A tale of two ventures : how founder experiences shape search in tech-anchored and market-anchored ventures

A TALE OF TWO VENTURES: HOW FOUNDER EXPERIENCES SHAPE SEARCH IN TECH-ANCHORED AND MARKET-ANCHORED VENTURES

Abstract

This article distinguishes two types of technology ventures: market anchored and technology anchored. These ventures need to conduct effective technological or market search, the identification and evaluation of alternative technologies or markets, respectively, and form a viable technology–market combination. These types of search are fostered by appropriate experiences of the founding team. A study of 203 new technology ventures shows contrasting effects of breadth and depth of the founding team's market and technological experiences on the initial success of the venture types.

Keywords

Entrepreneurial opportunity, Entrepreneurial search, Founder experiences, Venture types.

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Chatterji (2009: 200-201) recounts the founding of Atricure by Mike Hooven: "Interestingly, when Hooven left [Johnson & Johnson] in 1994 to start his own company, he did not know exactly what clinical area he would specialize in. Instead he met with doctors to figure out what clinical needs were not being addressed, and eventually founded Atricure to focus on atrial fibrillation, a major cause of stroke and congestive heart failure (Levin, 2002)."

In their HBS case study, Lassiter and Roberts (2005) tell of the founding of Surface Logix: "Roberts was CEO of Surface Logix Inc., a Boston, Massachusetts start-up that was attempting to commercialize soft lithography. ... Soft lithography was a core technology for creating extremely small devices—physical structures measured in nanometers— billionths of a meter. ... Much of the early work involved establishing and developing the basic technology platform—aspects of the technology that would be required to make tiny devices, regardless of their application. ... It was time to focus on a small number of potential commercial applications, turning the promise of the science into practical, producible products. Roberts [CEO] was struggling with how to choose from the wide array of possibilities that presented themselves almost every day."

INTRODUCTION

Maarten Bodewes suffered tinnitus - a constant ringing in the ears. He loved attending concerts, but such loud environments were painful. He tried various ear plugs but found that while they reduced noise, they reduced audio quality, were uncomfortable, and were decidedly unstylish. Maarten, who had a background in industrial engineering, teamed up with Dimitri O., who had expertise in design and acoustics. Together, they determined that market needs for undistorted and stylish noise reduction were not being met. They founded of Loop Earplugs to address this opportunity. They researched ear protection technologies, in collaboration with several universities, in search of a solution that would reduce noise evenly across frequencies, thus avoiding distortion.

Charlotte D'Hulst, a recent graduate from the City University of New York, founded Yesse Technologies to capitalize on her doctoral research and patents related to olfactory receptors. She believed her scientific work could enable digitization of the sense of smell, using sensors derived from genetically modified mice. Such a "digital nose" technology could have applications in many industries. She searched the best place to start and determined that diagnostics and fragrance companies have a great need for reliable and quantifiable scent detection and reproduction.

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In this manuscript we will argue that these ventures are of a different kind, such that founders such as Maarten, Dimitri, or Charlotte could benefit from, or be held back by, different kinds of professional experiences. To survive and prosper, new technology ventures need to establish a technology-market link, that is, to make a viable combination between a market need to serve and a technology to do so. Prior entrepreneurship literature refers to this linking as a "technology–market match" (Grégoire et al., 2010: 425), "a technology-market combination" (Grégoire and Shepherd, 2012: 764), or the "technology-to-market linking problem in new firm creation" (Gruber et al.2008: 1652). To find these "matches" ventures engage in "search," that is, the identification and evaluation of alternatives.[1] We employ "search" as our overarching theory, which we develop below.

Intuitively, one would expect prior professional experiences of the founding team members, who are the key agents identifying and choosing among technological and market options for their new venture, to facilitate search. Presumably, the more experience they have, the more effective they are at search. However, the extensive prior research has produced inconsistent findings regarding the effects of experience on new venture performance (for extensive overviews, see Delmar and Shane, 2006 and Jin et al., 2017). For example, prior industry experience of the entrepreneurs has positive effects according to some studies (Colombo and Grilli, 2005; Cooper et al.,1994), no effects (Brush and Chaganti, 1999; Delmar and Shane, 2006), or negative effects (Schrader and Siegel, 2007) according to other studies. Regarding the latter, Shrader and Siegel (2007) found to their surprise previous industry experience to be negatively related to performance.

We introduce a distinction between market-anchored and tech-anchored ventures which we believe reconciles these disparate findings. Because venture type is a key contingency for the type of search that the venture needs to conduct to establish initial viability, contrasting types of experience foster initial success because they shape search. We will argue that the effectiveness of a venture's search is shaped by founder experiences, in contrasting ways for market-anchored and tech-anchored ventures. We also introduce two distinctions in founding team experiences: between market and technological types of

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experiences, and between broad and deep experiences. While the literature has recognized that experience drives search (in particular the work by Gruber and colleagues), it has not juxtaposed these types of experience and specified how they facilitate – or impede – the search needed to establish a viable venture. It has also not recognized that, counter-intuitively, some types of experience can be detrimental to initial firm performance. Accordingly, our research question is: which types of experiences of the founding team are beneficial – or detrimental – for initial venture performance for market-anchored and tech-anchored ventures?

The opening vignettes tell the founding stories of two technology ventures. We argue that the current literature does not recognize that these two ventures are fundamentally different: Atricure was a market-anchored venture whose founder identified underserved market needs (atrial fibrillation). Another example of this venture type is Dropbox, the file hosting service started after its founder recognized the need for access to the same set of files from different computers. Loop Earplugs similarly sought to meet an unmet need in ear protection. In contrast, Surface Logix is a tech-anchored venture. It sought to commercialize a particular technology its founders had developed (soft lithography). Given this technology, its founders sought a market in which to apply it. Yesse Technologies had the same challenge.

In this article, we will argue that for each technology venture one of these sides – the market or the technology – forms an anchor in the identification of a viable link, and that this respective anchor has substantial consequences for which kinds of founder experiences foster success. In other words, given that where they start from (their anchor) may differ, entrepreneurial ventures may need different types of experience to search well and hence perform better. Therefore it is illuminating to distinguish between two fundamentally different technology ventures: market-anchored and tech-anchored. We classify ventures based on their *founding intent* to pursue a market opportunity (serve an un/underserved market need) or a tech opportunity (commercialize an un/underused technology). We propose that founders identify an entrepreneurial opportunity in either an un/underserved *market* or an un/underused *technology*, respectively, and subsequently assess a complementary technology or market (respectively) that would

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constitute a viable "technology–market combination" (cf. Grégoire and Shepherd 2012: 764). For a market-anchored venture, making this link requires the venture to search for technological solutions that can satisfy the poorly met need. Tech-anchored ventures, on the other hand, make the link by searching for markets to serve with the technology they identified. While both are "technology" ventures, by which we mean that relatively proprietary technology (cf. Clarysse et al.,, 2011) plays an important role in both, technology is the anchor domain in the latter and the target of search in the former. In other words, the opportunity pursued sets the anchor, and is a given at the *founding* of the venture. Founders may have more or less knowledge about the opportunity, but prior knowledge is not the basis for the type. While ventures may pivot to different technologies and markets after founding, this *initial* choice of a market-technology link greatly influences their initial viability and helps attract investors, employees, partners, suppliers, and customers (Gruber et al., 2008).

These ventures, therefore, face very different challenges to achieve initial viability: to find a (or set of) technology (-ies) capable of addressing the focal market need (in the case of Atricure), or identify a viable market to serve with its identified technology (Surface Logix). Garmin is another example of a tech-anchored company. Its founders saw an opportunity to exploit a superior technology for processing global positioning satellite (GPS) signals. The company's first product was a panel-mounted GPS navigation device aimed at the marine market, which was soon followed by a handheld GPS receiver used by military personnel. We argue that technology ventures such as Surface Logix and Garmin on the one hand, and Atricure and Dropbox on the other hand, face different challenges in their search for a technology-market match, which requires effective market or technology search, respectively, to reach initial success.

At the nascent stage, founders may consider different venture ideas (Davidsson, 2015), perhaps including some based on un/underserved market needs or un/underused technologies (cf. Aldrich and Martinez, 2001; Dimov, 2007; Eckhardt and Shane, 2003; Fiet, 2007). At the time of founding, however, the founding team focuses on one of these, and pursues a market opportunity or a technology opportunity, respectively. We posit, that any particular technology venture has an anchor that ties it to one domain

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(tech or market) and that search needs to happen in the other domain (market or tech). The anchor is set by the opportunity that the venture is formed to pursue. Market-anchors and tech-anchors may both be viable starting points for a technology venture. Although ventures continue to form new technology-market matches ("pivot") we focus on the founding intent to pursue a market or technological opportunity, and its initial search driving its initial performance.

We argue that this crucial distinction has not been recognized in prior work, even though prior studies can be aligned with it. The entrepreneurship research that has explicitly examined the "technology-to-market linking problem in new firm creation" (Gruber et al., 2008: 1652, and also Grégoire et al., 2010; Grégoire and Shepherd 2012), has assumed that technology ventures make tech-market links by searching for application markets for a technology. The studies by Gruber and colleagues are about entrepreneurs seeking applications for a fungible technology, and the ones by Grégoire and colleagues (2012: 756) are set in the "tech transfer" context, in which "an entrepreneurial opportunity thus consists of applying a new technology in a particular market." These studies thus implicitly focused on technology-anchored ventures performing market search. In contrast, the seminal study by Shane (2000) examined entrepreneurs who had a market opportunity in mind, based on varying degrees of market knowledge, and when confronted with a technology developed at MIT formed a venture. These are market-anchored ventures.

Prior literature has also distinguished markets and technologies as sources of innovation or opportunities. The innovation and entrepreneurship literatures have highlighted that shifting technologies and markets can be sources of opportunity. Di Stefano and colleagues(2012) review technology-push and demand-pull perspectives in innovation studies, which view technology and demand as two sources of innovation. Along the same lines, entrepreneurship scholars have differentiated between opportunities created by supply-driven and demand-driven changes (Ambos and Birkinshaw, 2010; Dimov, 2007; Eckhardt and Shane, 2003). Supply-driven entrepreneurial opportunities arise from technological developments, while demand-driven opportunities are based on changing customer needs. However, this literature has not conceived of the pursuit of market or technological opportunities as the basis for

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different types of ventures. Hence, it has not examined the nature of these ventures and has not specified the founder(s) experience(s) needed to achieve initial success in either venture type.

In the next sections we explicate the differences between market-anchored and tech-anchored ventures, formulate hypotheses about the contrasting founder(s) experiences that enable each type to conduct effective search, and test our hypotheses using an original data set of 203 Flemish ventures. Building on our overarching theory of "organizational search" we develop a research model including experiences of founding team members as antecedent variables to the effectiveness of search for market and technological options. We propose contrasting effects of founding team experience (broad/deep technology/market) on the success of these types of ventures, based on our theory that tech-anchored and market-anchored ventures need to conduct distinct kinds of search. First, we argue that while founders' in-depth market experience hinders tech-anchored ventures (cf. Gruber et al., 2013), it is an asset for market-anchored ventures. We expect the opposite pattern to hold for founding teams with in-depth technological experience. In contrast, we expect market search at tech-anchored ventures to benefit from a founding team with a breadth of market experience and market-anchored ventures to benefit from a team with a breadth of technological experience. We visualize our overall model in Figure 1.

*** INSERT FIGURE 1 ABOUT HERE ***

SEARCH IN TECHNOLOGY VENTURES

In this section we develop the distinction between tech-anchored ventures and market-anchored ventures based on the organizational theory notion of search, and propose that more effective search leads the venture to position itself in a better niche, resulting in higher initial performance. Search is a notion originally formulated in the behavioral theory of the firm (Cyert and March, 1963; see also Katila and Ahuja, 2002). Search involves identifying and assessing alternatives with uncertain value (Gavetti et al., 2012). A fundamental postulate of behavioral theory (Cyert and March 1963) is that these "choice alternatives" (Gavetti et al., 2012: 5) are not available ex ante to actors, but must be constructed through search (Knudsen and Levinthal, 2007). A second postulate is that the evaluation of alternatives is

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imperfect, so that often the best alternative is not identified nor selected (cf. Knudsen and Levinthal, 2007). Search can be more or less intentional and effortful (cf. Fiet, 2007).

The concept of search was elaborated in organizational theory with regard to the relationship between the organization and its environment (Levinthal and March, 1981; Starbuck, 1976; Thompson, 1967). Organizations find their place in the environment through search (Levinthal and March, 1981). All possible alternative positions in the environment form a fitness landscape, on which different locations are associated with varying level of performance. This opportunity landscape may contain local optima (or peaks), several of which may be viable (Knudsen and Levinthal, 2007). A key task for founders of new ventures is to find a viable environmental niche or "organizational habitat" (Gruber et al.,2012) within the overall landscape in which to establish themselves initially (cf. Aldrich and Martinez, 2001). If they choose a domain that presents more promising conditions, their initial performance will be higher relative to ventures that chose a less attractive option. The goal of organizational search is to find a high spot on this landscape. However, Cyert and March (1963: 169-171), in their seminal book, proposed that search is "biased" by the experience of the participants in the organization.

We argue that for technology ventures this initial niche consists of an anchor (market or tech) and a complementary tech or market domain identified by search. This search, bounded by the initial anchor of a market or technology, is what Bhardwaj and colleagues (2006: 251) refer to as "anchored search … which is tethered to the chosen anchor and involves creating and discovering growth possibilities using the anchor as guide." Therefore, tech-anchored and market-anchored new ventures have different starting points in their search for a successful technology–market combination (cf. Grégoire and Shepherd, 2012): the anchor formed by the founding intent to pursue a particular technological or market opportunity.

We expect the initial success of the two venture types to be shaped by the effectiveness of their market or technology search. Tech-anchored ventures tend to perform better when they conduct a broad market search, while market-anchored ventures tend to perform better if they conduct a broad technology search. Broader search scope fosters the identification and assessment of superior alternatives, which we expect to manifest in higher initial performance.

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Founder(s) of tech-anchored ventures see entrepreneurial potential in a technology and seek a market in which to apply it. Many technologies have a degree of fungibility and thus can create benefits in different market domains (Danneels, 2007). Their founding is therefore anchored in the technological domain, and their search aims to identify potential market applications. As a result, tech-anchored ventures will perform better when their initial search fosters the identification and selection of the most viable market(s) for first entry (Gruber et al., 2008). Market-anchored ventures, on the other hand, see an entrepreneurial opportunity in un/underserved market needs and look for a technical solution(s) to address those needs. Anchored in their chosen market domain, they seek to identify a technological solution to address that need. As a result, market-anchored ventures will perform better when they conduct an effective technology search. A major input into the construction of alternatives for new ventures is the experience founding team members acquired at other organizations. Hence we will examine how founders' prior experiences affect the generation and evaluation of alternatives regarding potential markets and technologies.

Table 1 summarizes the key distinctions between the venture types.

*** INSERT TABLE 1 ABOUT HERE ***

In the next section, we will hypothesize various ways in which search is shaped by founders' experiences. For theoretical foundation, we draw on prior literature that has distinguished depth of knowledge within a domain and breadth across domains. Knowledge depth refers to the level of sophistication and complexity of knowledge within a particular field, while knowledge breadth refers to the extent to which an entity (individual, team, or firm) has knowledge in multiple domains (Lungeanu and Zajac, 2019; Zhou and Li, 2012). We argue that based on the type of prior professional experience (see measures section), individuals develop deep and/or broad knowledge of markets and technologies.

Experience – and the knowledge base it has formed – has distinct effects on search based on whether it is deep or broad. While the literature proposes that knowledge shapes search (cf. Zhou and Li, 2012; Fiet, 1996; 2007), it is not clear whether knowledge depth or breadth foster local (narrow) or distant (broad) search.

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Extant research suggests that deep knowledge enables more profound connections between problem-solution pairs (e.g., Grégoire et al., 2010), while it also argues that experts can get caught up in a locked-in myopic mindset (Dane, 2010). Reconciling this contraction, we argue that search will be broad in case of deep knowledge of the anchor domain (the given domain of founding intent) and narrow in case of deep knowledge of the searched domain (the complementary domain in which suitable markets or technologies are searched). In contrast, broad experience within the anchor has no relevance, since the starting point is a given - a given market or a given technology in market- or tech-anchored ventures, respectively. On the other hand, broad experience in the search domain (which is technology or markets in market- or tech-anchored ventures, respectively) widens search scope.

In sum, we expect that the initial performance of a new venture is influenced by its ability to perform the type of search its anchor domain requires: a market search for a tech-anchored venture or a tech search for a market-anchored venture, and this search is in turn facilited – or hindered – by experiences present on the founding team. Deep experience in the anchor domain and broad experience in the complementary domain leads to distant search, and vice versa. The next section formulates several hypotheses about founding team experiences we expect to enhance or hinder search by market-anchored and tech-anchored ventures, and therefore enhance performance for each type in contrasting ways.

HYPOTHESES

As discussed, the two types of ventures have contrasting anchor points (market vs. technology), and hence different search tasks (tech vs. market search, respectively) in order to form a favorable tech-market combination, leading to higher performance. The anchoring domain implies the need to conduct effective organizational search in the complementary domain (technology or market). We expect the performance of market-anchored and tech-anchored ventures to be impacted by the effectiveness of their technological and market search, respectively. We propose that market and technological experiences of the founding team influence search effectiveness, reflected in the venture's initial performance.

Before discussing these founder characteristics in more detail in the following sections, we briefly

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show how each of them is related to search effectiveness, that is, the venture's ability to identify and assess a range of alternatives. We argue that *search is more effective when it takes on a wider scope*, what has been referred to as local (or narrow) versus distant (or wide) search (Katila and Ahuja, 2002; Rosenkopf and Nerkar, 2001), as it leads to the identification of a more diverse set of options. Prior work experience of founding teams can facilitate or hinder consideration of a broad range of alternatives, depending on whether it is broad or deep. We expect search to be broader if the prior experience of the founding team is deep in the anchor domain and broad in the search domain, while the reverse pattern of experience narrows search.[2]

Market and Technological Experience: Depth and Breadth

Prior work experience can facilitate or hinder consideration of a range of alternatives, that is, affect whether search scope is narrow or wide. Prior research has examined how prior experience shapes market-tech links in new ventures (Grégoire and Shepherd 2012; Grégoire et al., 2010; Gruber, 2010; Gruber et al., 2012; Gruber et al., 2013; Shane, 2000). In line with this prior work, we contrast the effects of market and tech experience. However, beyond prior work, we anticipate distinct effects based on the depth or breadth of these experiences, and whether those experiences are held in the anchor domain or in the complementary search domain. By definition, for market-anchored ventures, the chosen market is the anchor domain and technologies are the search domain. In contrast, for tech-anchored ventures, the chosen technology is the anchor domain and technologies are searched.

This distinction leads us to opposing mechanisms for the two types of venturs. In-depth experience in a search domain, in our study the technology or the market domain, leads to local search in the neighborhood of that experience, and discourages broad search (Levinthal and March, 1993), while broad experience has the opposite effect. In contrast, deep experience in the anchor domain facilitates broad search in the complementary domain. We first hypothesize the effects of in-depth experience.

In-depth market experience. Some prior studies suggest that founding teams with in-depth market experience tend to form a knowledge corridor out of which it is difficult for the venture to escape (Gruber

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et al., 2008, 2013). Entrepreneurs with in-depth experience in a particular market tend to identify opportunities in that market (Fern et al.,2012) and not to engage in a search for more distant opportunities. Shane (2000: 452) found that idiosyncratic prior knowledge of markets creates a ‘‘knowledge corridor’’ that allows the entrepreneur to recognize certain opportunities, but not others. This narrowness in the search for alternative markets may focus them on inferior markets, depressing their performance (Gruber, 2010). We think the former arguments from prior work hold for tech-anchored ventures because the scope of market search is crucial to a tech-anchored venture's selection of a viable market domain. For *tech-anchored ventures, in-depth market experience is detrimental to initial performance*, as it limits the broad identification of market opportunities. As we argued above, the presence of in-depth experience narrows search in the domain in which that knowledge is held, at the cost of identifying potentially more attractive alternatives.

In contrast, other research suggests positive effects of deep market experience or knowledge. Innovation studies regarding the role of the demand-side as a source of innovation highlight the importance of having deep insights into the user (von Hippel, 1998). Grégoire and colleagues (2010) show that entrepreneurs with in-depth "structural" market knowledge are able to make higher-order connections between needs and solutions. In contrast, entrepreneurs lacking in-depth market knowledge tend to identify superficial connections. This suggests that entrepreneurs with in-depth market knowledge deriving from prior market/industry experience will be more able to draw structural relations between demand and potential solutions, and hence be better judges of how to address market needs.

We think these latter arguments apply to market-anchored ventures. For these ventures, prior in-depth market experience will not create a knowledge corridor, as they don't need to search in the market domain. Instead, the initial success of *market-anchored ventures will benefit* from its founders having a deep understanding of the needs of the market the venture intends to serve (the focal market). Market-anchored ventures will perform their search more effectively if they have a well-defined goal, that is, a clear understanding of the market need to be fulfilled. As such, deep market experience facilitates technology search because it helps to set a clear goal in terms of the performance specs that the

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technology needs to have. In sum, we expect contrasting effects of deep market knowledge for market-anchored vs. technology-anchored ventures.

> *Hypothesis 1a*. For tech-anchored ventures, the presence of in-depth market experience in the founding team has a negative impact on performance.
>
> *Hypothesis 1b*. For market-anchored ventures, the presence of in-depth experience with the focal market in the founding team has a positive impact on performance.

In-depth technological experience. As with in-depth market experience, we expect contrasting effects for in-depth technological experience. On the one hand, in-depth experience with the technology upon which the firm is anchored should be *helpful for tech-anchored ventures*. Founders with deeper technological expertise will be able to think more abstractly about the technology and frame it more generally (Gruber et al., 2012). A more fundamental understanding of the technology will lead to a greater ability to articulate potential applications (cf. Danneels, 2007; Grégoire et al., 2010; Gruber et al., 2013). Broad market search requires the characterization of the technology in its own right, that is, "delinked" from any specific application (Danneels, 2007; Danneels and Frattini, 2018). Founders with a profound understanding of their technology have a greater ability to de-link it from any particular use, allowing them to see a broader scope of applications (Danneels, 2007; Danneels and Frattini, 2018). In addition, the deeper the technological expertise present in the founding team, the more thorough their understanding of the extent and limits of the technology's functionalities (Gruber et al., 2013), and the more accurate their assessment of where it can and cannot be applied. Hence, we expect that the depth of experience with the focal technology facilitates the identification and selection of new markets (Gruber et al., 2012). In-depth technological experience facilitates market search because it helps identify and evaluate multiple paths (or links to market needs).

On the other hand, just like deep experience in serving a particular market will tend to drive the founder to focus on that market (Gruber et al., 2012), we expect that deep experience with a particular technology will lead to a narrow technological search. We expect this to be *harmful for market-anchored ventures*, manifesting in poorer performance. In-depth technological experience leads to a local search for

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solutions near the known technology. Tech search needs to be broad for these ventures, but founders with deep tech experience tend to conduct local search in the neighborhood of their technological expertise (cf. Katila and Ahuja, 2002). Focusing on familiar knowledge elements can preclude market-anchored founders from investigating more distant—and potentially more useful—technological solutions (Fleming and Sorenson, 2004). These suboptimal solutions will less adequately serve the identified market needs, and subsequently lead to relatively lower customer satisfaction and venture performance.

> *Hypothesis 2a.* For tech-anchored ventures, the presence of in-depth experience with the focal technology in the founding team has a positive impact on performance.
>
> *Hypothesis 2b.* For market-anchored ventures, the presence of in-depth technological experience in the founding team has a negative impact on performance.

Broad market experience. Some technology-market linking studies have looked at the effect of the number of markets/industries in which founding team members have experience (Gruber, 2010; Fern et al., 2012). As mentioned, we expect that search will be more effective if it covers a bigger area of the opportunity space (cf. Gruber, 2010). The greater the range of alternatives considered, the more likely the venture will be to form a market-tech link that yields high initial success. The broader the experience (both market and technological) present in the founding team, the more alternative options can be generated. The breadth of experience on the founding team provides the set of knowledge elements available for re-combination (cf. Fleming, 2001). The more diverse elements are available for re-combination, the greater their recombinant potential, and the greater the range of alternatives that can be conceived of (cf. Amabile, 1983; Fleming, 2001). Specifically, we expect that the mere availability of an alternative through the presence on the team of experience in more than one market opens up its search scope. The addition of just one more set of unique knowledge brings the biggest step up or the largest marginal increase in information for the decision-making unit (Shannon, 1948; cf. Harrison and Klein).

Broader market experience, in particular, will allow for more market application alternatives to be generated, and hence a more effective market search can be performed. In contrast, narrow market experiences will lead to narrower exploration of opportunities. A team with experience in different

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markets/industries will recognize more opportunities for exploiting a technology. Hence, we expect *broad market experience to have a positive effect for tech-anchored ventures*. Since market choice is a given for market-anchored ventures, we expect the breadth of market experience to be irrelevant for this type of venture.

> *Hypothesis 3*. For tech-anchored ventures the presence of broad market experience in the founding team has a positive impact on performance.

Broad technological experience. In parallel to our reasoning for broad market experience, we expect broad technological experience to facilitate tech search. To our knowledge, no prior research has examined the effect of the number of technologies in which founding team members have experience. However, based on search theory, we argue that the broader the technological experience contained in the founding team, the more technological alternatives can be generated, and hence the more effectively the tech search task can be performed. A greater breadth of technology experience on the team will give market-anchored ventures a richer recombinant search space (cf. Fleming, 2001). This in turn will enable a greater variety of technological solutions with which they could potentially address the needs they want to serve. Hence, we expect *broad technological experience to have a positive effect for tech-anchored ventures*. In line with our reasoning for broad market experience, we expect the mere presence of experience in at least two alternative technologies to open up the search space. In parallel to the above, since technology choice is a given for tech-anchored ventures, we expect breadth of technological experience to be irrelevant for this type of venture.

> *Hypothesis 4*. For market-anchored ventures, the presence of broad technological experience in the founding team has a positive impact on performance.

METHODOLOGY

Sample

The sampling frame of new technology ventures was obtained through the Agency for Innovation by Science and Technology, referred to as IWT by its Flemish acronym. The IWT is a Flemish government

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agency to support innovation in academia and industry (Flanders is the Dutch-speaking northern portion of Belgium). One of its programs provides grants to entrepreneurs who start technology ventures. Most of these types of entrepreneurs in Flanders apply for these grants, as the IWT actively encourages them and helps them to prepare their proposals, and the grants provide up to 50,000 Euros in seed money. Therefore we expect our sampling frame to be fairly representative of technology-based ventures in Flanders. Using internal data from the IWT on grant applicants and public data on IWT grant recipients, we annually updated a list of ventures founded between 2006 and 2014. We contacted the ventures within a year after their application for an IWT grant. Typically, the application for such a grant followed soon after the decision to pursue a particular market or technological opportunity. We limited our sample to ventures that established a legal entity less than three years before the time of this first survey. Hence, ventures were surveyed close to the choice of opportunity. We conducted yearly survey rounds between 2009 and 2017. Ventures were observed from one to five times, so firms contributed from one to five observations to the data set (cf. Dencker and Gruber, 2015). The mean age across repeated measures of the time since legal set-up was 2.7 years. We used the regression command xtreg in STATA 14, which corrects standard errors for these repeated observations. In all we contacted 360 companies and obtained complete questionnaires from 203, yielding a response rate of 56%. The sample consists of 125 tech-anchored and 78 market-anchored ventures, good for 509 observations. Twenty-seven percent had solo founders (tech-anchored: 21%; market-anchored: 37%).

We tested for non-response bias by comparing ventures that responded only once with those that respondent multiple times (contingent on survival), in the assumption that the former are akin to non-respondents (Armstrong and Overton, 1977). We compared them on our focal variables, as well as team size and industry. We found no significant differences ($p < .10$). Therefore, we conclude that non-response bias is unlikely to be a problem in this study.

Variables

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We used both survey and archival data sources to construct our variables. Surveys were filled in via the web, during onsite visits (about 10%), and telephone follow-up calls were made to clarify unclear markings or fill in missing values. We were able to extract information even from firms that ceased operations using the Internet Archive Wayback Machine (www.archive.org), which has records back to 1996. We can thus draw on a rich data set combining original survey data (on performance) with secondary data (on experience and venture type) obtained from independent sources. Appendix A contains an overview of our measures.

*** INSERT APPENDIX ABOUT HERE ***

Coding on venture type, experience, and some of the control variables was performed by one of the authors and a research assistant. Coding was first performed independently based on a predefined coding scheme, and degree of agreement was calculated. Subsequently, disagreements were resolved by discussion and consultation with another author. All kappa scores are above 0.61, which means there is substantial agreement and for some almost perfect agreement. The exception is for "deep technology experience" for which we obtained fair agreement.[3]

Venture Type. Ventures were coded either "technology-anchored" or "market-anchored" based on their start-up history stated on the company website and in press articles concurrent with their founding time. We recovered these documents through the Internet Wayback Machine and Mediargus. In four cases (of our sample of 203), we interviewed the founders to confirm our understanding of their founding. Ventures were coded as technology anchored when the entrepreneur started with the intent to pursue the entrepreneurial potential inherent in a technology and then sought a market in which to apply it. Ventures were coded as market-anchored when the entrepreneur started with presumed insight into an un- or underserved market need and sought a technological solution to satisfy the poorly met need. The interrater agreement was 92%, and kappa is .83.

The coding of venture type was relatively straightforward, supporting the face validity of our distinction. However, it did become clear that a careful consideration of the venture's founding history is necessary. It is important to note that founders may consider many opportunities during the nascent stage

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of a venture, which may include both market-anchored and tech-anchored options. However, we study only actually founded ventures, which inevitably have either a market or technology anchor. In some cases, for example, founders indicated that they perceived a market gap, but then actually founded a venture to exploit a promising technology in market applications unrelated to the initially identified market gap. We coded these ventures as technology anchored because we focused on the actually founded venture.

The following are two examples of ventures in our sample. On the website of one of our ventures we found the following: "[name company] develops and builds unmanned aircrafts for terrain mapping and surveying. The idea originated from the PhD of [name founder] who studied the aerodynamics of micro air vehicles." In an interview the lead founder stated: "The idea to do something with the unmanned aircrafts emerged during my PhD […] We imagined that the technology could have commercial value for very large construction projects. So we did test cases in the mining industry first and later on in the dredging and agriculture industries." We coded this venture tech-anchored. Three co-founders of another of one of our sample ventures noticed that TV broadcasters in Belgium were struggling to put high-quality videos and advertisements online. Their conversations with industry experts confirmed such a need. The three founders eventually decided to develop a technology platform to upgrade videos with personalized interactivity, real-time measurements, and more inventory. We coded this venture market-anchored.

Venture Performance. For the dependent variable, we used a survey measure adapted from Wiklund and Shepherd (2003) and Gruber (2007). We preferred a perceptual measure of performance because it allows a more overall assessment of initial success and comparability across different industries and venture time horizons and objectives (cf. Song et al., 2005). Measures of sales or profits are not as appropriate as many of our ventures are still in the process of identifying a market–technology combination, and may not have customers yet. Hence, a perceptual performance measure, while not without limitations, is best suited to ventures at this stage (see the limitations section for further discussion regarding suitability). In line with prior research (e.g., Gruber, 2007) and with the

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recommendation by Richard and colleagues (2009) to assess performance relative to strategic goals of the firm, we adopted a goal-centered approach by asking key founders to compare current performance with the goals stated in the original business plan. An exploratory factor analysis showed this this 7-point/6-item measure to be unidimensional. The reliability is α=.86. One-time measures can be heavily biased by random fluctuations (Richard et al., 2009). Richard et al. (2009: 726) note that subjective measures are susceptible to bias arising from the availability of recent events. We were able to mitigate this limitation by repeating measures of performance over time. We checked the concurrent validity of this perceptual measure of firm performance by examining its correlations with failure and revenue growth recorded in an archival source (Belgisch Staatsblad, government official records; revenues available for 71 out of 203 ventures). These correlations support the concurrent validity of our dependent variable ($r = -.28$, $p < .01$ with failure and $r = .26$, $p < .01$ with revenue growth). We also test the predictive validity of our perceptual performance measure with two performance outcomes that happened by 2020 (from 3 to 11 years later): failure (business liquidated, 29% of sample) and acquisition (22% of sample; there was no IPO). Later failure is negatively associated with performance in last observation ($r = -.32$, $p < .01$) and with average performance ($r = -.35$, $p < .01$). Later acquisition has positive associations with last and average performance ($r = .17$, $p < .05$ and $r = .19$, $p < .01$). Those ventures in the bottom quartile of self-rated (averaged) performance were four times more likely to later be liquidated than those in the top quartile (56.4% vs. 14%). In contrast, those in the top quartile of self-rated performance were 2.4 times more likely to be acquired than those in the bottom (30% vs. 12.7%) in the following 3-11 years.

Founding team experience. The experience variables were coded based on the background of the members of the founding team. The information for coding the experience variables was derived from LinkedIn profiles, company web page bios and technology descriptions, press articles, patent applications, and interviews with the founders. We coded the background of every person on the founding team (28% of ventures had only one founder). We coded experience variables as dichotomies (like Dencker and Gruber, 2015; Eesley and Roberts, 2012; Shane and Stuart, 2002; Souitaris et al., 2023).[4]

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By the time we coded the experience variables (several years after founding) all ventures had at least made a tentative market-technology link. In other words, the market-anchored ventures had chosen a technological direction to build a solution to fit their identified market need, and the tech-anchored ventures had identified a preferred market application for their technology. In some cases we gathered these data via phone interviews.

We coded technological experience as deep if the founder (or one of the founders) developed the technology themselves (e.g., as noted in co-authorship on a patent) or had a PhD in the technological domain of the start-up (cf. Grégoire et al., 2010; Gruber et al., 2008). This experience measure taps whether the founding team has structural knowledge (cf. Grégoire et al., 2010) in the technological domain, which includes understanding its elements, their causal relationships, and the mechanisms in the domain. For example, two high school teachers founded one of our ventures to develop digital board games for children. Because neither of them had developed the technological solutions themselves or had software development experience, we coded this founding team as not having deep technological experience. We coded technological experience as broad if at least one of the founders had experience in at least one technological domain beyond that of the venture. For example, one of the ventures was founded to develop a platform to create, broadcast, and monetize your own online radio station. One of the founders had prior technological experience as he worked as an R&D engineer in a speech recognition firm. We coded this founding team as having experience in at least one other technological field. The interrater agreements on the depth and breadth of technological experience of the founding team were 80% and 87%, respectively (kappas are .36 and .67).

We coded the market experience variables along the same lines.[5] We use the term market experience to refer to experiential knowledge that could help the venture design and define the offering and understand how to serve the target market. Therefore, we examined experience for the extent that it would provide related knowledge (cf. West and Noel, 2009) transferable to enable understanding of un- and underserved needs and how to address them.[6] Market experience was coded as broad if any member of the founding team had marketing, sales, or entrepreneurial work experience in at least one other industry

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than the industry of the start-up. For example, one of our sample ventures developed a technology to monitor and manage energy consumption and targeted large energy companies. One founder had prior experience as a business developer in a mobile internet company, while the other founder worked as a sales manager in the bank industry. We concluded that this founding team had broad market experience. Market experience was coded as deep if at least one of the founders had marketing, sales, or entrepreneurial work experience in the market or industry of the start-up (cf. "industry specialists" in Souitaris et al., 2023). Again, this depth measure taps structural knowledge (cf. Grégoire et al., 2010) in the market domain, which includes understanding its elements, their causal relationships, and the mechanisms in the domain. One of our ventures had developed a solution to reduce empty seats at sports and music events. The co-founder was the former CEO of a company that organized many big sport and music events around the world. We judged that this founding team has deep market experience. The interrater agreements on the depth and breadth of market experience of the founding team were 88% and 87%, respectively (kappas are .76 and .72).

Control Variables

Entrepreneurial experience. We include prior entrepreneurial experience as a control because some prior research has found it leads to broader search (Gruber et al., 2008). If one member of the founding team had previously started a firm, we coded entrepreneurial experience as 1. The interrater agreement is 95% and kappa is .89. We used alternative measures in robustness tests.

Raised capital. We include cumulative raised capital as a proxy for organizational slack as it affects resources available for innovation projects. (Danneels, 2008; Gulati, 1995). We constructed this variable combining secondary and survey information. Using both information sources we filled in values that were missing in either source. This is a time-varying variable, and the value at each observation time reflects the funds accumulated up to that point.

Environmental dynamism. We control for industry-level environmental dynamism by constructing a measure building on the seminal work of Dess and Beard (1984; see also Sharfman and Dean 1991;

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Hmieleski and Baron, 2008). We regressed time on industry revenues and number of industry employees for the most recent 10-year period (cf. Sharfman and Dean, 1991). We divided the standard errors of these regressions by their means, and next standardized and summed these values. Data on industry revenues and industry employment totals were acquired through the OECD sector data.

Additional controls: founding team size, sector, and venture age. To control for the confounding influence of these key venture characteristics, we controlled for team size (number of members of the founding team), sector (six industries), and age (months since legal set up, based on Belgisch Staatsblad, government official records).

FINDINGS

Table 2 contains the descriptives and bivariate correlations. The standard deviations indicate that the firms in the sample do indeed vary on the variables of interest. The two venture types have nearly identical mean performance, suggesting that both are equally viable ventures, on average. Interestingly, fifty-seven percent of the market-anchored companies have at least one person on board with deep tech experience. This indicates that many of these ventures, even though they started with the purpose of targeting a market need, have strong science or engineering expertise on the founding team.

*** INSERT TABLE 2 ABOUT HERE ***

We decided to use random effects because some variables are not time varying. We could not use fixed-effects estimators since our independent variable measures are constant over time (i.e., experience at founding). We used initial year of observation (year t) measures of independent variables with measures of firm performance at t+1, t+2, t+3, etc. as the dependent variable. The average VIF on models 1 and 2 were 1.98 and 1.71 (the highest VIF on either model was 1.44 on a focal variable and 3.99 on a control variable), which means that multicollinearity did not pose a problem. We present the findings in Table 3.

*** INSERT TABLE 3 ABOUT HERE ***

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In-depth market experience has opposite effects on performance, as expected. Founders with in-depth market experience had better performing market-anchored ventures, and worse performing tech-anchored ventures. However, the effect for tech-anchored ventures is only marginally significant ($p<.10$). The findings strongly support Hypothesis 1A ($p<.01$) but only weakly support Hypothesis 1B. In-depth technological experience has a positive and significant effect for tech-anchored ventures ($p<.01$), while we find no effect for market-anchored ventures ($p>.10$). These results support Hypothesis 2A, but not Hypothesis 2B. Furthermore, we find that breadth of market experience has a positive and significant effect for tech-anchored ventures ($p<.05$), while broad technological experience has a positive effect for market-anchored ventures ($p<.01$). These results support Hypotheses 3 and 4. In sum, our results support the positive effects of kinds of experience in their respective venture types. Contrary to expectations, for both venture types it does not hurt performance to have in depth knowledge in the search domain (market depth for tech-anchored ventures and tech depth for market-anchored ventures).

Robustness tests

Since our sample consists of ventures that responded only once (39% of MP and 33% of TP) and ventures that responded multiple times, our coefficient estimates could be affected by attrition bias. To examine the possible presence of this bias, we applied a standard econometric technique proposed by Heckman (1979; see also Greene, 2003). We first estimated probit models where the dependent variable is one if the venture replied to more than one wave of our survey and zero if it only replied once. We included as explanatory variables the age of the venture, the entrepreneurial experience of the founding team, and team size, and as an instrument the year of first observation. From these models we calculated the inverse Mills' ratio (lambda) and included it in our regressions explaining venture performance. All of the coefficients on our focal variables remained of similar magnitude and identical significance level with inclusion of lambda, and the coefficient on lambda was not significant. Hence, it does not seem that selective attrition affects our substantive results.

We examined whether our coefficients might be biased because of self-selection of founders into the two types of ventures. We used a Heckman procedure to assess this potential bias. We first estimated a

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probit model to predict if ventures would start-up as tech-anchored or market-anchored. As instruments in this selection model we used two characteristics that strongly predict type of start-up: the number of patents obtained before founding and into the first year of existence and the presence of a university-connected investor. Upon entering the lambda into the performance model, the focal coefficients remain at a similar magnitude and significance. In sum, our conclusions are robust to a Heckman correction for selection bias.

We conducted additional robustness tests. First, we controlled for year effects with dummies for each founding year in our sample to account for macro trends, and found the results hold. Second, instead of a dummy for the presence of entrepreneurial experience, we also used the averaged years of entrepreneurial experience (EE), the highest number of years of EE in the team and the sum of years of EE in the team, and found our results are the same.

DISCUSSION

In this article, we developed a key distinction between two types of technology ventures: market-anchored and tech-anchored. The first type is founded to pursue an opportunity in serving an un/underserved market need, while the second type sets out to commercialize an un/underused technology. We next argued that these ventures face very different search tasks to achieve initial viability: to find a (or set of) technology capable of addressing the focal market need, or to identify a viable market to serve with the technology. We theorized that their initial performance is influenced by their ability to perform the search complementary to their anchor domain. This involves market search for a tech-anchored venture or tech search for a market-anchored venture, which completes the market-technology combination (cf. Grégoire et al., 2010; Grégoire and Shepherd, 2012; Gruber et al., 2008). We proposed contrasting effects of founding team experience (broad/deep technology/market) on the performance of these ventures, as these differentially foster or hinder tech and market search. Our study offered some initial evidence of these contrasts.

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Theory is a set of statements about concepts and their relationships, and the mechanisms by which those relationships occur, intended to describe and explain the phenomenon of interest (Mantere and Ketokivi, 2013; Shepherd and Suddaby, 2017). In this sense, we make four interrelated theoretical contributions to the entrepreneurship literature: the distinction between two types of technology ventures (introducing the concepts market- and tech-anchored ventures), the nature of entrepreneurial search (the mechanism that links the types to venture performance), and the role of different types of experience in new venture performance (distinguishing deep/broad and market/tech experience concepts). These contributions must be considered tentative until additional research confirms the patterns we found.

First, we contribute the distinction between market-anchored vs. tech-anchored ventures. We found that this type is a key contingency for antecedents of initial performance. We proposed that the market-anchored vs. tech-anchored nature of a venture leads to different search tasks requiring distinct experiences to foster initial entrepreneurial successes. That entrepreneurship scholars have previously ignored this contingency may help explain prior inconclusive findings regarding which types of experiences promote new venture performance (for extensive overviews, see Delmar and Shane, 2006 and Jin et al., 2017). As we show, market vs. tech anchoring type is a highly consequential yet previously neglected venture characteristic.

We believe that the failure to distinguish tech-anchored from market-anchored types of technology ventures has led to confusion. For example, a classic and often-cited article in this literature could easily be misunderstood as being about tech-anchored ventures. Shane (2000: 457, 464) studied eight entrepreneurs who each sought to commercialize a technology invented at MIT (3D printing). These were all market-anchored ventures, as their founders had insights into an un/underserved market, which they subsequently linked to the 3D printing technology as they encountered it. Each of the founders "heard about the technology from someone directly involved in its development … [and] … looked at the technology … coming to it with a pretty specific need." Tech-anchored ventures could have emerged, but "none of the four inventors of the 3DP process chose to exploit this technology" (Shane, 2000: 454).

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Second, we also make a contribution to the entrepreneurial search literature. We proposed that new ventures make an initial anchoring choice (technology or market) and need to perform a search (market or technology) to find a viable peak in the opportunity landscape. The extensive literature on organizational search has focused largely on search across technologies and in established corporations (e.g., Katila and Ahuja, 2002, 2004; Rosenkopf and Nerkar, 2001), while the entrepreneurial search literature has studied market search (e.g., Grégoire et al., 2010; Grégoire and Shepherd, 2012; Gruber et al., 2008, 2013; Shane, 2000) and has therefore implicitly focused on technology-anchored ventures. We extend this literature by making a distinction between market and technological search in technology ventures. We provide novel evidence on some of the founder characteristics (experiences) needed to perform these effectively. Appreciating the search tasks conducted by the new venture types may help explain contradictory findings (see introduction for examples) regarding effects of experiences in prior entrepreneurship studies. There is currently no literature that deals specifically with the difference between market search and tech search. We call for more research on the nature of market vs. technological search, and how their goals, procedures, criteria, pathways, etc. constitute distinct tasks for the founders of new ventures. Studies that provide direct evidence of the nature of the market and tech search tasks could provide novel insights to both the entrepreneurship and the organizational search literatures.

Third, to our knowledge ours is the first study to theorize and demonstrate the different effects of depth vs. breadth and market vs. tech experience. Empirical evidence regarding the effect of founders' prior experiences is mixed (Delmar and Shane, 2006; Jin et al., 2017). Most studies address only industry/market experience, not tech experience, such as recent studies on start-up teams by Furr (2019) and Souitaris and colleagues (2023). We also distinguish between the breadth and depth of experience, and show the contrasting effects of each dimension on venture success. Our study provides a deeper understanding of the effects of prior experiences on entrepreneurial outcomes by differentiating depth and breadth of experience and by testing venture type as a contingency. We developed theory to propose that the effectiveness of a venture's search is shaped by founder experiences, in contrasting ways for market-anchored and tech-anchored ventures. Contributing to search theory, we argue that search is facilited – or

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hindered – by experiences present on the fouding team. Deep experience in the anchor domain and broad experience in the complementary domain leads to distant search, and vice versa. Supporting these expectations, we found that the breadth and depth of experiences in markets and technologies present on the founding team have crucial effects. The best combination of experience for a market-anchored venture is founders with prior in-depth market experience and broad technological experience, while for tech-anchored ventures it is founders with broad market experience and in-depth technological experience. In other words, the experiences differentiating high performing founding teams in a market-anchored venture from high performing founding teams in a tech-anchored venture are opposite.

Limitations

We investigated only the effects of founding team market and technological experiences. We did not examine the many other entrepreneurial activities and characteristics that could facilitate or hinder tech vs. market search. Managers with different types of formal education, for example, may be more or less adept at different search tasks. Some of the variables that we did examine could benefit from greater precision.

We focused on ventures in the stage immediately following the pursuit of an initial opportunity. Search in nascent ventures, or in more mature ventures that engage in pivoting or diversification, will likely be influenced by the experiences of their founders as they engage in different search tasks, as well as by the characteristics of managers added as the venture grows. As ventures grow, the addition of employees with experience that complements that of the founders, and that is aligned with the chosen market/technology combinations, will likely impact venture performance (cf. Lazar et al., 2020). Relatedly, our results should only be taken to apply to the initial performance of ventures – those in the search stage in which initial market-tech links are formed. Different patterns of experience may be more important to performance in later growth or maturity stages (e.g., as predictive of IPO or exit value).

Moreover, while the experience variables in our study address the source of information, we do not examine how this information is elaborated and discussed in the team to perform technology-market

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linking. Future research could build on information elaboration literature (van Knippenberg and Schippers, 2007; van Knippenberg et al., 2004) to explore how team communication processes influence the different types of search in new ventures.

We study innovative and high-tech ventures from a wide variety of industries. Future research could check whether our results hold by comparing market anchored vs. tech anchored ventures in one specific industry or considering only ventures dealing with the same market or technology.

The interpretation of our results should also be tempered with the recognition that founding teams (as well as all top teams) are self-selected; "when building a new venture, entrepreneurs select both the venture (business idea) to develop and the partners with whom to work" (cf. Lazar et al., 2020: 30). Naturally occurring teams are not randomly assigned to ventures, and therefore potential endogeneity inevitably clouds causal interpretation of research on such teams (cf. Lazar et al., 2020). We don't address how teams are formed, and how these forces influence team characteristics–outcomes relationships (Lazar et al., 2020).

Finally, the use of a perceptual measure of performance may be subject to recall bias and imprecision. However, such perceptual measures are widely used in management and entrepreneurship studies (cf. Wall et al., 2004, extensive list is available from the authors). The use of a perceptual performance measure offered a number of advantages in the current study over the use of archival performance indicators. First, our study deals with ventures that are often still in the research stage. During our survey-testing, several entrepreneurs indicated that they had not made any sales yet, and that their primary focus was on testing and refining their technology. Hence, measuring performance as revenue or profit is not appropriate because many tech-based ventures do not expect to achieve sales in their first few years of existence. Second, measuring new venture performance using an archival measure can be problematic as the objectives of new ventures may vary by industry (Gruber, 2007; Song et al., 2005). Our study included ventures from different industries. Third, our perceptual measure taps various aspects of firm performance, which provides us with richer and more comprehensive information than would be obtained by single indicators of performance. For different ventures, different dimensions of performance are

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relevant. As we repeated the performance measures, we also account for changing performance goals. For instance, a venture may initially not have expectations for sales, but expect them in later years. Fourth, Belgian new ventures are – depending on their size – only obliged to report short versions of the financial statements than reported by larger and public firms and thus vary greatly in the amount of accounting data that they publish. Many authors recommend using subjective measures of performance if there is no complete information available or if accounting procedures differ greatly (Anderson and Eshima, 2013; Dess and Robinson, 1984; Herrmann and Nadkarni, 2014; Heavey and Simsek, 2015). For our sample ventures, concurrent revenues are available for only about a third of the sample, and fewer for later years as ventures terminate or are acquired. In sum, perceptual measurement of venture performance, although not without limitations, is arguably the most appropriate for our study (cf. Garrett and Neubaum, 2013).

Implications for Practice

Our findings suggest efforts to support entrepreneurs need to be tailored to their venture type, and may even be counterproductive if applied to the wrong type. The distinction among entrepreneurial ventures developed in our study also has important implications for how technology transfer offices (TTOs) and investors' support and guide start-ups. Our findings suggest that the two types of ventures have different needs and require different types of support. While market-anchored ventures would benefit from support in scanning the technological possibilities to build a product that can address the identified market need, technology-anchored ventures need resources so they can conduct broad searches into potential markets.

While most TTOs are geared toward supporting tech-anchored ventures, market-anchored ventures may also be prevalent. While the common image of university-spawned ventures is that of faculty seeking to commercialize a technology conjured up in a lab, not all university spin-outs are tech-anchored ventures. KeriCure is an example of university-spawned market-anchored venture. It was started when its key founder was earning an Organic Chemistry Ph.D. at the University of South Florida. The founder's husband nearly lost his hand when a cut between his thumb and forefinger became seriously infected. This incident led her to invent a liquid spray-on bandage that forms a protective and flexible barrier

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against germs. In other words, she identified a market need (in wound care), and searched for a technology that could address it. Our research suggests that universities and TTOs need to support market-anchored and technology-anchored ventures in a different way. Universities and technology transfer offices are traditionally focused on how technology invented by academic scientists can be linked to market needs. Most TTOs help founders screen potential markets and protect intellectual property developed at the university. These skills are well suited to tech-anchored ventures, which need help with protection of their IP, licensing, and market scanning. They would potentially benefit from exposure to outsiders with broad market experience, such as entrepreneurs in residence. Technology-anchored founders benefit from TTOs that have a network in different markets and include entrepreneurs in residence with market experience in different industries. This could compensate for a lack of breadth in market experience in the founding team. Market-anchored ventures, on the other hand, would likely benefit the most from broad exposure to diverse technologies across campus. For example, market-anchored businesses could benefit from events where founders present their ideas in front of academics with different technological backgrounds to compensate a lack of breadth in technological experience in the founding team.

Finally, investors consider founder competences as important investment criteria (Franke et al., 2008; Souitaris et al., 2023). This study sheds a new light on predicting which types of founders will successfully start ventures. Here, we show that the value of the founders' characteristics in terms of experience are contingent on the type of venture. In judging the likely success of entrepreneurs, investors often focus on depth of experience more so than breadth. We found that broad market experience and broad technological experience are important predictors of initial success for tech-anchored and market-anchored ventures, respectively.

In sum, we developed a distinction between market-anchored and tech-anchored new ventures, based on the new venture founding intent that entrepreneurs start from. We proposed their initial success depends on their effective conduct of technology or market search after founding, contingent on whether the venture sis market-anchored or tech-anchored. The extant entrepreneurship literature has overlooked

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this distinction, which may have led to inconclusive results regarding the impact of pre-founding experience on performance. We also contribute to the broader search literature by showing the path creating impact of anchoring choice and complementary search. We hope these initial findings inspire further research into the nature of entrepreneurial search and linking.

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NOTES

[1] Search in our definition is the identification and evaluation of alternatives. In the behavioral theory of the firm, in which it is a key concept, search is not necessarily effortful or deliberate, or does not necessarily involve the consideration of more than one option.

[2] Katila and Ahuja (2002: 1183) align narrow vs. broad search with exploitation and exploration, respectively: "Organizational learning researchers have sometimes argued that in their search for solutions to problems, firms position themselves in a unidimensional search space that spans the spectrum from exploitation to exploration … how widely a firm explores new knowledge, search scope."

[3] The Cohen's kappa-statistic measure of agreement is scaled to be 0 when the amount of agreement is what would be expected to be observed by chance and 1 when there is perfect agreement. For intermediate values, Landis and Koch (1977a, 165) suggest the following interpretations: 0.00 – 0.20 Slight, 21 – 0.40 Fair, 0.41 – 0.60 Moderate, 0.61 – 0.80 Substantial, 0.81 – 1.00 Almost perfect.

[4] Even though they are simple, dichotomous measures are the most valid measures of our market and technology experience constructs. First, regarding the measure of *breadth*, it was very unusual for our teams to have more than one alternative market experience or technology experience (17% have experience in more than two markets and 3% have experience with more than two technologies), so number of markets the team has experience in essentially reduces to the measure we used: a dummy that equals 1 if any member of the founding team had marketing, sales, or entrepreneurial work experience in at least one other industry than the industry targeted by the start-up, and likewise for technology breadth. Theoretically, we feel a dichotomous measure of breadth is appropriate because for broadening of search (the identification and evaluation of options) to occur, it is sufficient that one alternative experience is available for consideration. Exposure to more than one market or technology opens the team's consideration set (Gruber, 2010). These dichotomous measures are also consistent with key prior studies (Dencker and Gruber, 2015; Eesley and Roberts, 2012; Shane and Stuart, 2002, Souitaris et al., 2023).

Second, our measures of experience *depth* are intended to tap structural knowledge (cf. Grégoire et al., 2010). Because we want to tap structural knowledge, we feel years of experience with a technology is

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not an adequate measure. Years of experience with technology does not come to par with an actor with profound understanding because it is his/her invention and/or she/he conducted doctoral work on it. In addition, in our data we often could not ascertain how long a person had worked with a particular technology.

Also, many ventures were active in emerging, new markets or brand-new technologies. In those contexts, number of years of experience would seem misleading, and rather proxy for maturity of the knowledge domain. In sum, we feel the straightforward, easily understood and replicable dichotomous measures the best choice for this study (for parallel arguments, see Souitaris et al., 2023).

[5] Although we refer both to market and industry, we understand these concepts are different. We use the term "market" in a broad sense, in line with the technology-market linking literature on which we build (e.g., Gruber et al., 2008; Grégoire and Shepherd, 2012). The label "market" refers to the experience most germane to searching for markets and identifying market opportunities.

[6] In our theory, any in-depth market experience will create a corridor for tech-anchored ventures, but for market-anchored ventures only in-depth experience in the focal market will help. Conversely, any in-depth tech experience will limit tech search for market-anchored ventures, but for tech-anchored ventures only deep experience in the technology the venture was founded to exploit will help. We closely examined our ventures to see if there are any market-anchored ventures with in-depth market experience that pursued a market different from that area of deep market experience, and if there are any tech-anchored ventures that used a technology different from the one in which deep tech experience was present in the team. We found no tech-anchored venture with a founder who had a PhD or was an inventor in a technology in which the venture did not use that technology. We found only one market-anchored venture that had a founder with deep experience in a market other than the one the venture was founded to pursue. So in our sample, coding of in-depth experience in *any* market or technology or *focal* market or technology yields the same results.

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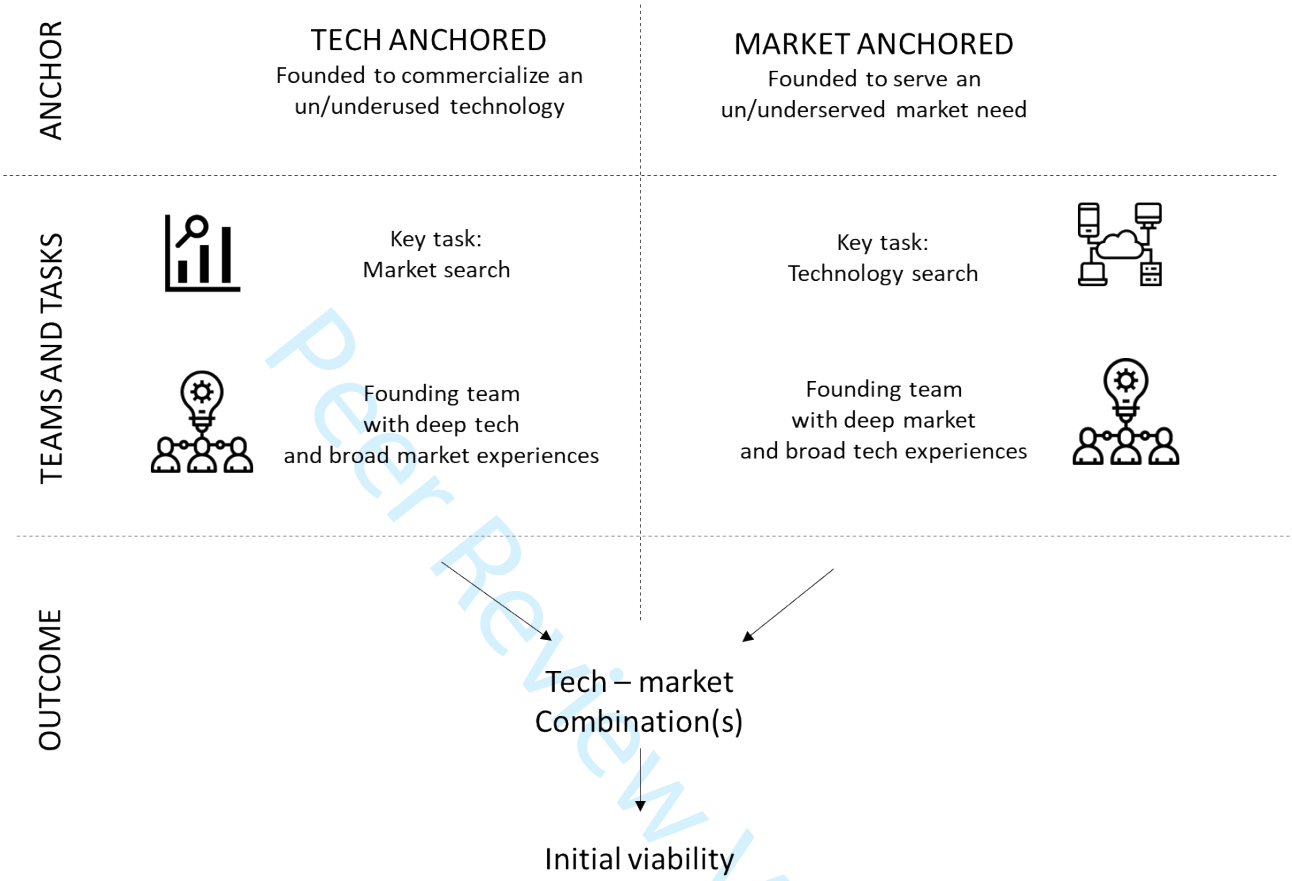

Figure 1. A Tale of Two Ventures.

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Table 1: Differences between Tech-anchored and Market-anchored ventures.

Key dimensions	Tech-anchored	Market-anchored
Search anchor	Technological domain	Market domain
Search aims	Search for profitable markets (=market search)	Search for appropriate technology (or technologies) (=technology search)
Initial viability	Selecting the most viable market for first entry	Selecting the most viable technology solution
Famous examples	Garmin	Dropbox

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Table 2. Mean and standard deviation and simple correlations.

	Mean	SD	min	max	Mean TA	Mean MA	α	1	2	3	4	5	6	7	8	9	10	11
1. Firm performance	4.04	1.07	1	7	4.04	4.04	0.86	1.00										
2. In-depth market exp	0.56	0.50	0	1	0.50	0.67		0.01	1.00									
3. In-depth technological exp	0.77	0.42	0	1	0.9	0.56		0.11**	0.12**	1.00								
4. Breadth of market exp	0.61	0.49	0	1	0.56	0.70		0.05	0.04	−0.19**	1.00							
5. Breadth of technological exp	0.24	0.43	0	1	0.28	0.18		0.11**	−0.09*	−0.11**	0.27**	1.00						
6. Founding team size	2.22	1.09	1	7	2.32	2.06		0.08*	0.13**	0.20**	0.21**	0.11**	1					
7. Entrepreneurial exp	0.38	0.48	0	1	0.35	0.41		0.03	0.22**	−0.04	0.32**	0.15**	0.29**	1.00				
8. Company age	47.10	22.05	4	118	45.99	48.87		0.02	0.06	0.04	−0.00	−0.06	0.01	−0.01	1.00			
9. Raised capital	1444.99	6251	0	64400	1920.70	689		0.02	0.13**	0.07	−0.09*	−0.05	0.21**	0.19**	0.14**	1.00		
10. Environmental Dynamism	0.01	0.99	−2.69	1.78	−0.07	0.13		−0.04	−0.02	−0.08	0.17**	0.00	0.09*	0.13**	−0.05	−0.13**	1.00	
11. Technology anchored	0.61	0.49	0	1				0.00	−0.16**	0.40**	−0.13**	0.11**	0.12**	−0.06	−0.06	0.10*	−0.10*	1.00

* Significant at $p < 0.05$ (two-tailed)

** Significant at $p < 0.01$ (two-tailed)

Technology anchored (TA), Market anchored (MA)

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Table 3. GLS random-effects model.

Variables	MODEL 1 Performance (Tech-Anchored)		MODEL 2 Performance (Market-Anchored)	
In-depth market experience	-0.30(1.61)†	H1A	0.44(2.44)**	H1B
In-depth technological experience	0.87(2.98)**	H2A	0.01(0.05)	H2B
Breadth of market experience	0.44(2.21)*	H3	-0.15(0.80)	
Breadth of technological experience	0.17(0.82)		0.50(2.36)**	H4
Founding team size	0.01(0.13)		0.09(1.14)	
Company age	-0.01(3.46)**		-0.00(0.29)	
Entrepreneurial experience	-0.06(0.29)		0.02(0.12)	
Raised capital	0.00(1.11)		0.00(1.91)*	
Environmental dynamism	-0.09(0.83)		0.02(0.25)	
Industry dummies[a]				
Biotech	-0.48(1.18)		-0.38(0.73)	
ICT	-0.52(1.19)		-0.66(2.05)*	
Business services	-0.21(0.47)		-0.52(1.77)*	
Construction	-0.64(1.36)†		0.29(0.70)	
Energy	-0.69(1.49)†		-1.02(2.91)**	
Intercept	3.88(7.45)**		4.08(12.40)**	
Observations	356		224	
Companies	129		83	
Wald Chi-square	30.82**		37.30**	
R^2	0.09		0.19	

[a] Reference category is other industries
Significance tests are one-tailed for hypothesized relations and two-tailed for controls.
†p<0.10, *p<0.05, **p<0.01

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APPENDIX: OVERVIEW OF MEASURES

Dependent Variable:*Firm performance* (informant average) – time varying

Based on Wiklund and Shepherd (2003)

Compare your firm with your initial business plan (Much Lower - Much Higher)

- Sales/Revenue growth

- Growth in the number of employees

- Net profit margin

- Customer satisfaction

- Overall company performance

- Profitability/ROI

Independent Variables:

Experience

Depth of Market Experience (0/1, highest score in founding team) – constant over time

Depth of Technology Experience (0/1, highest score in founding team) – constant over time

Breadth of Market Experience (0/1, all founding team) – constant over time

Breadth of Technological Experience (0/1, all founding team) – constant over time

Control variables:

Founding team size – constant over time

Company age – time varying

Entrepreneurial experience (0/1, highest score in founding team) – constant over time

Raised capital – time varying

Environmental dynamism – constant over time

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Sector dummies: biotech/medical; ICT; business services; construction, maintenance, and material processing; mobility/energy/electric devices; other – constant over time

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