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Huang, S. orcid.org/0000-0001-5867-3521, Battisti, M. and Pickernell, D. (2023) The roles of innovation strategy and founding team diversity in new venture growth. *Journal of Business Research*, 158. 113653. ISSN 0148-2963

<https://doi.org/10.1016/j.jbusres.2023.113653>

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The roles of innovation strategy and founding team diversity in new venture growth

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Declarations of Competing Interest

None

Acknowledgement:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Abstract

Using fsQCA, this study explores how venture strategy, as well as founding team knowledge diversity and demographic diversity interact to explain revenue growth of new ventures. Based on a longitudinal dataset containing 210 new ventures, we find that the effects of team diversity are complex such that different diversity conditions explain short-term (i.e. one year) compared to sustained growth (i.e. over three years) and that their role is contingent on the venture's strategy. We identify three recipes that explain revenue growth in the short-term and four recipes that explain revenue growth in the longer-term. One recipe is the same for both time periods pointing towards the potential role of imprinting of certain team diversity conditions in combination with an innovation strategy. Our findings provide a nuanced and in-depth picture of the relative relevance of an innovation strategy, knowledge diversity, and demographic diversity at distinct stages of venture founding.

Keywords

start-up, team diversity, innovation, imprinting, fsQCA

1. Introduction

Ventures are often started and led by teams (Wasserman, 2012; Beckman, 2006), making it imperative to understand “why some teams are more effective than others in launching and growing a venture” (Knight et al., 2020, p. 231). Researchers have therefore examined performance implications of team factors such as team formation strategies (Lazar et al., 2020), group dynamics (Lazar et al., 2020), team processes (Klotz et al., 2014), and team characteristics (Jin et al., 2017).

One important team characteristic shaping venture outcomes is the extent of diversity within founding teams (Jin et al., 2017; Zhou and Rosini, 2015), broadly categorised into two groups (Lazar et al., 2020; Zhou and Rosini, 2015). The first concerns diversity in task-related experiences such as functional, organisational, and entrepreneurial experiences. As knowledge is often a function of experiences (Kolb, 2015; Holcomb et al., 2009), diversity in task-related experiences represents founding teams’ knowledge diversity. The second group concerns diversity in attributes like age, gender, race/ethnicity, and nationality, representing founding teams’ demographic diversity (Brixy et al., 2020; Bell et al., 2011).

Findings on the impacts of founding team diversity are mixed, however. The same diversity attribute (e.g., functional diversity) has been found to have a positive, negative, or no significant relationship with venture performance (Hashai and Zahra, 2021; Jin et al., 2017; Zhou and Rosini, 2015) suggesting that diversity can be a “double-edged” sword entailing both benefits and costs (Brixy et al., 2020). From information-processing perspectives (Williams and O’Reilly, 1998), diversity within the founding team contributes to better idea generation, decision-making, and problem-solving (Wang et al., 2019; Stahl et al., 2010; Milliken and Martins, 1996). From the self-categorisation perspective (Williams and O’Reilly, 1998), diversity can disrupt team dynamics due to adverse social categorisation. For example, diversity among team members might undermine team communication (Cronin and Weingart, 2007), cooperation (Chatman and Flynn, 2001), and cohesion (Finkelstein et al., 2009).

While prior studies have highlighted the importance of contextual conditions under which diversity might benefit founding teams and firms (Cannella et al., 2008), researchers have paid limited attention to the role of venture strategy. A venture’s initial strategy determines the tasks and activities organisations pursue (Fern et al., 2012; Porter, 1980). Different tasks, in turn,

determine information processing requirements or demands on founding teams (Amason et al., 2006). As availability of information and knowledge is determined by team diversity (Williams and O'Reilly, 1998), we expect performance implications of founding team diversity will likely depend on the venture's strategy.

To address the above limitations, we draw on imprinting theory that posits that conditions under which organisations are created have lasting effects on their structures, processes and outcomes even after accounting for contemporaneous effects (Marquis and Tilcsik, 2013; Simsek et al., 2015; Stinchcombe, 1965). Imprinting is therefore a time-sensitive process initiating a development trajectory (Mathias et al., 2015). The early stages of a venture represent a sensitive period in which initial conditions have enduring impact on the venture's future (Milanov and Fernhaber, 2009). Founding team composition represents one important set of initial conditions, as different diversity attributes might serve as potential sources of imprints (Simsek et al., 2015; Burton and Beckman, 2007). Similarly, venture strategy is another potentially important imprinting condition because it determines venture structures and development trajectories (Bamford et al., 2000; Boeker, 1989). It is crucial to examine interactions of different conditions, because multiple conditions often operate simultaneously. Some conditions might complement each other to enhance imprinting effects, while some conditions might compensate for the absence of others. Different conditions (e.g., knowledge and demographic diversity) might also compete with each other. In their review of the imprinting literature, Simsek et al. (2015) call for more research capturing not only interaction of different conditions, but also longer-term manifestations of imprinting by using *longitudinal designs*.

Specifically, this study examines *how different combinations of venture strategy, founding teams' knowledge, and demographic diversity explain venture growth*. Following the three-stage configurational theorising approach by Furnari et al. (2021) we first conduct a comprehensive literature review to *scope* the relevance of venture strategy and identify a range of different diversity attributes that might interact with each other to explain venture growth. We then *link* the identified conditions in a configurational framework that illustrates that multiple different combinations of conditions can explain venture growth. We apply fuzzy-set qualitative comparative analysis (fsQCA) to a longitudinal dataset of 210 new ventures provided by the Entrepreneurship Database Program at Emory University supported by the Global Accelerator Learning Initiative. FsQCA is considered the ideal approach as it can better capture complex

interactive effects of theory-based conditions compared to “focusing on single effects of individual variables” (Kraus et al., 2018, p. 33). In the last step, we *name* each of the identified recipes and develop relevant propositions.

Findings from this study make several contributions: We identify three recipes that explain short-term venture growth and four that explain sustained venture growth illustrating the value of configurational analysis. These recipes offer a key step towards advancing our understanding of the complex interplay between different diversity attributes and venture strategy. In particular, we identify how different diversity attributes complement or substitute each other depending on venture strategy and performance timeframe. Further, we critically evaluate the potential persistence of imprinting effects by comparing the stability of recipes across timeframes.

2. Literature review

Building on Stinchcombe’s (1965) seminal work, entrepreneurship research on imprinting has shown that conditions present during early venture founding stages can have a lasting impact on the development and outcomes of ventures (Snihur and Zott, 2020; Mathias et al., 2015; Milanov and Fernhaber, 2009). One such condition is *venture strategy*. Since different strategies require different organisational structures and systems, the effects of an early innovation strategy might persist for years despite subsequent contemporaneous influences (Simsek et al., 2015; Boeker, 1989). Indeed, evidence suggests that initial strategy affects firm growth (McDougall et al., 1994; Feeser and Willard, 1990), specifically sales revenue (Bamford et al., 2000).

Another potential imprinting condition impacting venture growth is *founding team composition* (Simsek et al., 2015). Founding teams are interesting to explore because they are endogenously formed with founders self-selecting into the team (Ferriani et al., 2020). Consequently, founding teams are typically more homogenous (DeSantola and Gulati, 2017; Ruef et al., 2003), but diversifying a team at a later stage might be problematic due to path dependence and inertia. The composition of founding team might thus have long-lasting effects on development and outcomes of ventures (Eesley et al., 2014; Beckman, 2006). Composition of the founding team can also influence implementation of venture strategy, impacting venture performance. Initial venture strategy represents an important choice regarding competitive positioning, skills and knowledge requirements (Eesley et al., 2014). It determines the tasks and activities the venture pursues (Porter, 1980). Different tasks pose differing information processing

demands or requirements on the founding team (Amason et al., 2006). An innovation strategy requires the founding team to access a variety of knowledge domains (Maes and Sels, 2014), a function of its diverse prior experiences (Williams and O'Reilly, 1998).

2.1. Innovation strategy

The existence of formal IP regimes (i.e., patents, trademarks, and/or copyright) is a key indicator of an innovation strategy (Helmers and Rogers, 2010; Suh and Hwang, 2010; Mendonça et al., 2004; Acs and Audretsch, 1988). Literature suggests patents are outcomes from firms' innovation processes (Rosenbusch et al., 2011; Acs and Audretsch, 1988), possession of patents implying the venture has developed an invention that might serve as the basis for marketable products and services. However, not all inventions are patented (Holgersson and Wallin, 2017; Arundel and Kabla, 1998). While some researchers found patents enhance venture performance and business survival (Helmers and Rogers, 2011; Mann and Sager, 2007), others found a negative relationship between patents and venture performance (Power and Reid, 2021).

Trademarks and copyrights also reflect firms' innovation activities (Helmers and Rogers, 2010; Suh and Hwang, 2010; Mendonça et al., 2004). Trademarking allows firms to build and protect their brands, an important marketing asset (Sandner and Block, 2011), which might increase customer loyalty and enhance marketing effectiveness (Keller and Lehmann, 2006). Trademarks also serve as signals for venture quality (Block et al., 2014) differentiating offerings from competitors (Block et al., 2015). Evidence suggests trademarks can enhance venture performance and contribute to business survival (Power and Reid, 2021; Helmers and Rogers, 2010; Srinivasan et al., 2008). Copyrights allow firms to protect their creative works (Brem et al., 2017). Copyrights concerning software, for example, have been found to enhance technical efficiency of software firms (Suh and Oh, 2015), contributing to their performance (Suh and Hwang, 2010).

Venture strategy therefore represents a potentially important source of imprinting (Shapira and Wang, 2009) with innovation strategy using formal IP regimes likely to contribute to venture growth. It requires different resources and skills than a strategy focused on solely imitating competitor offerings (Schnaars, 2014). Successful execution of an innovation strategy therefore depends on founding team composition, discussed next.

2.2. *Founding team composition*

Team composition is an important contributor to successful execution of venture strategy and consequent performance (Shepherd et al., 2021). While team diversity allows access to different resources, particularly relevant to solving non-routine problems and fostering creativity and innovation (Beckman, 2006), it is associated with increased coordination costs and potential conflict (Knight et al., 1999) as well as decreased cooperation and cohesion (Finkelstein et al., 2009). Conversely, individuals with similar attributes might be attracted to each other resulting in more efficient team processes such as decision making and execution as well as increased productivity (Byrne et al., 1971). Consequently, the impact of team diversity on venture growth can be positive or negative (Knight et al., 2020; Chowdhury, 2005; Beckman, 2006), and their effects can be non-linear in nature (Hoogendoorn et al., 2017). Despite decades of research on effects of team diversity on venture performance, results are still inconclusive, suggesting oversimplification of the team diversity phenomenon (Knight et al., 2020; Bell et al., 2011), requiring more clarity in distinguishing between different types of diversity as well as considering interaction effects between different types of diversity and initial venture strategy.

2.2.1. *Knowledge diversity*

Since knowledge is a function of experience (Kolb, 2015; Holcomb et al., 2009), the diversity in experience-based attributes therefore represent founding teams' knowledge diversity. We focus on the diversity in three task-related experiences: organisational, functional, and entrepreneurial diversity.

Organisational diversity reflects the extent to which founding members worked at diverse types of organisations. Founding members affiliated with different organisations bring more diverse experiences and knowledge to the venture (Burton et al., 2002). Organisations differ in how they organise and manage work processes and different organisations represent different knowledge sources (Grant, 1996). A founding team with members having diverse organisational experiences might benefit from firm-specific knowledge and broader market knowledge (Beckman, 2006). Moreover, founding members' prior affiliation with different organisations represents their social capital, a source of competitive advantage (Nahapiet and Ghoshal, 1998; Adler and Kwon, 2002).

Functional diversity reflects the extent to which founding members have domain-specific knowledge. A functionally diverse team is more likely to possess the different skills and expertise required to manage the venture (Randel and Jaussi, 2003). It reflects the “completeness of the founding team” and allows team members to fill key positions or functions in the venture (Roure and Keeley, 1990). It thus minimises potential mismatch between prior functional experience and current role in the venture (Beckman and Burton, 2008). Indeed, team completeness, represented through different functional backgrounds, has been found to significantly enhance new venture growth (Vissa and Chacar, 2009).

Entrepreneurial diversity captures founding members’ different entrepreneurial experiences. Since start-ups are constrained by limited resources (Zahra, 2021), entrepreneurs often perform a variety of roles and tasks within the business. Indeed, “entrepreneurs must be jacks-of-all-trades to some extent. Although they need not be expert in any single skill, they must be sufficiently good at a wide variety to make sure the business does not fail” (Lazear, 2004, p. 208). Prior entrepreneurial experience allows entrepreneurs to develop experience-based knowledge and skills relevant to entrepreneurial tasks, contributing to venture success (Unger et al., 2011). Moreover, diverse entrepreneurial experience implies team members have been exposed to different business models and sectors enhancing problem-solving and creative solutions (Wang et al., 2019). Indeed, firms are more likely to grow when led by founders with previous entrepreneurial experience compared to those without (Gifford et al., 2021).

2.2.2. Demographic diversity

Diversity in demographic attributes has been conceptualised as surface-level diversity because they are easily observable (Brixy et al., 2020). This study focuses on three demographic attributes: age, gender, and culture.

Age diversity concerns the extent to which founding members represent different age groups. Research suggests young entrepreneurs are more likely than older entrepreneurs to be overconfident (Forbes, 2005). A founding team with members from different age groups can thus counter this bias and enhance firm performance (Steffens et al., 2012). However, age diversity might also promote interpersonal conflicts within founding teams inducing anxiety and stress, and undermining individuals’ cognitive functioning (Jehn and Mannix, 2001). Conversely, individuals of similar age tend to share common experiences and interests, contributing to effective

communication within the team through communicating more frequently on issues related and unrelated to work (Zenger and Lawrence, 1989). Empirical findings on performance implications of age diversity are mixed. Studies have found age diversity can have positive (Foo, 2011), negative (Foo et al., 2005), and non-significant relationships with team effectiveness (Schneid et al., 2016). Similarly, impact of age diversity on venture performance remains inconclusive (Zhou and Rosini, 2015; Amason et al., 2006).

Gender diversity refers to the extent both male and female are present in the founding team. Firms might benefit from a gender diverse founding team due to different cognitive processing styles. Males and females differ in information processing styles. Males tend to process information more selectively and females tend to process information more comprehensively (Putrevu, 2001; Chung and Monroe, 1998; Darley and Smith, 1995). This implies a gender diverse team can benefit from more comprehensive insights in tackling tasks. Furthermore, literature suggests females are more likely than males to use relational information processing emphasising similarities among disparate pieces of information. A preference for relational information processing enables female team members to connect, integrate, and use information and ideas distributed within and beyond the founding team, resulting in gender diversity to be positively related to innovation performance of new ventures (Dai et al., 2019). Similarly, Xie et al. (2020) found gender diversity in R&D teams positively related to firm's innovation efficiency due to informational and social benefits.

Cultural diversity reflects the extent to which founding team members are from diverse cultural backgrounds. Individuals' cultural background is associated with sets of values and beliefs (Hofstede, 2001), guiding decisions and actions (Schwartz, 2012). Cultural background influences how individuals perceive and interpret information in the environment, in turn affecting how they respond to strategic issues (Schneider and De Meyer, 1991). A culturally diverse team can enhance group decision-making and reduce groupthink (Maznevski, 1994), outperforming homogenous teams in evaluating situations from different perspectives, as well as generating more alternatives to address identified problems (Watson et al., 1993). In a meta-analysis of multicultural groups, Stahl et al. (2010) found that cultural diversity enhances team creativity. Cultural diversity in top management teams has been found to enhance new product innovation and firm performance (Nathan and Lee, 2013; Nielsen and Nielsen, 2013). Research has also found, however, that cultural diversity in boards of directors negatively impacts firm performance (Frijns et al., 2016).

From the self-categorisation perspective (Williams and O'Reilly, 1998), cultural diversity might lead to potential relationship conflicts in the founding team, impeding group decision making quality (de Wit et al., 2012). Hence, cultural diversity might entail both benefits and costs for the founding team.

3. Configurational framework

Based on the scoping of the literature, we argue that organisational diversity, functional diversity, and entrepreneurial diversity form a condition set representing founding team's knowledge diversity. In addition, age, gender, and cultural diversity form a condition set representing founding team's demographic diversity. These two condition sets are complemented by venture strategy to explain – in different combinations with each other – venture performance. Previous research is inconclusive on relationships between diversity and venture performance (Hashai and Zahra, 2021; Jin et al., 2017; Zhou and Rosini, 2015) as performance is measured in different ways (Jin et al., 2017), but mostly short-term (Richard et al., 2009). In the context of imprinting, however, it is important to also consider longer-term performance measures (Simsek et al., 2015). Revenue growth is most often used to measure new venture performance (Jin et al., 2017), because of relative ease of identification, measurement and comparability, in comparison with profits and market share. We conceptualise venture performance both in terms of short-term and sustained revenue growth as this allow us to capture persistent imprinting effects vis-à-vis potential contemporaneous effects.

Previous research often examined only selected diversity attributes in isolation (Gifford *et al.*, 2021; Mannor *et al.*, 2019; Burton and Beckman, 2007; Richard *et al.*, 2004), providing only a partial picture of their effects on performance. However, team members can differ in multiple attributes simultaneously, meaning one diversity attribute might be amplified or mitigated by the presence or absence of others. Supporting this, Dai et al. (2019) show that founding team's gender diversity positively interact with functional diversity to influence firm innovation performance. Therefore, it is imperative to consider how multiple diversity attributes might act in combinations to influence venture performance.

Figure 1 represents a configurational framework in the form of a Venn diagram in which overlapping areas represent potentially different combinations of conditions that explain the outcome of interest (Meyer et al., 1993). As complex combinations like the ones suggested are still

under-explored, we follow an inductive approach to configurational theorising (Kier and McMullen, 2020).

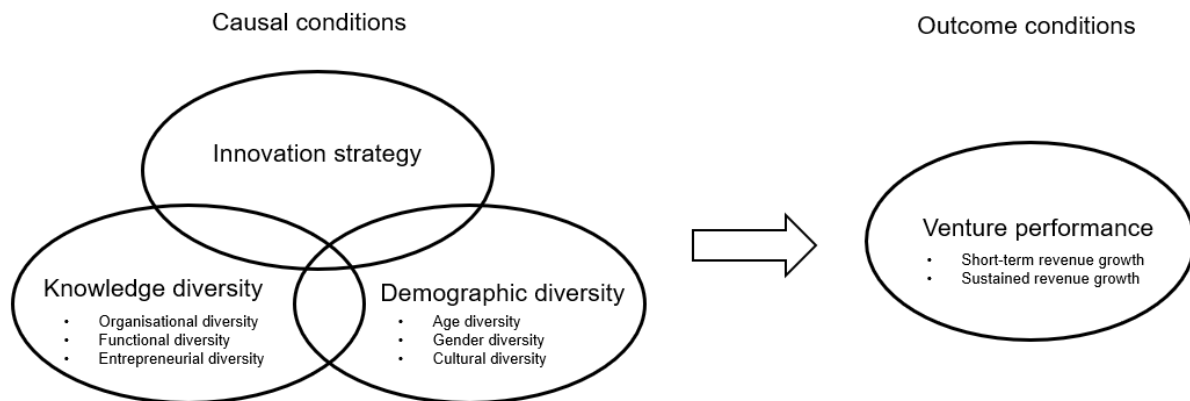


Figure 1: Configurational framework

4. Methodology

Fuzzy-set qualitative comparative analysis (FsQCA) is increasingly used, in a variety of entrepreneurial research contexts (Douglas et al., 2020; Beynon et al., 2019; Pickernell et al., 2019; Kraus et al., 2018). We use fsQCA to identify configurations that capture three elements of causal complexity: a) conjunctive causation, where conditions only have effect in conjunction with other conditions, rather than individually (Woodside, 2013); b) equifinality, where multiple causal combinations lead to the same outcome; and c) asymmetry, whereby causal recipes for the presence of outcome might not mirror from those for its absence (Fiss et al., 2013).

4.1. Data

We use data provided by the Entrepreneurship Database Program at Emory University supported by the Global Accelerator Learning Initiative (GALI). The full dataset contains 13,818 ventures that applied to accelerators between 2013 to 2017; however, we restrict our sample to firms that completed three waves of follow up surveys to be able to capture short-term revenue growth (i.e. over a one-year period) as well as sustained revenue growth (i.e. over a period of three years). While studies have found that imprinting effects manifest themselves on the imprinted entity after one year, they also call for future research to capture a longer time span to better understand the persistence of imprinting effects (Burton and Beckman, 2007; Hahn et al., 2019). Recent work suggests the imprint genesis might occur up to three years after founding (Snihur and

Zott, 2020). We thus chose a three-year time span to capture the potential persistence of imprinting effects on venture performance. The longitudinal dataset contains 1,408 firms. We then select firms between one and six years old, following Dai et al., (2019), because it takes time for new ventures to establish the operation, and firms are generally considered new ventures during the first six years of operation. To ensure founding teams are comparable in size, we removed firms with only a single founder or more than three founders as the GALI dataset only provides detailed information about three founding members. We removed cases containing missing values on the focal variables, creating a final sample of 210 cases for data analysis.

4.2. Measurement and calibration

4.2.1 Outcome conditions: Revenue growth

Revenue growth is the most commonly used measure for new venture performance (Jin et al., 2017; Daunfeldt and Halvarsson, 2015; Murphy et al., 1996). We consider two types of outcomes: short-term and sustained revenue growth. Short-term revenue growth was measured based on the percentage change in revenue between year 0 and year 1. Specifically, it was calculated using the differences in revenue between year 0 and year 1 divided by the revenue in year 0. Sustained revenue growth was measured based on the percentage change in revenue over a three-year period. Specifically, it was calculated using the differences in revenue between year 0 and year 3 divided by the revenue in year 0.

4.2.2 Causal condition: Innovation strategy

Innovation strategy was measured using proxies of patents, copyrights, and trademarks. Previous studies have highlighted patents (Rosenbusch et al., 2011; Acs and Audretsch, 1988), copyrights (Suh and Hwang, 2010), and trademarks (Helmers and Rogers, 2010; Mendonça et al., 2004) are indicators of firms' innovation efforts (Mendonça et al., 2004). Given that a strategy based on using these formal IP regimes reflects a strong innovation focus, we define this condition as innovation strategy. A firm receives a 0 if it does not have any innovation indicators, and 3 if it has all three, meaning values range from 0 to 3. Firms having a value of equal to or above 1 are considered to have adopted an innovation strategy.

4.2.3 Causal conditions: Knowledge diversity

Knowledge diversity was captured through the proxies of three experience-based attributes: organisational, functional, and entrepreneurial experience. In contrast to research that focus on the distribution of differences across a team, we focus on the total *variety* of experiences that are available within the founding team (Bunderson and Sutcliffe, 2002; Klein and Harrison, 2007). Organisational diversity was measured based on a count of unique organisations founding team members worked for in the latest two prior organisations (Mannor et al., 2019). Four types of organisations, for-profit, non-profit, government, and others were included in this study. To calculate levels of organisational diversity in founding team, we used the sum of unique organisations founding members had worked for divided by number of team members to normalise for difference in team size (Mannor et al., 2019; Frijns et al., 2016). Some team members had no prior organisational experience, not surprising given some people start their business during or immediately after school (Åstebro et al., 2012).

Functional diversity was measured based on founding team members' two most recent paid full-time jobs (Mannor et al., 2019). Using team members' previous two jobs is sufficient to capture different functional experiences of each team member because research has found "similar results with team members' most recent job and all available past positions" (Beckman et al., 2007, p. 156). Four functional categories, senior management, CEO/executive director, support staff, and others were included in this study. We calculated founding teams' levels of functional diversity by using the sum of unique functional experiences team members had held divided by number of team members to normalise for different team size (Mannor et al., 2019; Frijns et al., 2016).

Entrepreneurial diversity was measured based on a count of unique types of ventures founding team members had launched before. Three types of venture, profit, non-profit, and others were included in this study. Previous research highlighted profit and non-profit ventures differ in business model, strategies, and activities (McDonald et al., 2021; Moore, 2000). To calculate levels of entrepreneurial diversity in the founding team, we used sum of unique types of ventures started by founding members divided by team size to normalise for different team size (Mannor et al., 2019; Frijns et al., 2016).

4.2.4 Causal conditions: Demographic diversity

Demographic diversity was captured through three demographic attributes: age, gender, and cultural background. Age diversity was measured using coefficient of variation formula (Ali

et al., 2014). Specifically, standard deviation of founding team members' ages was divided by mean age of team members. Gender diversity was calculated using the Blau's index (Blau, 1977), a measure widely used in previous research concerning gender diversity (Ali et al., 2014; Dai et al., 2019). Specifically, it was calculated as $1 - \sum(P_i)^2$, where P_i refers to percentage of team members of each gender. The index ranges from zero, meaning all team members are from the same gender, to 0.5, meaning genders are equally distributed within the founding team.

Following Frijns *et al.*, (2016), cultural diversity of the founding team was measured as the average of cultural distances in all pairs of the founding team. In line with previous studies (Frijns et al., 2016; Kogut and Singh, 1988), we first calculated the cultural distance (CD) between team members based on four dimensions of Hofstede's (2001) national culture framework: individualism-collectivism, masculinity-femininity, power distance, and uncertainty avoidance. To illustrate, suppose a founding team has two members with one member from India and another from USA; the cultural scores for India (USA) are 48 (91) for individualism-collectivism, 56 (62) for masculinity-femininity, 77 (40) power distance, and 40 (46) for uncertainty avoidance, respectively (Hofstede *et al.*, 2010). The cultural distance between team members was computed based on the cultural scores as:

$$Cultural\ distance_{ij} = \sqrt{\sum_{k=1}^4 \left\{ \frac{(I_{ki} - I_{kj})^2}{V_k} \right\}} \quad \forall i \neq j,$$

where CD_{ij} refers to cultural distance between each two founding team members (i, j); $I_{ki} - I_{kj}$ refers to differences in cultural score on dimension k between team members i and team member j ; V_k refers to in-sample variance of cultural score for dimension k . This is an established measure that has been widely used to capture the cultural distances of team members (Dodd et al., 2015; Beugelsdijk and Frijns, 2010). Based on the cultural distance scores of the team, we then calculated the extent of cultural diversity within the founding team by using the cultural distance scores divided by the number of pairs within the founding team to account for differences in team size, following Frijns et al., (2016).

4.2.5 Data calibration

Data calibration is the process to transform raw data into fuzzy membership scores ranging from 0 to 1, where 0 implies full non-membership and 1 implies full membership (Schneider and

Wagemann, 2012; Ragin, 2008). Following previous fsQCA studies (Linton and Kask, 2017; Huang et al., 2021a), we used thresholds of 90th, 50th, and 10th percentiles to represent the three anchoring points of full membership, cross-over point, and full non-membership, respectively. Calibration thresholds are shown in Table 1. We calibrated the raw data into fuzzy membership scores based on the direct calibration method (Ragin, 2008; Ragin and Davey, 2016). We added 0.001 to cases with a score of 0.5 to prevent these cases being excluded from the analysis due to maximum ambiguity (Fiss, 2011).

Table 1. Calibration thresholds

Condition	Full in	Cross-over point	Full out
Innovation strategy	2.00	1.00	0.00
Organisational diversity	1.00	0.67	0.33
Functional diversity	1.33	1.00	0.50
Entrepreneurial diversity	1.00	0.33	0.00
Age diversity	0.35	0.09	0.02
Gender diversity	0.50	0.44	0.00
Cultural diversity	1.13	0.34	0.00
Short-term revenue growth	9.80	0.72	-0.84
Sustained revenue growth	33.88	1.75	-0.90

Table 1. Calibration thresholds

5. Data analysis and results

We conducted data analysis following three steps, in line with best practices in fsQCA studies (Greckhamer et al., 2018; Muñoz et al., 2020). First, we conduct necessity analysis to assess whether any conditions are necessary conditions for the outcome. A condition is considered necessary when occurrence of outcome is always accompanied by presence of the condition (Ragin, 2008). Second, we perform sufficiency analysis to identify the specific recipes sufficient to produce the outcome. As a last step, we conduct a series of tests to evaluate the robustness of our results. We perform all data analysis using fsQCA 3.0 software (Ragin and Davey, 2016).

5.1. Analysis of necessary conditions

Necessity analysis allows us to assess the extent to which instances of a particular outcome agree in displaying conditions considered necessary for the outcome (Ragin, 2008). Table 2 shows the results from the necessity analysis. As shown in the table, consistency scores for the fourteen conditions (seven conditions in their present and absent forms) are all below the recommended

value of 0.90 (Schneider and Wagemann, 2012). Furthermore, coverage scores for all conditions are below the suggested value of 0.65 (Muñoz et al., 2020). These results show none of the individual causal condition is a necessary condition for the outcome.

Causal Conditions*	Short-term revenue growth		Sustained revenue growth	
	Consistency	Coverage	Consistency	Coverage
Innovation strategy	0.49	0.62	0.52	0.62
~Innovation strategy	0.78	0.54	0.81	0.53
Organisational diversity	0.62	0.54	0.65	0.54
~Organisational diversity	0.59	0.53	0.56	0.49
Functional diversity	0.49	0.62	0.51	0.60
~Functional diversity	0.77	0.54	0.78	0.52
Entrepreneurial diversity	0.61	0.60	0.60	0.56
~Entrepreneurial diversity	0.64	0.52	0.66	0.51
Age diversity	0.59	0.56	0.59	0.54
~Age diversity	0.67	0.57	0.68	0.54
Gender diversity	0.45	0.50	0.46	0.48
~Gender diversity	0.73	0.55	0.75	0.53
Cultural diversity	0.23	0.62	0.23	0.59
~Cultural diversity	0.87	0.47	0.88	0.45

* ~ sign refers to absence of the causal condition

Table 2. Analysis of necessary conditions for revenue growth

5.2. Analysis of sufficient conditions

We conducted sufficiency analysis to identify different combinations of causal conditions leading to the outcomes. First, we constructed a truth table with 128 logically possible configurations (2^7), where 7 refers to the seven conditions examined in the present study. The truth table was then reduced based on a frequency threshold of 2 cases to enhance consistency and parsimony of solutions, meaning relatively rare configurations with 1 or 0 empirical case are excluded. The threshold of 2 allows us to retain 91% cases in the analysis, higher than the recommended 80% cases (Douglas et al., 2020). We coded the outcome of the individual configurations as 1 based on a consistency threshold of ≥ 0.90 and a proportional reduction in inconsistency (PRI) threshold of ≥ 0.65 (Greckhamer et al., 2018; Douglas et al., 2020). The outcome is coded as 0 if consistency and PRI are below respective thresholds. Truth tables are

shown in Appendix A with each row representing one configuration of conditions associated with the outcome. The model used in our sufficiency analyses is summarised as follows:

Revenue Growth = f (innovation strategy, organisational diversity, functional diversity, entrepreneurial diversity, age diversity, gender diversity, cultural diversity)

5.2.1. Recipes for revenue growth

Table 3 shows results from sufficiency analysis for short-term (Panel A) and sustained revenue growth (Panel B). Three recipes (S1 to S3) are sufficient to explain short-term revenue growth and four recipes (L1 to L4) are sufficient to explain sustained revenue growth. Overall solution consistency is 0.91 and 0.90 respectively with consistency for individual recipes ranging from 0.90 to 0.96, all above the recommended 0.80 threshold (Greckhamer et al., 2018; Douglas et al., 2020), meaning the outcome is consistently explained by the identified recipes. The overall solution coverage is 0.15 and 0.24 respectively, suggesting the recipes explain a substantial proportion of the outcome.

Causal conditions	Panel A: Short-term revenue growth			Panel B: Sustained revenue growth			
	S1	S2	S3	L1	L2	L3	L4
Innovation strategy	○		●	●	●	●	●
Knowledge diversity							
Organisational diversity	○	○	●	●	●	○	●
Functional diversity		○	○		●	○	○
Entrepreneurial diversity	●	●	○	●		●	○
Demographic diversity							
Age diversity	●	●	●	○	○	●	●
Gender diversity	○	○	●	○	○	○	●
Cultural diversity	●	●	●	○	○	●	●
Number of cases	10			13			
Consistency	0.92	0.91	0.96	0.93	0.90	0.96	0.96
Raw coverage	0.13	0.12	0.11	0.17	0.17	0.11	0.11
Unique coverage	0.01	0.00	0.02	0.03	0.03	0.01	0.02
Overall solution consistency	0.91			0.90			
Overall solution coverage	0.15			0.24			

Note: ● (○) represents the presence (absence) of the causal condition; blank spaces indicate the condition is irrelevant in the specific recipe.

Table 3. Recipes for the presence of short-term (Panel A) and sustained revenue growth (Panel B)

For short-term revenue growth, recipe S1 shows joint presence of entrepreneurial diversity, age, and cultural diversity, in combination with absence of organisational diversity, innovation strategy, and gender diversity. Recipe S2 is similar in terms of presence and absence of the same diversity attributes, but in this recipe innovation strategy is not relevant. Recipe S3 shows joint presence of innovation strategy, organisational diversity, age, gender, and cultural diversity, in combination with joint absence of functional and entrepreneurial diversity. For sustained revenue growth, recipe L4 is identical to recipe S3 suggesting stability across different time periods. Recipe L3 is the same as S2 with the exception that innovation is now present rather than not relevant. Recipe L2 shows joint presence of innovation strategy, organisational and functional diversity, in combination with absence of all demographic diversity attributes. Lastly, recipe L1 is similar to L2 in that it shows joint presence of innovation strategy and organisational diversity in combination with absence of all demographic diversity attributes. In recipe L1 however, entrepreneurial diversity is also present compared to functional diversity that is present in L2 but is not relevant in L1.

5.3 Robustness tests

The final step of data analysis involves a series of robustness checks through adjusting calibration thresholds and analysing recipes leading to absence of the outcome, following similar configurational studies (An et al., 2020; Huang et al., 2021b). We re-adjusted the calibration thresholds to assess the stability of our results. Specifically, we used new anchoring points at 95th, 50th, and 5th percentiles of the data to represent the full membership, cross-over point, and full non-membership, respectively. Using the more stringent thresholds allow us to identify recipes for outcomes at extremely high level. The results based on new calibration thresholds are shown in Appendix B, Table B.1. Analysis reveals three recipes for short-term revenue growth (Panel A). One recipe (i.e., SN3) is identical, and another two recipes are consistent with those identified based on the original calibration thresholds. Additionally, analysis identifies one recipe for sustained revenue growth (Panel B). This recipe is identical to those identified based on the original calibration threshold. These findings suggest the resulting causal recipes for short-term and sustained revenue growth are relatively stable and robust to the use of different specifications.

We then performed additional sufficiency analyses to uncover recipes leading to absence of the outcome. Results are shown in Appendix C, Table C.1. Analysis demonstrates four recipes

sufficient to produce absence of short-term revenue growth and three recipes sufficient to produce absence of sustained revenue growth. All recipes leading to absence of short-term and sustained revenue growth are distinct from those identified in our main analysis for presence of outcomes, indicating no contradictory recipes in our study (Ragin, 2008).

Lastly, to assess potential industry effects, we performed another set of data analysis by focusing on a subset of the sample with firms that are invention-based. Specifically, one of the survey questions asked: “Would you say that your venture is invention-based (i.e., a company that builds upon newly-created technology owned by the venture and/or its founders)?” The answer to this question is either Yes or No. In total, 112 out of the 210 firms are invention-based firms. The industry distributions of all the firms, as well as the invention-based firms are summarised in Appendix D, Table D.1. The focus on invention-based firms can thus help to mitigate the heterogeneity due to firms from different sectors. As shown in Appendix D, Table D.2, the results based on invention-based firms suggest four recipes sufficient to produce short-term revenue growth and three recipes sufficient to produce sustained revenue growth. Importantly, one of the recipes leading to short-term, as well as sustained revenue growth is identical to those identified from our main analysis. Taken together, the results from sufficiency analysis for absence of outcome, as well as sub-sample analysis focusing on invention-based firms further supports the robustness of our main findings, the comparison of shorter versus longer time frames allowing inferences to be drawn about the potential relative strengths of imprinting and contemporaneous effects.

6. Discussion

In the following two sections, we first interpret each recipe and develop relevant propositions. Then we discuss how our findings contribute to the literature as well as practice.

6.1. Interpretation of findings and proposition development

Starting with the recipes for short-term revenue growth, recipes S1 and S2 are very similar. These ventures compensate the lack of (Type 1) or irrelevance (Type 2) of a formal innovation strategy by exploiting their founders’ diverse entrepreneurial experience and background to achieve short-term revenue growth. These recipes do not seem to be viable in the longer-term, suggesting that the benefits derived from a diverse founding team do not have a lasting imprinting effect given the lack of innovation strategy. Taken together, these two recipes represent “growth

sprinters” i.e., ventures that achieve revenue growth only in the short-term on the basis of their founding team’s diverse experiences rather than an innovation strategy. Therefore, we formally state:

Proposition 1a: A lack of innovation combines with an organisational and gender homogenous, but age, culture, and entrepreneurially diverse founding team to result in short-term revenue growth (Growth sprinter Type 1).

Proposition 1b: An organisational, functional and gender homogenous but age, culture, and entrepreneurially diverse founding team results in short-term revenue growth (Growth sprinter Type 2).

Recipe L3 represents ventures that demonstrate sustained revenue growth because of having an innovation strategy in combination with a demographically diverse founding team that also benefits from diverse entrepreneurial experience. This recipe is similar to the “growth sprinter Type 2” (S2). While these ventures have the same diversity profile of their founding team as recipe S2, they also have an innovation strategy in place that ventures in recipe S2 do not have. The combination of diversity attributes (age, cultural and entrepreneurial diversity) on its own therefore only explains revenue growth in the short-term (S2). Only when complemented by an innovation strategy, does it explain sustained revenue growth. This suggests that whether the combination of specific diversity attributes have a potentially lasting imprinting effect is contingent on the venture having an innovation strategy or not. Taken together, this recipe represents “entrepreneurial innovators” and we formally state:

Proposition 2: Innovation combines with an age, culture and entrepreneurially diverse, but organisational, functional and gender homogenous founding team to result in sustained revenue growth (Entrepreneurial innovator).

Recipes S3 and L4 are the most relevant from an imprinting perspective as they are the same across both time frames. These ventures can be described as innovators that benefit from a demographically heterogeneous founding team with diverse prior organisational experience. We thus label them “demographically-diverse innovators”. As the two recipes are identical for short-term as well as sustained revenue growth, the stability of the two recipes suggests that the founders’ demographic and organisational diversity in combination with an innovation strategy is deeply embedded in the venture, pointing towards the persistence of imprinting effects.

Proposition 3: Innovation combines with a functional and entrepreneurially homogenous, but organisational and demographic (across all three attributes) diverse founding team to result in sustained revenue growth (Demographically diverse innovator).

Lastly, recipes L1 and L2 represent ventures that demonstrate sustained revenue growth based on an innovation strategy in combination with a knowledge-diverse, but demographically homogenous founding team. Knowledge diversity manifests itself through organisational diversity in combination with either entrepreneurial diversity (L1 – Type I) or functional diversity (L2 – Type II). Given the lack of stability of these recipes across the two timeframes, imprinting alone cannot explain the sustained revenue growth of these ventures, but contemporaneous influences are likely. Taken together, these two recipes represent “knowledge-diverse innovators” and we formally state:

Proposition 4a: Innovation combines with an organisational and entrepreneurially diverse, but demographically homogenous (across all three attributes) founding team to result in sustained revenue growth (Knowledge-diverse innovator – Type 1).

Proposition 4b: Innovation combines with an organisational and functional diverse, but demographically homogenous (across all three attributes) founding team to result in sustained revenue growth (Knowledge-diverse innovator – Type 1).

6.2. Contributions

Our findings highlight the complex interplay between venture strategy, different attributes of founding team diversity and venture performance, confirming the value of a configurational approach. Regression-type analysis that are based on linear predictors are prone to oversimplifying relationships between team diversity and performance, which also explains inconclusive results in previous research. Previous research has tended to oversimplify the team diversity phenomenon (Knight et al., 2020; Bell et al., 2011), but findings from this research offer an important step towards understanding the complex interplay between different diversity attributes and venture strategy. To advance knowledge on the effects of founding team diversity on venture performance, it is important to identify the multiple combinations of different types of diversity as well as different performance timeframes. Our inductive configurational approach reveals the complex nature of how founding team composition impacts venture performance. It allows us to (1) advance knowledge on how different diversity attributes complement or substitute each other depending on

venture strategy and performance timeframe and (2) to critically evaluate the potential persistence of imprinting effects by comparing the stability of recipes across timeframes.

First, we extend existing literature on founding team diversity by demonstrating that the effectiveness of various diversity attributes is contingent on the venture strategy and performance timeframe that is considered. This finding is relevant, highlighting the importance of examining interactions between different diversity attributes as they often operate simultaneously and one attribute's effectiveness might depend on presence and/or absence of another attribute (Simsek et al., 2015).

If we explore individual condition sets in more detail, interesting nuances emerge. For knowledge diversity, knowledge derived from a diverse range of prior functional roles either does not matter as an imprinting condition for revenue growth compared to knowledge derived from diverse organisational experience and diverse entrepreneurial experience or needs to be explicitly absent. This is important as it suggests that it is either not relevant that founding team members held a variety of positions, or it is *in fact relevant that they did not hold a variety of position*. This finding seems to contradict previous research that found that team completeness, as represented through different functional backgrounds, benefits venture performance (Vissa and Chacar, 2009; Beckman et al., 2007; Roure and Keeley, 1990). Results from this study, however, suggest for short-term revenue growth, functional experience is not present in any of the identified recipes. For sustained growth, functional diversity is present in only one recipe - the "knowledge-diverse innovator type 1" (L2). In addition, functional diversity can easily be *substituted* as evidenced in the "knowledge-diverse innovator type 2" (L1). The two recipes are the same with the exception that functional diversity is *substituted* by entrepreneurial diversity. This suggests that it is more relevant in what context (e.g., for-profit, or not-for-profit) team members have gained their knowledge rather than through which positions.

For all recipes, presence of either organisational and/or entrepreneurial diversity is a necessary condition. Again, this highlights that experiences across a range of contexts is relevant, but this experience can be accumulated as an entrepreneur and/or an employee, the relevance of which depends on whether the firm pursues an innovation strategy or not. In fact, our recipes show that the presence of an innovation strategy is always *complemented* by organisational diversity apart from recipe L3, the "entrepreneurial innovator" where organisational diversity is substituted by

entrepreneurial diversity. By contrast, in recipes where an innovation strategy is absent or not relevant, as is the case in the “growth sprinter” recipes (S1 and S2) entrepreneurial diversity needs to be present. Entrepreneurial diversity thus seems to have an important substitution function, at least in the short-term.

When it comes to demographic diversity, age and cultural diversity seem to be the most relevant conditions and the two are always present in combination with each other. This means that the presence of cultural diversity is always linked to presence of age diversity. This finding points towards the importance of examining different diversity conditions in combination with each other, rather than in isolation, to understand potential interaction effects. The combined presence of age and cultural diversity suggests that these founding teams might benefit from cultural diversity through for example improved creativity, improved innovation and improved strategic decision-making while at the same time age diversity might reduce the potential negative effects that are often associated with cultural diversity such as increased conflicts (de Wit et al., 2012). This is relevant as it suggests that age and cultural diversity *complement* each other. In turn, this helps explain inconclusive results of previous research regarding the effects of cultural diversity on venture performance where cultural diversity has mostly been examined in isolation (Gifford et al., 2021; Mannor et al., 2019; Burton and Beckman, 2007; Richard et al., 2004).

Another key finding is related to absence of gender diversity across all but one recipe - the “demographically-diverse innovator” (S3/L4). In all other recipes gender diversity is explicitly absent, suggesting that homogeneity in gender in combination with the presence of other diversity conditions – in particular, age, cultural and some knowledge diversity – is more beneficial for venture performance. This contradicts previous research that shows that gender diversity benefits the innovation and venture performance (Dai et al., 2019). Instead, our findings suggest a much more complex relationship between gender diversity and venture performance. If gender diversity or homogeneity is beneficial for venture performance seems to be contingent on the presence and absence of other diversity conditions. In fact, it might be that in previous research the positive effects of gender diversity have been confounded with effects of other diversity conditions that are less easily observable compared to gender diversity.

Compared to knowledge diversity that needs to be present in a founding team in one way or another, demographic diversity does not need to be present. We found two recipes – the

“knowledge-diverse innovators” (L1/L2) where all demographic diversity attributes were entirely absent. In these two recipes, demographic homogeneity in combination with knowledge diversity and innovation strategy explains sustained revenue growth. Previous research has suggested that founding teams are typically more homogenous (DeSantola and Gulati, 2017; Ruef et al., 2003) as founders self-select into the team on the basis of perceived similarity (Ferriani et al., 2020). Our research extends these findings by demonstrating that demographic homogeneity can be beneficial *if* the founding team is knowledge diverse. These ventures seem to benefit from their founders’ demographic similarity in terms more efficient team processes and decision making (Byrne et al., 1971) while at the same time benefitting from their diverse knowledge accumulated across different organisational contexts and/or functional positions and entrepreneurial experiences (Verhoeven, 2021).

Second, given that imprinting is a time-sensitive process (Mathias et al., 2015), exploring performance in the short- and longer-term allows us to better understand the stability of recipes. Recipes that are stable across the two timeframes thus suggest the persistence of imprinting effects over time, an area that is still under-researched (Simsek et al., 2015). We identified two recipes (S3/L4) – the “demographically-diverse innovators” – that are identical for short-term and sustained revenue growth, pointing towards a lasting imprinting effect. This temporal stability suggests that the founding teams’ diversity attributes and their initial venture strategy are deeply embedded in the venture and provide lasting performance effects. In contrast, the “growth sprinters” (S1/S2) do not seem to benefit from the same lasting imprinting effects as these recipes are not stable across the two timeframes. If there were any initial imprinting effects at all, these did not seem to last. To what extent the “entrepreneurial innovators” (L3) and “knowledge-diverse innovators” benefit from imprinting effects is difficult to assess. Although these two recipes were associated with sustained revenue growth, they were not stable across the two timeframes, suggesting the presence of contemporaneous effects which are difficult to disentangle from potential imprinting effects, particularly in the longer-term. Overall, comparing recipes across the two timeframes adds much needed nuance regarding the potentially complex imprinting effects of founding team composition on venture performance which has been plagued by inconsistent findings (Jin et al., 2017; Zhou and Rosini, 2015).

Comparing recipes for short-term and sustained revenue growth indicates that an innovation strategy is a necessary condition to achieve sustained revenue growth, but that short-term revenue

growth can be achieved *without* having an innovation strategy based on formal IP regimes. In particular recipes S1/S2 – the “growth sprinters” – illustrate that ventures can achieve revenue growth in the short-term by exploiting market opportunities based on their founders’ diverse entrepreneurial and personal experiences rather than formal IP regimes. For sustained revenue growth, however, an innovation strategy is imperative. For all four recipes related to sustained revenue growth (L1-L4), having an innovation strategy is not only a necessary condition, but it needs to be *complemented* by a demographically and/or knowledge diverse founding team.

Lastly, entrepreneurs, but also accelerators, venture capitalists and angel investors might also benefit from these findings. We identify multiple combinations of diversity attributes that have beneficial performance effects providing practical relevance for new ventures as well as venture support. In particular, we point towards the relevance of having founding team members with experience across different contexts including for and not-for-profit contexts either as employees or entrepreneurs. Our findings show that collective knowledge gained from working across different contexts is much more relevant compared to the positions founding team members held in previous positions. This organisational and entrepreneurial diversity is particularly important for founding teams that are demographically homogenous.

7. Conclusions

Overall, findings provide us with novel insights into the importance of team composition for venture performance, contributing to better understanding of the “fuzzy front end of entrepreneurship” (Kier and McMullen, 2020, p. 10). Using an inductive configurational approach, our findings clearly demonstrate that *founding team diversity matters* for venture performance, in the short as well as the longer-term. By doing so, we respond to recent calls for research capturing not only the interaction of different diversity attributes, but also capturing potential longer-term manifestations of imprinting by using longitudinal designs (Simsek et al., 2015). However, *how diversity attributes matter*, is more complex to answer. Using fsQCA allowed us to capture causal complexity (Douglas et al., 2020) between different diversity attributes, venture strategy and venture performance. Findings from this study thus advance our understanding of the heterogeneity of venture performance by identifying multiple recipes that lead the same outcome (i.e. equifinality). As a result, findings make a relevant contribution to better understanding why some teams are more effective than others in growing a venture (Knight et al., 2020).

There are also several limitations to the study, providing areas for future research. One limitation of adopting this configurational approach is that only a limited number of conditions are possible to include in the analysis. While we have selected the conditions based on a thorough scoping of the literature as recommended by Furnari et al. (2021) there might be other relevant individual and firm-level variables to consider in future research. Relatedly, unlike Hanssens et al. (2016) or Fazlelahi et al. (2022) we are unable to formally control for potential contemporaneous effects (though as seen we are able to undertake an analysis which allows inferences to be drawn) which are thus difficult to disentangle from imprinting effects, particularly in the longer-term. As such, future research could consider how the interplay between imprinting and contemporaneous effects might influence the performance of new ventures.

Moreover, while venture strategy can produce enduring imprinting effects on the organisations (Marquis and Tilcsik, 2013), it is also important to note that “imprints are subject to change, evolution, and transformation” (Simsek et al., 2015, p. 299). In particular, imprinting is a dynamic process and may persist, amplify, decay, or transform over long time periods. In the situation of failing to achieve satisfactory performance, for example, firms might face great pressure from stakeholders to change venture strategy (Mintzberg and Mintzberg, 1983). This implies strength of imprints from initial strategy might diminish over time due to deficient performance. Indeed, poor performing firms are more likely to change initial strategy than high performing firms (Boeker, 1989). In addition, the composition and change in founding team might also lead to potential changes in the venture’s initial strategy. Indeed, diversity in the management team has been found to foster strategic change (Naranjo-Gil et al., 2008). Similarly, research has shown changes in management team can lead to imprint decay (Beckman et al., 2007). Consequently, more longitudinal research is required in this and other contexts to explore effects of these dynamics further.

Lastly, all ventures analysed are within accelerator contexts. Whilst this provides contextual stability, other contextual conditions are not accounted for such as e.g., industry dynamics, and thus further research is needed to confirm applicability of these results in different environments and contexts. A related limitation is that our study includes firms from a wide range of industry sectors and geographic areas. Since industries differ in their levels of complexities and competition, the importance of innovation strategy and knowledge/demographic diversity might be dependent on the industry in which firms operate. While we have tried to account for potential

industry differences in our robustness checks, further research should account for the heterogeneity of the sample by focusing on firms from specific industry sector and geographic area.

Appendix A. Truth Tables

Table A.1 Truth table for presence of short-term revenue growth

Innovation strategy	Organisational diversity	Functional diversity	Entrepreneurial diversity	Age diversity	Gender diversity	Cultural diversity	Number of cases	Revenue growth
1	1	0	1	0	1	0	2	1
0	1	0	1	0	1	0	2	1
1	1	0	0	1	1	1	2	1
1	1	0	1	1	1	0	2	1
1	0	0	1	1	0	1	2	1
0	1	0	1	0	0	0	2	0
0	1	1	1	0	1	0	3	0
1	0	0	1	1	1	0	2	0
1	0	1	1	1	1	0	2	0
1	0	0	0	0	1	0	3	0
0	1	1	0	0	1	0	2	0
1	1	1	0	0	1	0	3	0
0	1	1	1	1	1	0	5	0
1	1	1	1	1	1	0	7	0
1	0	0	1	0	0	0	4	0
0	0	1	0	0	0	0	2	0
0	1	1	1	0	0	0	2	0
1	0	0	0	1	1	0	3	0
1	1	0	1	1	0	0	2	0
1	1	1	1	1	1	1	2	0
1	1	1	1	1	0	0	4	0
1	1	1	0	1	1	0	2	0
1	1	0	0	1	1	0	2	0
0	0	0	0	1	0	0	2	0
1	0	0	0	1	0	0	2	0
1	1	0	0	1	0	0	3	0
1	0	1	1	1	0	0	4	0
0	1	0	0	0	1	0	4	0
1	0	1	1	0	0	0	4	0
1	0	0	1	1	0	0	2	0
1	0	1	1	0	1	0	3	0

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

Table A.2 Truth table for presence of sustained revenue growth

Innovation strategy	Organisational diversity	Functional diversity	Entrepreneurial diversity	Age diversity	Gender diversity	Cultural diversity	Number of cases	Revenue growth
0	1	0	1	0	1	0	2	1
0	1	1	1	0	1	0	3	1
0	1	0	1	0	0	0	2	1
0	1	1	1	0	0	0	2	1
1	1	0	0	1	1	1	2	1
1	1	0	1	0	1	0	2	1
1	0	0	0	0	1	0	3	0
1	0	0	1	1	0	1	2	0
0	1	1	0	0	1	0	2	0
1	1	1	1	1	0	0	4	0
0	1	1	1	1	1	0	5	0
0	0	1	0	0	0	0	2	0
1	0	0	1	0	0	0	4	0
0	1	0	0	0	1	0	4	0
1	1	0	1	1	0	0	2	0
1	0	1	1	1	0	0	4	0
1	0	0	0	1	0	0	2	0
1	1	0	1	1	1	0	2	0
1	1	0	0	1	0	0	3	0
1	0	1	1	1	1	0	2	0
1	1	1	1	1	1	0	7	0
1	0	0	0	1	1	0	3	0
1	0	1	1	0	0	0	4	0
1	1	1	1	1	1	1	2	0
0	0	0	0	1	0	0	2	0
1	0	0	1	1	1	0	2	0
1	0	0	1	1	0	0	2	0
1	0	1	1	0	1	0	3	0
1	1	1	0	1	1	0	2	0
1	1	1	0	0	1	0	3	0
1	1	0	0	1	1	0	2	0

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

Appendix B. Robustness tests based on new calibration thresholds

Table B.1 Recipes for presence of short-term and sustained revenue growth (new calibration thresholds)

Causal conditions	Panel A: Short-term revenue growth			Panel B: Sustained revenue growth
	SN1	SN2	SN3	LN1
Innovation strategy	○	●	●	●
Knowledge diversity				
Organisational diversity	○	○	●	●
Functional diversity	●	○	○	○
Entrepreneurial diversity	●	●	○	○
Demographic diversity				
Age diversity	●	●	●	●
Gender diversity	○	○	●	●
Cultural diversity	●	●	●	●
Consistency	0.97	0.98	0.98	0.97
Raw coverage	0.13	0.13	0.13	0.13
Unique coverage	0.02	0.01	0.02	0.13
Overall solution consistency	0.94			0.97
Overall solution coverage	0.17			0.13

Note: ● (○) represents presence (absence) of the causal condition; blank spaces indicate condition is irrelevant in the specific recipe.

Appendix C. Robustness tests for absence of outcome

Table C.1 Recipes for absence of short-term and sustained revenue growth

Causal conditions	Panel A: Short-term revenue growth				Panel B: Sustained revenue growth		
	SA1	SA2	SA3	SA4	LA1	LA2	LA3
Innovation strategy	○	○	●	○		●	●
Knowledge diversity							
Organisational diversity	●	○	●	●	●	○	●
Functional diversity	○			○	○	●	●
Entrepreneurial diversity	○	●	○	○	○	●	○
Demographic diversity							
Age diversity		●	●	●	●	○	○
Gender diversity	●	●	○		●	●	●
Cultural diversity	○	○	○	○	○	○	○
Consistency	0.87	0.87	0.87	0.86	0.90	0.92	0.93
Raw coverage	0.18	0.14	0.13	0.20	0.13	0.07	0.10
Unique coverage	0.05	0.05	0.01	0.03	0.07	0.01	0.03
Overall solution consistency	0.84				0.91		
Overall solution coverage	0.32				0.18		

Note: ● (○) represents presence (absence) of the causal condition; blank spaces indicate condition is irrelevant in the specific recipe.

Appendix D. Results based on 112 invention-based firms

Table D.1 Number of firms from each industry sector

Industry	Number of firms	Number of invention-based firms
Agriculture	47	22
Artisanal	7	3
Culture	0	0
Education	26	19
Energy	13	9
Environment	13	10
Financial services	12	6
Health	20	14
Housing development	2	1
Information and communication technologies	15	5
Infrastructure/facilities development	4	2
Supply chain services	6	4
Technical assistance services	3	2
Tourism	9	3
Water	4	2
Others	29	10
Total:	210	112

Table D.2 Recipes for presence of short-term and sustained revenue growth

Causal conditions	Panel A: Short-term revenue growth				Panel B: Sustained revenue growth		
	SI1	SI2	SI3	SI4	LI1	LI2	LI3
Innovation strategy		●	●	●	○		●
Knowledge diversity							
Organisational diversity	●	●	○	●	●	●	●
Functional diversity	○	○	○	○		○	○
Entrepreneurial diversity	●	●	●	○	●	●	○
Demographic diversity							
Age diversity	○		●	●	○	○	●
Gender diversity	●	●	○	●		●	●
Cultural diversity	○	○	●	●	○	○	●
Consistency	0.88	0.90	0.95	0.95	0.88	0.89	0.93
Raw coverage	0.18	0.18	0.12	0.11	0.29	0.19	0.11
Unique coverage	0.05	0.04	0.02	0.01	0.11	0.01	0.03
Overall solution consistency	0.85				0.85		
Overall solution coverage	0.27				0.32		

Note: ● (○) represents presence (absence) of the causal condition; blank spaces indicate condition is irrelevant in the specific recipe.

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