Entrepreneurial orientation dimensions and the performance of high-tech and low-tech firms: A configurational approach

Abstract

Building on the entrepreneurial orientation (EO)-as-experimentation perspective, we examine how configurations of the EO dimensions (innovativeness, risk-taking, and proactiveness) might lead to high and low firm performance, and how the configurations differ under different firm contexts. We adopted a configurational approach and applied fuzzy-set qualitative comparative analysis (fsQCA) to a sample of 110 UK small and medium-sized enterprises. Our findings show that three (four) configurations can result in high (low)-firm performance, demonstrating that the EO dimensions can contribute to as well as hinder firm performance. Moreover, the configurations leading to the same outcome are distinct between high-tech and low-tech firms, indicating that the impacts of the EO dimensions on firm performance depend on the firm context. Our findings offer useful insights for managers on how to configure the portfolio of firms' entrepreneurial activities to achieve superior performance.

Keywords

Entrepreneurial orientation, configurational approach, small and medium-sized enterprises (SMEs), firm performance, fsQCA

1. Introduction

Entrepreneurial orientation (EO), which is defined as firms' propensity to engage in innovation, risk-taking, and proactive opportunity-seeking (Covin & Slevin, 1989; Miller, 2011), has been identified as an important driver of firm performance (for recent reviews, see Rauch et al., 2009; Gupta & Wales, 2017). EO can contribute to firm performance because it allows firms to capitalise on potential new opportunities and thus remain competitive in the fast-changing market environment (Hughes & Morgan, 2007; Wales et al., 2013). Previous research often conceptualise EO as a unidimensional construct by aggregating its three dimensions: innovativeness, risk-taking, and proactiveness (Rauch et al., 2009; Wales et al., 2013; Gupta & Batra 2016; Pittino et al., 2017). However, each of the three dimensions can have differential impacts on firm performance, respectively (Kreiser et al., 2013; Dai et al., 2014; Kollmann et al., 2019). Therefore, some researchers have conceptualised EO as a multidimensional construct by examining its dimensions separately (Lumpkin & Dess, 1996; Covin & Wales, 2019).

Emerging research has started to suggest that the levels of the three EO dimensions tend to vary within firms (Kreiser et al., 2013; Dai et al., 2014) and further examined holistically the three EO dimensions, that is, innovativeness, risk-taking, and proactiveness, based on a configurational perspective (Lisboa et al., 2016; McKenny et al., 2018; Palmer et al., 2019). The reason being that firms constrained by resources may not be able to pursue high innovativeness, risk-taking, and proactiveness simultaneously as these entrepreneurial activities are resource-intensive (Lumpkin & Dess 1996). Furthermore, innovativeness, risk-taking, and proactiveness will likely impact firm performance in combinations rather than independent of each other. For example, Lomberg et al. (2016) find that innovativeness and proactiveness have shared effects on firm performance. Putniņš & Sauka (2020) suggest that the effects of risk-taking on firm performance depend on firms' levels of innovativeness.

Available research has generated useful insights about how configurations of the EO dimensions can enhance firm performance (Lisboa et al., 2016; McKenny et al., 2018; Palmer et al., 2019). However, given that innovativeness, risk-taking, and proactiveness are exploratory in nature, they are likely to entail uncertain outcomes (March, 1991). Indeed, according to the EO-as-experimentation perspective, "EO is associated with greater outcome variance, which enhances chances of both failure and success" (Wiklund & Shepherd, 2011, p. 925). In other words, EO might enhance as well as hinder firm performance.

Furthermore, the EO–performance relationship is contingent upon the context, including the size of the business and the industry where the business operates (Rauch et al., 2009). High-tech vs low-tech is a very important context, as high-tech firms often face greater uncertainty, complexity, and competition in the market environment than low-tech firms (Moriarty & Kosnik, 1989; Qian & Li, 2003; Sciascia et al., 2014; Lomberg et al,. 2016). Evidence suggests the impact of the unidimensional EO on firm performance depends on the industry context of the firm, such that, the impact is stronger in high-tech than non-high-tech firms (Rauch et al., 2009). However, no research has investigated whether and how the configurations of the three EO dimensions (innovativeness, risk-taking, and proactiveness) may result in high or low firm performance under such a different firm context.

Accordingly, this study aims to fill in the two above-mentioned gaps by examining two important and related but neglected questions. First, how may the configurations of innovativeness, risk-taking, and proactiveness lead to high and low firm performance? Second, how may the configurations for the same outcome depend on firm context concerning high-tech and low-tech firms? We used a sample of 110 small and medium-sized enterprises (SMEs) from the United Kingdom to answer the research questions based on the following two considerations. First, as Rauch et al. (2009) point out that the link between EO and performance depends on the size of the firm. SMEs, in comparison with large firms, are often constrained

by the limited resources they have (Radas & Božić, 2009; Maes & Sels, 2014). As such, SMEs might not be able to pursue high levels of innovativeness, risk-taking, and proactiveness at the same time because they are resource-intensive activities (Lumpkin & Dess, 1996). In other words, they need to be more strategic in configuring the activities they pursue to avoid over-stretching the limited resources they possess. Second, SMEs play an important role in the UK because 99.9% of all businesses are SMEs, which accounted for 60% of all jobs created in the private sector (BEIS, 2018). They are exposed to increased uncertainty and challenges, for example, access to EU markets, raw materials, and labour (Brown et al., 2019). It is thus imperative to better understand how configurations of entrepreneurial activities may enhance or impede the performance of SMEs that, in turn, can impact economic development and job creation (Thurik & Wennekers, 2004).

To address our research questions, we applied fuzzy-set qualitative comparative analysis (fsQCA), which has been adopted by increasing studies in entrepreneurship (e.g. Pittino et al., 2017; Leppänen et al., 2019; Douglas et al., 2020) and management (e.g. Greckhamer et al., 2018; Hildebrandt et al., 2018). This method has its advantages to uncover causal complexity concerning conjunction, asymmetry, and equifinality (Furnari et al., 2020). In particular, it can reveal how conditions leading to an outcome might not mirror the conditions leading to the absence of the same outcome, meaning causal asymmetry (Meyer et al., 1993). Moreover, it can identify potentially multiple configurations (e.g. equifinality) that produce the same outcome (Ragin, 2008; Schneider & Wagemann, 2012), which cannot be achieved through traditional statistical methods such as regression analysis. Furthermore, fsQCA can examine innovativeness, risk-taking, and proactiveness simultaneously and uncover how the combinations of them (e.g. causal conjunction) lead to a certain outcome (Ragin 2008; Schneider & Wagemann, 2012). As Covin and Wales (2019, p. 10) noted, "the use of fsQCA can potentially open up new avenues for identifying EO's various profiles" that

produce particular outcomes. Finally, unlike the traditional regression-based approach, the fsQCA method can deal with small samples (Ragin, 2008), meaning a sample size of 110 used in the present study is sufficient for fsQCA (Schneider & Wagemann, 2012).

The present study contributes to the literature in several ways. First, our study expands research on EO-as-experimentation perspective (Wiklund & Shepherd, 2011; Patel et al., 2015) by providing evidence showing how configurations of innovativeness, risk-taking, and proactiveness can lead to high as well as low firm performance. Second, our findings based on a configurational approach extend the EO literature by uncovering that risk-taking will not necessarily hinder firm performance. In response to the calls to examine the EO dimensions holistically (Wales 2016; Covin & Wales 2019), our research finds that risk-taking in combination with absent proactiveness can produce a high firm performance for high-tech firms. This challenges the conclusion made by previous research that risk-taking will negatively influence firm performance (Hughes & Morgan, 2007; Kreiser et al., 2013). Third, our study provides a more fine-grained understanding of how the configurations of the EO dimensions impacts firm performance by taking into account the firm context. While previous research suggests high-tech firms benefit more from EO (Rauch et al., 2009), our research based on a configurational approach shows that innovativeness appears to be more important for low- than high-tech firms. Together, our findings have important practical implications for SME managers: firms can obtain superior performance in multiple ways through configuring the different entrepreneurial activities to align with their firm context.

2. Theoretical background

2.1 EO and firm performance: A configuration approach

Previous research has conceptualised EO in two ways: unidimensional and multidimensional. The unidimensional view of EO is "focusing on what is *common* among

entrepreneurial firms" (Covin & Wales, 2019, p. 4). Researchers following this view operationalise EO by aggregating innovativeness, risk-taking, and proactiveness as one construct. For example, in a systematic review of 51 studies, Rauch et al. (2009) found that the unidimensional EO is significantly related to firm performance. By contrast, the multidimensional view of EO is "focusing on 'how entrepreneurial firms can be *different*'" (Covin & Wales, 2019, p. 4). Researchers with this view examine the three EO dimensions separately. For example, Kreiser et al. (2013) found that the three EO dimensions have differential impacts on firm performance. Both unidimensional and multidimensional views are legitimate because they emphasise different phenomena (Gupta & Wales, 2017; Covin & Wales, 2019).

In recent years, increasing research has called for studies to examine EO from a configurational perspective (Wales, 2016; Covin & Wales, 2019). One reason is that entrepreneurial activities are resource-intensive (Lumpkin & Dess, 1996), meaning resource-constrained firms might not be able to pursue all three activities simultaneously. In other words, they may need to strategically configure firms' entrepreneurial activities to avoid over-stretching the limited resources they have. Another reason is that the entrepreneurial activities may act in combinations to impact organisations. For example, innovation outcomes depend on how fast (e.g. proactiveness) the new products or services are launched into the market (Evanschitzky et al., 2012; Cankurtaran et al., 2013). Indeed, evidence suggests that innovativeness and proactiveness have shared effects on firm performance (Lomberg et al., 2016). Therefore, in addition to examining the shared effects (unidimensional EO) or the independent effects of innovativeness, risk-taking, and proactiveness on organisations, it is also critical to consider how configurations of the three dimensions impact firm performance.

Although it is well acknowledged that EO can contribute to firm performance (Rauch et al., 2009), emerging research has highlighted that EO might not always translate into better

performance. Specifically, according to the EO-as-experimentation view proposed by Wiklund and Shepherd (2011), EO will likely lead to performance variation, including both success and failure. In other words, EO has a double-edged sword effect resulting in both high performance and low performance. For example, Patel et al. (2015) find that EO can lead to variability in innovation outcomes. Since innovativeness, risk-taking, and proactiveness are, in essence, exploratory that entails uncertain returns (March, 1991), we argue that the configurations of the three dimensions can produce both high and low performance. In the next section, we discuss how each EO dimension might enhance and impede firm performance in turn.

2.2 EO and its double-edged effect on firm performance

We argue that innovativeness, risk-taking, and proactiveness may enhance as well as impede firm performance because they all entail costs and uncertainties (Kreiser et al., 2013; Dai et al., 2014; Rodrigo-Alarcón et al., 2018). Innovativeness represents firms' propensity "to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes" (Lumpkin & Dess, 1996, p. 142). On the one hand, innovativeness provides firms with the opportunity to differentiate themselves from competitors (Qian & Li, 2003) and obtain better profits (Gatignon & Xuereb, 1997; Ardito et al., 2015; Linton & Kask, 2017). Indeed, innovativeness allows firms to address changing customer demands and thus achieve superior performance (Howell et al., 2005; Wiklund et al., 2009; Cheng et al., 2013). On the other hand, innovativeness may negatively impact SMEs because they often lack resources, capabilities, and experiences in performing innovation activities (Van de Vrande et al., 2009; Nicholas et al., 2011). As such, pursuing high levels of innovativeness may "compromise the ability of SMEs to meet short-term financial obligations" due to the up-front investments required for developing firm-specific innovation capabilities (Kreiser et al., 2013, p. 276). Furthermore, the innovation process entails uncertainties

(Schnaars, 2002; Zhou, 2006), meaning not all innovation activities can yield positive outcomes.

Similarly, risk-taking may enhance as well as reduce firm performance. SMEs may need to embrace risk-taking to capitalise on potential new market opportunities (Frishammar & Hörte, 2007; Dai et al., 2014). The reason being that "if no risks are taken, no new products will ever be produced and launched" (Frishammar & Hörte, 2007, p. 769). Hence, risk-taking may contribute to firm performance because it allows firms to remain competitive in the marketplace. However, risk-taking entails a chance of failure (Janney & Dess, 2006; Alvarez, 2007). Indeed, high levels of risk-taking negatively impact firms' return on assets, while the opposite is the case when risk-taking is at a low or moderate level (Begley & Boyd, 1987). While increasing levels of risk-taking may produce better returns, the probability of failure is also higher (Alvarez, 2007). This implies that while successful risk-taking may enhance firm performance, the potential failure and losses from high levels of risk-taking may result in considerable business disruptions or even threaten firm survival. The disruptions will negatively impact the performance of SMEs because they often lack slack resources to absorb potential losses (Rosenbusch et al., 2013).

Proactiveness may enhance but also reduce firm performance. The propensity to engage in opportunity-seeking activities, such as anticipating market demands as well as launching products or services ahead of the competition, might contribute to firm performance because it allows firms to establish potential first-mover advantage and become a market leader (Lumpkin & Dess, 1996; Rauch et al., 2009). In addition, proactive firms have a higher propensity to engage in external environmental scanning that can contribute to the acquisition of information about the changing market environment and customer needs (Wang, 2008; Kreiser, 2011). However, anticipating future market demands entails uncertainties because consumer preferences can often change. Similarly, there is a chance that launching products ahead of the

competition may fail to generate positive outcomes. Indeed, market followers may have higher product success rates and outperform pioneers (Golder & Tellis, 1993; Schnaars, 2002). This may be due to the benefits of vicarious learning followers gained from pioneers (Srinivasan et al., 2007).

In short, the above discussions suggest that while innovativeness, risk-taking, and proactiveness may contribute to firm performance, they can also hinder firm performance because each activity is associated with costs and uncertainties.

2.3 The interplay of innovativeness, risk-taking, and proactiveness

We also argue that innovativeness, risk-taking, and proactiveness are likely to impact firm performance in combination rather than in isolation. Innovativeness may take place with different levels of proactiveness. For example, firms may launch new products ahead of the competition or act as followers by imitating the products of competitors (Schnaars, 2002). The former implies high proactiveness, while the latter implies low proactiveness. Because the outcomes of innovation depend on how fast (e.g. proactiveness) the products are launched into the market (Evanschitzky et al., 2012; Cankurtaran et al., 2013), it is fair to expect that firm performance will be influenced by the combinations of innovativeness and proactiveness. Indeed, emerging evidence has shown that innovativeness and proactiveness have shared effects on firm performance (Lomberg et al., 2016), providing support that it is important to examine the EO dimensions in combinations.

Similarly, innovativeness is likely to be associated with risk-taking. Because the innovation process consumes substantial resources (Evanschitzky et al., 2012), and a successful innovation outcome cannot be guaranteed (Rosenbusch et al., 2011), innovation can be considered a risky undertaking. Indeed, as Li et al. (2008, p. 119) point out, "the risk-taking orientation can manifest itself as the tendency to […] or [to] bring new products into new

markets". Research has highlighted that, however, some innovations are more risky than others (Zahra & Bogner, 2000). For instance, "risky innovations are developments whose failure can cause the demise of the firm" (Lomberg et al., 2016, p. 977), whereas "non-risky innovations" tend to have less profound impacts on the firm. Hence, we expect firm performance might be shaped by the combinations of innovativeness and risk-taking.

Moreover, the opportunity-seeking behaviour in terms of proactiveness might also entail risk-taking. Indeed, recent evidence has shown that proactive firms tend to take on more risks than firms that are less proactive (Putniņš & Sauka, 2020). Hughes and Morgan (2007, p. 653) suggest that "[r]isk aversion renders firms passive to developing new market opportunities, which is likely to deteriorate performance in an age of rapid change". This implies that low levels of risk-taking and proactiveness might hinder firm performance in dynamic environments. Yet research has also highlighted that small firms should "avoid proactive and risk-taking strategies in hostile environments" due to resource constraints (Rosenbusch et al., 2013, p. 649), meaning they lack resources to absorb potential losses that make them vulnerable. This implies that to capitalise on emerging new opportunities (i.e. proactiveness), small firms might not be able to commit substantial resources and thus involve lower risks in their opportunity-seeking activities. Taken together, we expect firm performance will be influenced by the combinations of proactiveness and risk-taking.

2.4 The differences between high-tech and low-tech firms

Firms in different industry sectors often experience different degrees of environmental dynamism, hostility, and complexity (Lomberg et al., 2016). For example, high-tech firms tend to face greater environmental dynamism and competition than low-tech firms. This implies that firms may differ in their needs to engage in innovativeness, risk-taking, and proactiveness,

depending on the firm context. We argue that the configurations leading to high (or low) levels of firm performance will vary between high-tech and low-tech firms for three reasons.

First, high-tech and low-tech firms differ in their needs for innovativeness. The preferences and demands of consumers often change rapidly within the high-tech sector (Moriarty & Kosnik, 1989; Qian & Li, 2003). As such, high-tech firms tend to have short product life cycles (Qian & Li, 2003; Szymanski et al., 2007), meaning firms' existing products in the marketplace can be short-lived. To remain competitive in the marketplace, high-tech firms thus have greater needs to pursue innovativeness for new products or services. In addition, many high-tech firms tend to be located in a cluster or in proximity which allows knowledge spillover and propels them to adopt an innovation (Orlando, 2004; Aldieri et al., 2020). By contrast, low-tech sectors are associated with a relatively stable environment (Qian & Li, 2003; Szymanski et al., 2007). This implies that they can often enjoy longer product life cycles. As a result, low-tech firms might have less pressure in pursuing innovation.

Moreover, high-tech and low-tech firms are exposed to different levels of risks. High-tech firms tend to require more investments for new projects than low-tech firms (Bolland & Hofer, 1998; Gowen & Tallon, 2005; Thornhill, 2006). Hence, the projects launched by high-tech firms tend to entail greater risks than those launched by low-tech firms. Because risk-taking entails uncertain outcomes (Alvarez, 2007), the potential positive or negative results from risk-taking can thus have a more prominent influence on high-tech than low-tech firms. That is, successful risk-taking may generate more returns for high-tech than low-tech firms; unsuccessful risk-taking may have more negative consequences on firm performance for high-tech than low-tech firms.

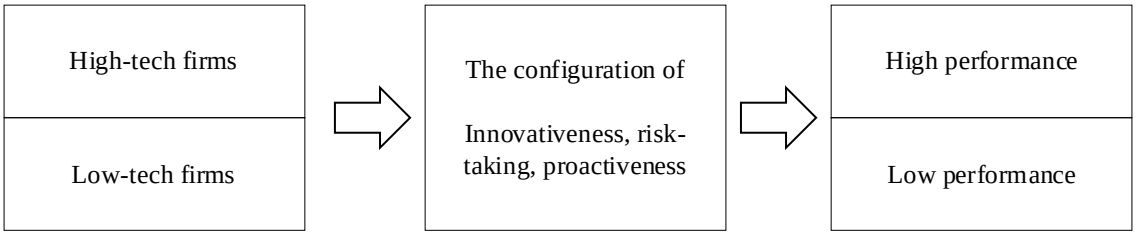
Lastly, high-tech and low-tech firms also differ in their needs for proactiveness. High-tech firms often experience greater technological and market changes than low-tech firms (Moriarty & Kosnik, 1989; Qian & Li, 2003; Szymanski et al., 2007). Because of the uncertain

and competitive environment associated with high-tech sectors (Bierly & Daly, 2007; Wu, 2012), high-tech firms have greater pressures to act in anticipation of market demands than low-tech firms. Indeed, the products from high-tech firms can become obsolete quickly in an environment where product life cycles are short and competition is high (Wu, 2012). To maintain competitiveness in the dynamic marketplace (Ardito et al., 2015), high-tech firms are more in need than low-tech firms to develop and launch new products ahead of the competition, that is, demonstrating higher levels of proactiveness.

In short, because the environments in which high-tech and low-tech firms are operating are associated with different levels of changes, competition, and complexity, they differ in their needs for innovativeness, risk-taking, and proactiveness. As such, the configurations for highor low firm performance will likely vary across firms from different industry contexts.

Figure 1 illustrates the framework of the analysis of this study. For both high-tech and low-tech firms, we examine how the configurations of innovativeness, risk-taking, and proactiveness can lead to high and low performance.

Figure 1. The framework of analysis



3. Method

3.1 Sample and data collection

We used the Financial Analysis Made Easy (FAME) database as the sampling frame because it contains detailed information about firms within the UK, and it has been used in previous EO research in the context of SMEs (Dada & Fogg, 2016). The first step is to identify

firms from the database. To achieve this, we applied three sample selection criteria: 1) firms with a primary trading address in England, UK; 2) active firms not in receivership or dormant; and 3) firms with no more than 250 employees. The first step led to 52,568 firms that fulfil our criteria. We only randomly selected 5,000 firms for further examination due to resource constraints. For the second step, we examined the dataset and removed firms that do not provide contact details for their top executives. In addition, around 5–10 firms were selected to represent each district in England (309 districts in total). Using this strategy, we try to avoid a concentration of firms in particular cluster or context. This step resulted in a sample of 1,542 firms. As the final step, we contacted these firms through an invitation email for data collection in May 2015. Our emails reached 1,388 target firms while the remaining 154 emails failed to deliver because of invalid email addresses or the executive has retired or moved to other firms. We then sent three rounds of follow-up emails to contact firms that did not respond.

In total, we collected 157 responses, a response rate of 11.3% based on the 1,542 firms that we reached. We excluded 47 firms due to missing data on key variables, leading to a final sample of 110 firms for further data analysis. The firms differ in age, size, and industry. For example, the average firm age was 30.4 years. In terms of firm size, 22 firms had fewer than 10 employees, 36 firms had 11–50 employees (36 firms), and 52 firms had 51–250 employees. The firms also cover different industry sectors, including 31 manufacturing firms, 53 service firms, and 26 firms associated with manufacturing and service. It should be noted that although firms from different industries are likely to engage in different types of activities, evidence suggests there is only a slight difference in innovation capabilities between the manufacturing and service sectors (Forsman, 2011). More importantly, evidence suggests there is no significant difference in the EO–performance relationship between SMEs in the manufacturing and service sectors (Rigtering et al., 2014), suggesting EO is equally important for firms in different sectors.

We conducted a *t*-test by comparing the early and late responses on focal variables including innovativeness, risk-taking, proactiveness, and firm performance to examine potential non-response bias, following Shashi et al. (2019). The two groups did not differ significantly on the focal variables (i.e. p-values > 0.05), suggesting non-response bias is unlikely to be an issue for the present study (Armstrong & Overton, 1977; Dada & Fogg, 2016).

We applied several approaches to minimise the potential impacts of common method bias. First, we guaranteed anonymity and confidentiality of survey responses to all participants to mitigate the effect of social desirability in answering the survey (Podsakoff et al., 2003). Second, we conducted Harman's one-factor test on the data collected. The results showed the three factors, namely innovativeness, risk-taking, and proactiveness accounting for 76.43% of the variance extracted, and the first factor (risk-taking) accounted for only 49.84% of the total variance explained. Third, we applied a confirmatory factor analysis (CFA) to evaluate the data. The results indicate a good model fit (CFI=0.96, RMSEA=0.08, $\chi 2 = 42.17$, df = 24, $p < 0.05$) (Hair et al., 2014). These results show common method bias is not a concern for our study.

3.2 Measurements

Outcome condition. We measured firm performance by asking participants to indicate the percentage of changes in firms' sales revenues in the past three years. A positive number indicates growth, and a negative number suggests a decrease in sales revenue.

Causal conditions – EO dimensions. We employed the widely adopted nine-item scale to measure innovativeness, risk-taking, and proactiveness (Covin & Wales, 2012), based on a scale from 1 (strongly disagree) to 5 (strongly agree). The measurements aim to capture the three dimensions at the firm level.

Appendix 1 illustrates the details of the survey questions. All conditions show strong construct reliability and validity such that Cronbach's alpha and composite reliability were well above the threshold of 0.70; the average variance extracted were above the threshold of 0.50; and all factor loadings were above 0.50 level (Hair et al., 2014).

High-tech and low-tech firms. Previous research often categorises firms into high-tech or low-tech firms based on the percentage of Research and Development (R&D) expenditures to sale revenues (Balkin et al., 2000; Makri et al., 2006). Yet, this measure is not without problems. For example, low sale revenues might make the percentage of R&D expenditures appear to be disproportionately high. Moreover, objective data concerning R&D expenditures are often hard to assess "because in most small firms there are no distinct R&D departments" (Autio et al., 2000, p. 916). Given that objective data is scarce for SMEs, we assess respondents' perceptions of their industry by using two questions. Specifically, we asked participants to indicate the extent to which their primary products are 1) high- or low-technology (Bierly & Daly, 2007) and 2) high or low knowledge-intensive (Thornhill, 2006; Bolland & Hofer, 1998), based on a scale from 1 (low) to 5 (high). We utilised the mean of the two items to categorise firms into high-tech or low-tech firms.

3.3 Implementing fsQCA

Following the suggestions from Schneider and Wagemann (2012), we conducted the fsQCA based on three steps. The first step is data calibration, meaning transforming the data for all causal and outcome conditions into fuzzy membership scores (Ragin, 2008). We performed the direct calibration method using the fsQCA 3.0 software (UC, 2017). Specifically, in line with previous fsQCA research (Pittino et al., 2017; Stroe et al., 2018), we selected 90th, 50th, and 10th percentile data to represent full membership, crossover point, and full non-membership, respectively, for the three causal conditions (innovativeness, risk-taking, and

proactiveness) and the outcome condition (Firm performance). Table 1 shows the calibration thresholds and the descriptive statistics for all conditions.

Table 1: Means, Standard Deviations (SD), Calibrations, and Correlations of Variables

Conditions	M	SD	Full in	Crossover point	Full out	1	2	3
1. Innovativeness	3.33	.85	4.67	3.33	2.33			
2. Risk-taking	2.86	.97	4.00	3.00	1.37	.492**		
3. Proactiveness	3.21	.92	4.33	3.00	2.00	.515**	.468**	
4. Firm performance	0.27	.55	0.55	0.18	–0.12	–.021	.047	–.050

N=110 firms; *p < .05; ** < .01 (two-tailed).

The second step in fsQCA is to perform the necessity analysis – to assess whether the presence or absence (~) of any of the causal conditions (innovativeness, risk-taking, and proactiveness) were necessary for firms to obtain high or low firm performance. A condition is a necessary condition for a certain outcome when the condition occurs in all cases leading to the outcome. Table 2 shows the results from the necessity analysis. The results suggest that none of the individual conditions alone was necessary to determine the presence of high or low firm performance based on a consistency threshold of 0.9 (Schneider et al., 2010). That is, innovativeness, risk-taking, or proactiveness alone was not a necessary condition to produce high or low firm performance.

Table 2: Analysis of necessary conditions for high and low firm performance

	High firm performance		Low firm performance	
Conditions	Consistency	Coverage	Consistency	Coverage
Innovativeness	0.587	0.598	0.512	0.545
~ Innovativeness	0.553	0.520	0.622	0.612
Risk-taking	0.583	0.574	0.551	0.568
~ Risk-taking	0.561	0.545	0.587	0.596
Proactiveness	0.646	0.566	0.610	0.558
~ Proactiveness	0.496	0.548	0.526	0.609

Note: ~ indicates the absence of the condition

The third step in fsQCA is to perform the sufficiency analysis to identify the configurations that are sufficient to produce high and low firm performance (Huang et al., 2020). To perform the sufficiency analysis, we first constructed a truth table containing eight configurations ($2^{3)}$ based on the three causal conditions included in our study (Ragin, 2008). Each configuration in the truth table entails at least two empirical cases, meaning that there are no logical remainders, which refers to configurations that contain no empirical cases (Schneider & Wagemann 2012). As such, all configurations in the truth table were used for further analysis. We coded the outcomes of the individual configurations as 1 if the consistency is equal to or above the threshold of 0.80 (Ragin, 2008), otherwise, the configuration was coded as 0. The truth tables for high and low firm performance are shown in Appendix 2. Finally, the fsQCA 3.0 software derives three types of solutions (i.e. complex, intermedia, and parsimonious solutions) based on the Quine–McCluskey algorithm (Fiss 2007; UC 2017). Because our study contains no logical remainders, the results from the three types of solutions are identical. Our model for sufficiency analysis includes three conditions:

Firm performance = f (innovativeness, risk-taking, and proactiveness)

4. Results

Table 3 illustrates the results from sufficiency analysis for high firm performance. As shown in the table, three configurations (P1–P3) are sufficient to produce superior performance. The consistencies for each configuration as well as the overall solution consistency were above the recommended level of 0.75 (Ragin, 2008). The overall solution coverage is 0.53 for high-tech firms, and it is 0.44 for low-tech firms, indicating that the identified configurations can explain a substantial share of the outcome. For high-tech firms, configuration P1 implies that risk-taking in combination with the absence of proactiveness can produce superior performance, where innovativeness is irrelevant; configuration P2 shows that the absence of risk-taking in combination with the presence of proactiveness can lead to superior performance, where innovativeness is irrelevant. For low-tech firms, configuration P3 demonstrates that the joint presence of innovativeness and proactiveness in combination with the absence of risk-taking can result in superior performance.

Table 3: Causal configurations for high firm performance

Conditions	High-tech firms (n=56)		Low-tech firms (n=54)
	P1	P2	P3
Innovativeness			●
Risk-taking	●	○	○
Proactiveness	○	●	●
Consistency	0.85	0.81	0.81
Raw coverage	0.31	0.37	0.44
Unique coverage	0.16	0.22	0.44
Overall solution consistency	0.82		0.81
Overall solution coverage	0.53		0.44

● (○) represents the presence (absence) of the causal condition
Empty space represents the condition is irrelevant for the outcome

Table 4 shows the results from sufficiency analysis for low firm performance. As shown in the table, four configurations (A1–A4) are sufficient to produce low firm performance. The

overall solution consistencies were 0.82 and 0.74 for high-tech and low-tech firms, respectively. Although the overall solution consistency for low-tech firms is slightly lower than the threshold of 0.75 (Ragin, 2008), we retained the configurations because the configurations explained a substantial share of the outcome, as indicated by the high solution coverage of 0.73. For high-tech firms, configuration A1 shows that innovativeness in combination with the joint absence of risk-taking and proactiveness can lead to low performance; configuration A2 indicates that the absence of innovativeness when combined with the joint presence of risk-taking and proactiveness, can also lead to low performance. For low-tech firms, configuration A3 shows that risk-taking can produce low performance, where innovativeness and proactiveness are irrelevant; configuration A4 demonstrates that the absence of innovativeness in combination with the presence of proactiveness can lead to low firm performance, where risk-taking is irrelevant.

Table 4: Causal configurations for low firm performance

	High-tech firms (*n*=56)		Low-tech firms (*n*=54)	
Causal Conditions	A1	A2	A3	A4
Innovativeness	●	○		○
Risk-taking	○	●	●	
Proactiveness	○	●		●
Consistency	0.85	0.82	0.74	0.81
Raw coverage	0.26	0.32	0.59	0.49
Unique coverage	0.14	0.20	0.23	0.14
Overall solution consistency	0.82		0.74	
Overall solution coverage	0.46		0.73	

● (○) represents the presence (absence) of the causal condition
Empty space represents the condition is irrelevant for the outcome

5. Discussion and conclusion

5.1 Discussion and contributions

Our empirical findings reveal that configurations of innovativeness, risk-taking, and proactiveness can contribute to as well as impede firm performance. In particular, our findings show that three configurations (configurations P1–P3) can lead to the presence of high firm performance. An examination of the three configurations demonstrates that none of the configurations leading to high firm performance contains the presence of all three EO dimensions, supporting the view that not all EO dimensions will occur at the same time (Lumpkin & Dess, 1996; Covin & Wales, 2019). We suspect this might be due to the resource constraints that SMEs often face (Van de Vrande et al., 2009; Heidenreich, 2009; Rosenbusch et al., 2013), limiting their capabilities to pursue all three activities simultaneously. In contrast to previous studies suggesting that risk-taking negatively influences firm performance (Hughes & Morgan, 2007; Kreiser et al., 2013), we uncover that risk-taking will not necessarily hinder firm performance when the EO dimensions are examined holistically. For example, risk-taking in combination with the absence of proactiveness can lead to high firm performance for high-tech firms (configuration P1).

Our findings also reveal that four configurations (configurations A1 to A4) can lead to the presence of low firm performance. Research on the EO-as-experimentation perspective has highlighted that EO is likely to produce performance variance, leading to success and failure (Wiklund & Shepherd, 2011). However, our understanding of this issue is still limited because researchers have devoted limited attention to this area, probably except the study from Patel et al. (2015) that examines how the unidimensional EO can lead to variability in innovation outcomes that in turn influence firm performance. Our study expands this line of research by providing evidence showing how configurations of innovativeness, risk-taking, and proactiveness can hinder firm performance and lead to low firm performance.

We found that the configurations leading to high and low firm performance are distinct between high-tech and low-tech firms. For example, configurations P1 and P2 for high-tech firms are distinct from configuration P3 for low-tech firms. Interestingly, innovativeness is shown only in configuration P3 (low-tech firms), but not in configuration P1 or P2 (high-tech firms). This implies that innovativeness is likely to be more important for low-tech firms. One explanation is that high-tech firms often pay close attention to the innovativeness of their products (Kirner et al., 2009), meaning further increases in such efforts are associated with diminishing returns (Strumsky et al., 2010). In contrast, low-tech firms are more likely to establish a differentiation advantage through innovation and thus obtain better performance (Porter, 1980; Linton & Kask, 2017). This is because low-tech sectors are more stable, meaning new products tend to emerge less frequently in such sectors (Qian & Li, 2003; Szymanski et al., 2007). Another explanation may be that innovativeness for high-tech firms and low-tech firms may mean different things, relevant to the measurement we adopted for innovativeness at the firm level. For example, for high-tech firms, new products or services to the industry or even to the world are seen as innovation, whereas for low-tech firms, products or services new to themselves including imitation may be deemed as innovativeness.

Our study contributes to the literature in several ways. First, our study expands research on the EO-as-experimentation perspective by providing evidence showing how configurations of innovativeness, risk-taking, and proactiveness can lead to high and low firm performance. While previous research has highlighted that the unidimensional EO may lead to variance in firm performance (Wiklund & Shepherd, 2011; Patel et al., 2015), to the best of our knowledge, the present study represents the first to demonstrate how *configurations* of the EO dimensions can not only contribute to but also hinder firm performance. Second, based on a configurational perspective, our study extends the EO literature by uncovering that risk-taking will not necessarily impede firm performance as suggested in previous studies (Hughes & Morgan,

2007; Kreiser et al., 2013). Our findings show that risk-taking in combination with the absence of proactiveness can result in high firm performance for high-tech firms (i.e. configuration P1). This result demonstrates the importance to examine the EO dimensions holistically and provides support for recent calls to examine EO based on a configurational perspective (Wales, 2016; Pittino et al., 2017; Covin & Wales, 2019; McKenny et al., 2019).

Third, our study advances the research on EO by showing how configurations of the EO dimensions might impact firm performance differently under different contexts. Available research suggests that high-tech firms can benefit more from EO (Rauch et al., 2009). However, our findings based on the configurations of EO dimensions uncover that this might not always be the case – high levels of innovativeness appear important for low-tech but not high-tech firms. Therefore, our research extends previous studies (e.g. Sciascia et al., 2014; Buenechea-Elberdin et al., 2017) that investigated the role of firms' innovativeness concerning EO and firm performance. Furthermore, we find that while risk-taking in combination with the absence of proactiveness can lead to high firm performance for high-tech firms, risk-taking alone can also result in low firm performance for low-tech firms. As such, the performance implications of risk-taking also depend on the firm context. Proactiveness appears to have similar performance implications for firms in a different context because this condition occurs in the configurations for both high-tech and low-tech firms.

From a practical perspective, our findings offer useful guidelines for SME managers on how to leverage entrepreneurial activities for superior performance. Instead of pursuing high levels of innovativeness, risk-taking, and proactiveness at the same time as suggested in previous research (Rauch et al., 2009), SMEs need to be strategic in configuring the EO dimensions to avoid overstretching the limited resources they have as well as to align the different activities with firm context. High-tech firms, for example, can leverage risk-taking for high firm performance by ensuring proactiveness is absent, which provides them with more

time to accumulate market insights that in turn help to mitigate the uncertainties associated with risk-taking (Schnaars, 2002; Srinivasan et al., 2007). High-tech firms can also emphasise proactiveness to capitalise on emerging new opportunities (Dess et al., 2003) while at the same time, ensure risk-taking is absent to prevent potential costly failure (Kreiser et al., 2013). To achieve high firm performance, low-tech firms can leverage innovativeness and proactiveness to gain the potential advantage of differentiation (Porter, 1980; Linton & Kask, 2017), while at the same time, ensure risk-taking is absent. In short, our findings are of interest to SME managers because the results uncover that firms can attain superior performance in multiple ways that do not always involve high levels of risk-taking.

5.2 Limitations and future research

This study has several limitations, which nevertheless provide opportunities for future research. First, our use of the percentage of changes in sales revenue to measure firm performance may not well represent firm performance. While using objective performance indicator are advantageous over the subjective approach (e.g. Rauch et al., 2009), increase in sales may not always yield a better profit (Davidsson & Wiklund, 2014). Hence, future studies could scrutinise whether our results hold by applying other performance measures such as using profitability as the outcome condition.

Second, we focussed on SMEs to reduce the potential heterogeneity in the study. Yet small firms and medium-sized firms may differ in their characteristics, resources, and capabilities (OECD, 2017). Therefore, future research examining the configurations of EO dimensions could also consider how the configurations for a particular outcome may depend on factors such as the size and age of firms.

Third, the present study did not control for the different industry activities but focussing on comparing the performance of high-tech and low-tech firms. Because firms from different

industries are likely to engage in different activities, it is possible that the performance implications of innovativeness, risk-taking, and proactiveness might be contingent on the industry sector. However, research has shown that there is no significant difference in the EO–performance relationship between SMEs in the manufacturing and service sectors (Rigtering et al., 2014), meaning EO is equally important for firms in different sectors. This does not rule out the possibility that EO and its dimensions may reflect different contexts. For instance, innovativeness for low-tech firms may have a different meaning and weight compared to innovativeness for high-tech firms. Future research could focus on firms from a specific sector to assess whether the configurations identified from our study hold under specific industry sector. Further studies could also explore the need to refine EO measurement for specific contexts.

Finally, the present study shows that while configurations of EO dimensions can contribute to firm performance, they can also result in low firm performance. Because of the double-edged effects of the EO dimensions on firm performance, future research could examine potential factors that might enhance the positive side and curtail the negative side of the EO dimensions. For example, recent research has shown that realised absorptive capacity allows firms to manage variability in innovation outcomes and achieve better firm performance (Patel et al., 2015). Future research could explore whether and how the presence of organisational ambidexterity, the capability to balance exploration and exploitation (O'Reilly & Tushman, 2013), might mitigate potential negative sides of the EO dimensions or complement the EO dimensions to enhance firm performance.

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Appendix 1. Survey Questions

Scales	Factor Loading
Innovativeness (α = .82; CR = .82; AVE = .60)	
We favour a strong emphasis on R&D, technological leadership, and innovations	.79
My firm has many new lines of products marketed in the past 3 years	.81
Changes in our product lines have usually been quite dramatic	.73
Risk-taking (α = .89; CR = .89; AVE = .72)	
We have a strong propensity for high-risk projects (with chances of very high returns)	.82
We believe, owing to the nature of the environment, that bold, wide-ranging acts are necessary to achieve the firm's objectives	.88
When there is uncertainty, we typically adopt a bold, aggressive posture in order to maximise the probability of exploiting potential opportunities	.85
Proactiveness (α = .79; CR = .81; AVE = .59)	
We initiate actions to which competitors then respond	.80
We are very often the first business to introduce new products, administrative techniques, operating technologies, etc.	.90
We typically adopt a very competitive, "undo-the-competitors" posture	.57

α = Cronbach's alpha; CR= composite reliability; AVE = average variance extracted.

Appendix 2. Truth Tables

Table 5a: Truth table for high firm performance (high-tech firms)

Rows	Conditions				
	Innovativeness	Risk-taking	Proactiveness	Number of cases	High performance
1	0	0	1	4	1
2	1	1	0	2	1
3	0	1	0	2	1
4	1	0	1	6	1
5	1	0	0	3	0
6	1	1	1	24	0
7	0	1	1	5	0
8	0	0	0	10	0

Note: 0 represents non-membership in the set; 1 represents full membership in the set

Table 5b: Truth table for low firm performance (high-tech firms)

Rows	Conditions				
	Innovativeness	Risk-taking	Proactiveness	Number of cases	Low performance
1	1	0	0	3	1
2	0	1	1	5	1
3	1	0	1	6	0
4	1	1	0	2	0
5	0	1	0	2	0
6	0	0	0	10	0
7	0	0	1	4	0
8	1	1	1	24	0

Note: 0 represents non-membership in the set; 1 represents full membership in the set

Table 6a: Truth table for high firm performance (low-tech firms)

Rows	Conditions				
	Innovativeness	Risk-taking	Proactiveness	Number of cases	High performance
1	1	0	1	10	1
2	1	0	0	2	0
3	1	1	0	2	0
4	0	1	0	4	0
5	0	1	1	8	0
6	1	1	1	14	0
7	0	0	1	7	0
8	0	0	0	7	0

Note: 0 represents non-membership in the set; 1 represents full membership in the set

Table 6b: Truth table for low firm performance (low-tech firms)

Rows	Conditions				
	Innovativeness	Risk-taking	Proactiveness	Number of cases	Low performance
1	1	1	0	2	1
2	0	1	1	8	1
3	1	1	1	14	1
4	0	0	1	7	1
5	0	1	0	4	1
6	1	0	0	2	0
7	0	0	0	7	0
8	1	0	1	10	0

Note: 0 represents non-membership in the set; 1 represents full membership in the set