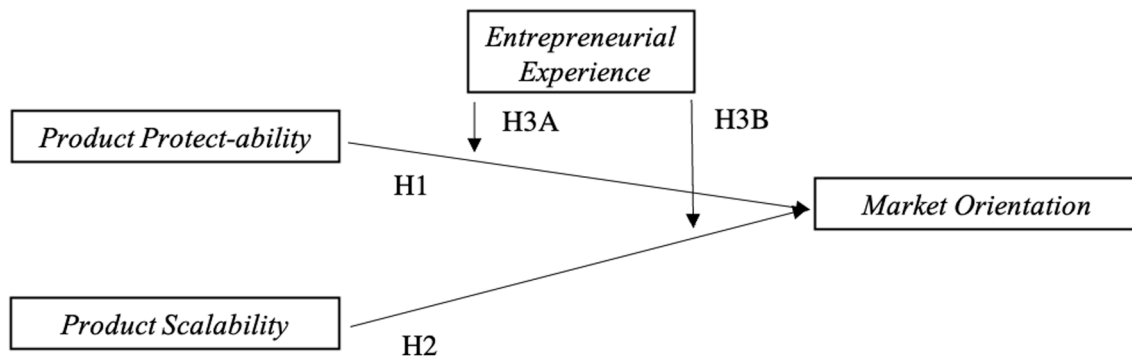


Fig. 1. Conceptual Framework.

generation)”, “when something important happens to a major customer or market, the whole business unit knows about it in a short time (market intelligence dissemination)”, and “Customer complaints fall on deaf ears in this business unit (R) (responsiveness to market intelligence)”. We performed a confirmatory factor analysis (CFA) to verify the measurement properties of the market orientation. Four reversed items were dropped for the following reasons: items that presented a weak convergence ($t < 1.96$) and items that evidenced a low standardized loading ($\lambda < 0.50$). Finally, results indicated good reliability ($\alpha = 0.89$) and good model fit ($\chi^2/df = 4.21$, NFI = 0.96, CFI = 0.97, SRMR = 0.045, RMSEA = 0.087).

3.2.2. Measurement of the independent variables

Product Scalability. Previous studies show that scalability is an important criterion used by Venture Capital firms (VCs) in order to screen prospective investments and market potential. High scalability is assumed to increase the likelihood of receiving investment funding (Huang et al., 2021). In a large empirical study among small businesses, Puri and Zarutskie (2012) show that VC-backed companies tend to be younger, faster-growing, and larger in comparison to companies without such backing. In this study, we use *Equity investment (t0)* as the measure of product scalability, which equals 1 if the focal firm has received equity investment before the survey is conducted (as of May 31st, 2016) and equals 0 otherwise.

Product Protect-ability. Because of limited resources, new firms usually cannot rely on some common defense mechanism that big companies use to protect their intellectual property, such as economies of scale and complementary assets (Teece, 1986). Patents is still one common legal instruments to protect their inventions for new firms (Katila & Mang, 2003; Anton & Yao, 2004). We use *Patent (t0)* to measure product protect-ability, which equals 1 if the focal firm has patents before the survey is conducted (as of May 31st, 2016) and equals 0 otherwise.

3.2.3. Measurement of the moderating variable

Founder Entrepreneurial experience. We use a dummy variable to indicate the founder’s entrepreneurial experience. Founders had prior experiences of running a self-owned business was coded as ‘1’, and Founder without entrepreneurial experience was coded as ‘0’.

3.2.4. Measuring control variables

In order to rule out the extraneous effects, we controlled for individual level factors (i.e., gender, and education of the entrepreneur). Gender was dummy-coded by ‘0’ (female) and ‘1’ (male). Education was also dummy-coded with at least postgraduate coded as ‘1’ and otherwise coded as ‘0’. Moreover, we also controlled firm level factors (i.e., firm size, firm age and innovation type) (Cheng & Hulzinger, 2014). Firm size, we use the natural logarithm of actual employee size. Innovation type was dummy-coded with the product innovation coded as ‘1’ and process

innovation coded as ‘0’.

4. Results

Table 1 provides the means, standard deviations and correlations for all variables. Of note are the significant positive correlations between product features of protect-ability (Patent (t0)) and scalability (Equity investment (t0)), and market orientation, indicating product features are related to market orientation. Given the high correlations between some of our independent and control variables (e.g., protect-ability, scalability, Firm age and innovation type), we checked for the possibility of multicollinearity. We analyzed variance inflation factors. All variables had scores below 10 (the highest score was 1.32) indicating that there was no multicollinearity problem.

To test our hypotheses, we performed ordinary least squares regression. The results of our analysis are presented in Table 2. Model 1 is the baseline model with only the control and moderating variables. Model 2 introduces the effects of product features on market orientation (H1 and H2). Hypothesis 1 and hypothesis 2 suggested that two product features, product protect-ability and product scalability would positively predict market orientation, respectively. The relationship between protect-ability and market orientation, scalability and market orientation is positive and significant. These results offer support for Hypothesis 1 and 2. Models 3 and 4 introduce the moderating effect of serial entrepreneur on the relationship between product features and market orientation (H3a and H3b). Hypothesis 3a suggested that serial entrepreneurs positively moderate the effect of protect-ability on market orientation. Model 3 shows that the coefficient on this interaction term between protect-ability and serial entrepreneur is positive and significant, indicating that the effect of protect-ability on market orientation becomes greater when the founder is a serial entrepreneur. Therefore, Hypothesis 3a is supported and this result will be further illustrated in Fig. 2. As shown in Fig. 3, the positive relationship between product protect-ability and market orientation was stronger when the founder had previous entrepreneurial experience. Hypothesis 3b suggested that serial entrepreneur positively moderated the effect of scalability on market orientation. Model 4 shows that the coefficient on the interaction term between scalability and serial entrepreneur is positive and significant, indicating that there is a significant moderating effect of serial entrepreneur on the relationship between scalability and market orientation. Therefore, Hypothesis 3b is supported and the result will be further illustrated in Fig. 3. As shown in Fig. 3, the positive relationship between product scalability and market orientation was stronger when the founder had previous entrepreneurial experience. Model 5 includes all control, moderating, independent and interaction variables, which indicates that the moderating effect of the variable serial entrepreneur is still positive and significant.

Table 1
Means, Standard Deviations (SD) and Correlations.

Variable	Mean	S.D	1	2	3	4	5	6	7	8	9
1.Market orientation	4.032	0.389									
2.Gender	0.853	0.356	-0.109								
3.Age	38.712	6.762	0.061	0.063							
4.Education	0.494	0.502	0.122	-0.060	0.187**						
5.Innovation Type	0.263	0.442	0.133*	0.125	0.224***	0.168**					
6.Ln_Employee size	3.080	0.819	-0.000	-0.009	0.217***	-0.008	0.036				
7.Firm age	3.647	1.980	0.006	-0.010	0.197**	-0.025	0.284***	0.226***			
8.Serial entrepreneur	0.712	0.455	0.053	0.015	0.040	0.091	0.027	-0.087	0.073		
9.Patent (t0)	0.321	0.468	0.344***	0.014	0.209***	0.201**	0.401***	0.052	0.206***	-0.078	
10.Equity investment (t0)	0.167	0.374	0.424***	0.040	0.034	0.040	0.007	0.038	0.068	0.133*	0.098

* p <.05; ** p <.01; *** p <.001, two-tailed test. The control variables were coded as follows: gender (1 = male, 0 = female), education (1 = at least postgraduate, 0 = otherwise), Innovation Type (1 = Product Innovation, 0 = otherwise).

Table 2
Regression results for the relationship between product features and market orientation.

Variables	Model1	Model2	Model3	Model4	Model5
<i>Control variables</i>					
Gender	-0.137 (0.089)	-0.144* (0.077)	-0.168** (0.078)	-0.137* (0.076)	-0.160** (0.077)
Age	0.002 (0.005)	-0.001 (0.004)	-0.001 (0.004)	n/a (0.004)	-0.001 (0.004)
Education	0.062 (0.065)	0.024 (0.057)	0.037 (0.057)	0.019 (0.056)	0.031 (0.056)
Innovation Type	0.122 (0.077)	0.031 (0.070)	0.027 (0.070)	0.036 (0.069)	0.032 (0.069)
Ln_Employee size	n/a (0.040)	0.005 (0.035)	0.013 (0.035)	-0.001 (0.034)	0.007 (0.034)
Firm age	-0.008 (0.017)	-0.008 (0.015)	-0.010 (0.015)	-0.006 (0.015)	-0.008 (0.015)
<i>Moderating variable</i>					
Serial entrepreneur	0.041 (0.0697)	0.022 (0.0616)	-0.015 (0.0650)	-0.089 (0.0746)	-0.123 (0.0770)
<i>Independent variables</i>					
Patent (t0)		0.249*** (0.066)	0.240*** (0.065)	0.0306 (0.108)	0.0232 (0.107)
Equity investment (t0)		0.409*** (0.074)	0.131 (0.182)	0.388*** (0.073)	0.114 (0.179)
<i>Interaction variables</i>					
Patent × Serial entrepreneur			0.314** (0.125)		0.312** (0.124)
Equity financed × Serial entrepreneur				0.337* (0.202)	0.332* (0.198)
Constant	4.012*** (0.221)	4.014*** (0.191)	4.082*** (0.190)	4.055*** (0.192)	4.122*** (0.190)
Observations	156	156	156	156	156
R-squared	0.046	0.293	0.275	0.258	0.284

Standard errors in parentheses. *** p <.

5. Discussion

This study analyzed the role of product features (i.e., scalability and protect-ability) and founder’s entrepreneurial experience in driving market orientation choice in technology-based new ventures. In line with our expectations, both product scalability and protect-ability relate positively to market orientation and this supports the premise that product itself indeed matters in the entrepreneurial strategy formation process. As the product protect-ability increases, it allows for the allocation of more resources for market development and mitigates the risk of being imitated by competitors. While the product scalability increases, the attractive market size and the competitive uncertainty enables firms to develop a suitable market orientation. We also find

support for our expectations in relation to the joint impact of experience of founders and product features on market orientation. Entrepreneurial experience does positively moderate the relationship between product features (protect-ability and scalability) and market orientation. This suggest that entrepreneurial experience augment the ability to form and implement a suitable market orientation. The founders differ in the resources orchestration process in terms of forming mobilization plan to use resources for acquiring, disseminating and using market information in the entrepreneurial process.

This study makes two contributions to the literature. First, our results add to the ongoing discussion about the antecedents of market orientation, especially in the context of technology-based new ventures. By showing that product scalability and protect-ability play an important role in the development of market orientation, we add to the current list of antecedents by suggesting factors outside of the organizational realm. Studies on the antecedents tend to focus on factors that directly impact market orientation preferences, which fall into three organizational categories, including top management factors, interdepartmental connectedness and organizational systems (Jaworski & Kohli, 1993; Kirca, Jayachandran and Bearden, 2005). More recent work points towards going beyond these factors and to include more antecedents in relation to the perception of challenges by entrepreneurs and to emphasize how they should manage their resources. For example, Guo, Kulviwat, Zhu, and Wang (2019) investigated the antecedents of market orientation from macro level by focusing on market turbulence, competitive intensity and technology turbulence. Our study aligns with this proposal and further extends the research framework on market orientation antecedents by adding variables on the product level.

Although the importance of product features is well acknowledged in the marketing literature, little attention has been paid to the study of product features as antecedents of market orientation from a strategic perspective. Instead, existing research on the relation between market orientation and product features prevailing take products and their associated features as outcomes (Morgan & Anokhin, 2020; Zhao, Song & Storm, 2013; Zhou, Yim & Tse, 2005). However, in the context of technology based new ventures, research indicates that firms often adopt a hybrid strategy, combining technology-push and market-pull approaches to create new products and services (Guo et al., 2020). Entrepreneurs who follow this hybrid approach may experiment with product prototypes based on their initial business model hypothesis, while also adjusting the strategy by following market feedback. Specifically, our study show both product protect-ability and product scalability matter in shaping market orientation in technology based ventures. Moreover, as previous research on antecedents of market orientation typically deals with the direct influences of each factor respectively, our study examined the joint impact of product features and entrepreneurial experience in developing market orientation. Such a more complex framework of interactions aligns with the “opportunity-individual nexus” in the entrepreneurship literature (Dencker & Gruber, 2015; Shane & Venkataraman, 2000; Shepherd, Souitaris, & Gruber,

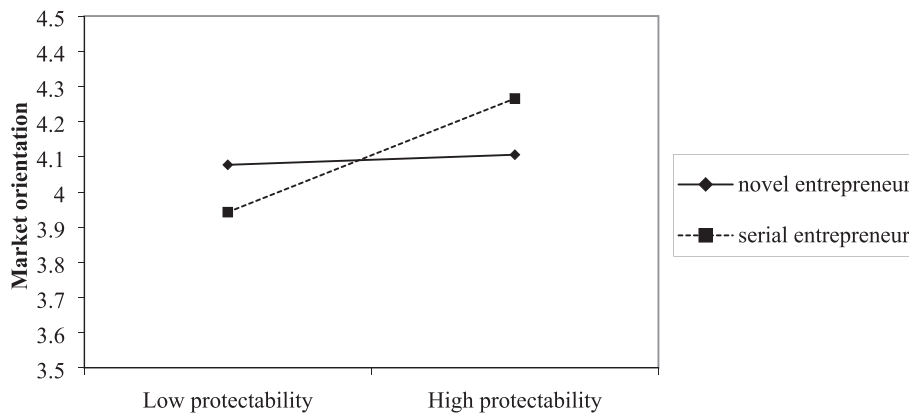


Fig. 2. The effects of protect-ability and serial entrepreneur on market orientation.

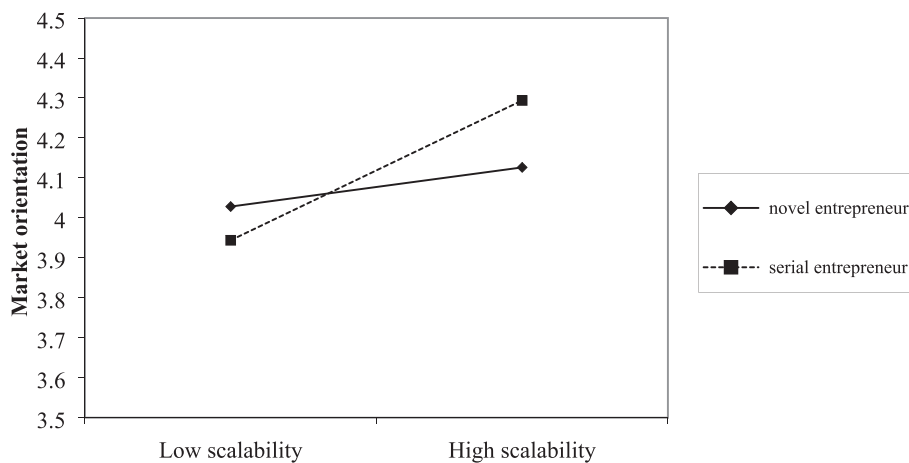


Fig. 3. The effects of scalability and serial entrepreneur on market orientation.

2020) and provides a more elaborate view on the nature of market orientation practices.

Second, our research response to the call of further investigation on resource orchestration in start-ups (Sirmon et al., 2011). The framework of resource orchestration is essentially a contingency model where firms aim to find an optimum between the required and available resources in order to leverage preferred strategies. Investigating the contingencies of market-orientation in start-ups is promising because market orientation is a generally beneficial yet challenging strategy orientation. Specifically, we theoretically and empirically examine the role of product features to mobilize resources for acquiring, disseminating and using market information in the entrepreneurship process. Our study shows the pivotal role of entrepreneurial experience as a catalyst for resource orchestration and enriches the current contingencies associated with the organization of resources. In addition to the constraints of resource acquisition, entrepreneurs are likely to be constrained by their decisions in relation to the allocation and deployment of resources. Our results show that contextual factors, such as product features could indeed influence this particular decision-making process.

This study offers a number of practical implications for technology-based ventures. First, we suggest that technology-based entrepreneurs should consider the potential technology appropriation risk and market potential when developing their market orientations. While implementing market orientation is often believed to improve venture performance, entrepreneurs needs to be aware that doing so may also bring resources investment challenges and concerns related the potential competitors. Additionally, pursuing market orientation may result in information overload. Therefore, the development of market orientation

strategies becomes a crucial issue in the overall technology-based entrepreneurship process. It is suggested to jointly consider both organizational characteristics as well as product features when opting for certain market orientation.

Second, the results of our study explicitly show the positive moderating effects of entrepreneurial experience in driving market orientations and this finding underscores the importance of human capital (i.e. entrepreneurial experience) in strategy making in the technology-based ventures. This may also imply that entrepreneurial experience may help to deal with the uncertainty brought by the implementation of a particular market orientation. If possible novel technology entrepreneurs are therefore advised to team up with serial entrepreneurs since this could compensate for their lack of experience in selecting suitable market orientations.

6. Limitations and future research

This study is subject to some limitations. First, our model does not include any industry related factors. As a previous study shows, also environment factors, such as market turbulence, competitive intensity are important for the development of market orientations (Guo, Kulviwat, Zhu & Wang, 2019). Therefore industry (e.g., whether it is an emerging industry) may have a potential impact on the strength of the relationship between product features and strategy making. Second, the sample of this study comprises technology-based start-ups in a wide variety of industries in the greater Shanghai area. This may limit the generalizability of our findings. We consider product protect-ability and scalability as features of opportunities because we argue that both these

features are closely related to the risk and return of opportunities. Therefore, these features play an important role in the strategy development process of technology-based firms. However, the results might be different for ventures that are not technology-based. Third, in order to empirically measure the features of opportunities, we approximate the protect-ability and scalability with patents and equity investments. We are aware that venture capital investments are not entirely the same as product scalability, and that protect-ability of a product may not only depend on the patent but on other protection mechanisms as well.

As our study is an initial attempt to examine the impact of product features on market orientation, our results may open up a number of opportunities for future research in this area. First, although we find that product features significantly affect the development of market orientations in technology based new ventures, strategy development in new ventures is not exclusively focused on market orientations. Previous studies show a variety of strategic orientations, including entrepreneurial orientation, market orientation, and resource orientation. Therefore, it may be interesting to study some of the potential tensions among these different strategic orientations. For examples, future studies could examine the impact of product features on diverse strategic orientations by exploring the role of products in the strategy making process of technology-based new firms. This could also be done across different markets or industries.

Second, future research could further explore the role of different opportunity types and focus on other possible product features. A larger variety of opportunity types such as opportunity attractiveness (Scheaf, Loignon, Webb, Heggstad & Wood, 2020) and opportunity riskiness (Dencker & Gruber, 2015) could be included, for example. Also studying the role of other product features, such as product novelty, product meaningfulness, could extend the current growing list of antecedents related to market orientation. As said, the results of this study could be enriched by future research across a variety of contexts and by including comparative analyses across different industries, regions and countries in order to further refine the core relationships. Finally, we also encourage future studies to seek additional and novel measures to capture product features in a more systematic and objective way in order to enable future comparisons and to improve the overall measurement quality of these constructs.

7. Conclusion

Entrepreneurs of technology-based ventures are subjected to a number of uncertainties in relation to the market, technology, and the availability of sufficient resources to develop effective market orientations. Our study shows how two product features (scalability and protect-ability) shape the development of market orientation strategies within new technology-based ventures. We also show that there is a positive interaction effect between the entrepreneurial experience of founders and product scalability in driving market orientation strategies. These efforts encourage research to better understand the complexities of strategy making and to view product features as additional antecedents of market orientation choice. Our empirical findings also support the importance of the resource orchestration process for the success of technology-based new ventures.

CRedit authorship contribution statement

Zhao Zhou: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Robert M. Verburg:** Writing – review & editing, Supervision, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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