Factors Shaping Entrepreneurial Ecosystems and the Rise of Entrepreneurship:

A View from Top Management Journals

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Tekes

Foreword

Digitalisation is far from being over. It is no longer about computers; people and physical things are becoming hyperconnected with cheap, abundant sensors resulting in the merging of digital and physical realities. To meet these challenges, Nordic societies look for new ways to prosper in the era of hyperconnectivity while upholding the traditional Nordic values of trust, equality and human-centrism.

A crucial question is how Nordic companies and startups can compete with these values on the global markets. Demos Helsinki wanted to uncover what is required for a successful Nordic hyperconnected business ecosystem to emerge. Assigned by Demos Helsinki, Aleksi Aaltonen, Assistant Professor at the Warwick Business School, browsed through over 2,000 issues from 60 top-tier management journals to find the answer. The working paper you are now reading is the first condensed analysis from this massive task. The work is a part of the strategic research opening Naked Approach, funded by the Finnish Funding Agency for Innovation.

I am confident that the review can help Nordic decision-makers, universities, research clusters and startup communities to create a winning hyperconnected business ecosystem. The working paper identifies the 10 most important topics from the literature and guides the reader to the key insights. For example, a reader interested in the future of Nordic universities might find interesting that the positive impact on the overall competence level of the population that universities provide is probably more important to entrepreneurship than direct knowledge spillovers from research. Likewise, a reader affiliated with public funding institutions probably is sympathetic to the part that states that entrepreneurship and entrepreneurial ecosystems cannot be directly created by public intervention, but public interventions certainly play a key role. Sometimes, for example, government championing and regulatory protection of a

disruptive innovation can be more effective than direct subsidies and funding in promoting entrepreneurship. And a startup founder can most likely resonate with the parts discussing how founders imprint a new firm with their personality and endow it with specific knowledge and resources, setting the firm on a trajectory that is difficult to change afterwards.

The reader is left with some concrete suggestions, ranging from a three-year 'entrepreneurship leave' for academics to reduce the opportunity costs of trying out entrepreneurship to supporting regional startup ecosystems by developing the capabilities of local industrial corporations to acquire startups. These are good ideas just waiting to be implemented: it is up to the reader to become a champion for this change.

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Key findings

1. The working paper identifies 10 generic factors that shape entrepreneurial ecosystems and the rise of entrepreneurship.

2. Not every great technology comes from Silicon Valley, but no startup can afford to ignore the US West Coast actors in hyperconnected high-technology business.

3. Entrepreneurship grows in local ecosystems, but most high-technology startups have to compete globally for customers and financing.

4. Regions can catalyse entrepreneurship by indirect interventions – throwing public money at startups does not necessarily generate successful ecosystems.

5. Key actors in entrepreneurial ecosystems are, in addition to entrepreneurs, investors, large companies, public authorities and universities.

6. Early-stage investors have a regional focus – to tap global capital flows, regions need local investors.

7. Entrepreneurial overconfidence may lead to excess new firms and failure, but traditional Finnish underconfidence results in missed opportunities without learning.

8. Any entrepreneurial firm has to consider at least two strategic issues irrespective of the market they are planning to enter: timing and incumbent reactions.

Introduction

Technological innovations have historically come from many different places around the world. For instance, important mobile technologies such as NMT and GSM were born and first commercialised in Nordic countries in the 1980s and 1990s. As the world moved beyond simple text messaging and voice calls, the region lost its leading role in shaping digitally connected consumption and business. Nokia and Ericsson are still important innovators in mobile network infrastructure, but, for the time being, the Nordic industrial conglomerates have had to give up on consumer products and ecosystems. The former superstars of the telecommunications industry were unable to compete with computer industry giants as the two industries converged on smartphones. Today, the Nordic region is hoping to develop a vibrant entrepreneurial ecosystem to find new ways of succeeding again in the post-smartphone world of computing. The outlook for such a reinvigoration looks promising, yet considerable challenges remain.

Hyperconnectivity, the Internet of Things, or whatever the next era is going to be called, will largely unfold as the evolution of current Internet and mobile ecosystems. There will be many new players, but Apple, Google, Facebook and the like are not going to easily relinquish the control of key platform technologies and the ecosystems upon which the next era of computing is built. This presents a dilemma for entrepreneurs and policymakers alike: how to avoid building something that will soon be taken over by the Silicon Valley giants. Blossoming startup entrepreneurship, knowledge and contacts from previous successes in the region are considerable assets for new entrepreneurial startups. Yet, they must also find strategically smart ways to participate in an industry that largely revolves around the Valley.

HYPERCONNECTIVITY

Internet of networks, people, things, machines, and computers enabling intelligent operations using advanced data analytics for transformational outcomes, to redefine the landscape for individuals and organisations alike. (Lätti, 2016).

At the same time, entrepreneurship is becoming more systematic and institutionalised than ever before. There is plenty of research across different management disciplines on the factors that shape entrepreneurial ecosystems and the rise of successful entrepreneurship. This is not to suggest a crude, old-fashioned best practices approach that often ignores context-specific dynamics underpinning visible practices. Nevertheless, it can be tremendously useful to recognize forces that have been found to shape entrepreneurship and then carefully reflect upon those forces in a specific regional or firm setting (see Barzelay, 2007). Vicarious learning[1] cannot substitute for a strong capacity for learning by doing in entrepreneurship, but it can accelerate the latter and help avoid costly mistakes. This working paper lays the groundwork for such reflection by reviewing and summarising scholarly knowledge on mechanisms that shape high-technology entrepreneurship. The working paper status suggests that the findings are subject to minor adjustments and reinterpretation, but I do not expect the key findings to change.

The paper draws from research in top academic journals to identify factors that are relevant for high-technology entrepreneurship both at the regional and firm levels. Most of the studies in the review use data from the late 1990s and early 2000s. The studies touch upon various aspects of entrepreneurship, and help identify numerous factors and mechanisms that have been found to play an important role in technology entrepreneurship in general. All of these are directly relevant to entrepreneurship in the IoT. The aim is to synthesise these as a basis for forward-looking debates and scenario work on high-technology entrepreneurship.

A hasty reader may skip the next section and move directly to the findings.

[1] Learning from the experience of others

Brief overview of the method

The screening of literature is based on formal criteria and individual assessment of each identified article. The former ensures appropriate coverage and a baseline quality of the articles, while the latter helps decide whether each tentatively identified item can make a contribution to the understanding of entrepreneurial ecosystems and the rise of entrepreneurship. The literature corpus for the review is constructed from research published in top-tier journals according to the Chartered Association of Business Schools[2] journal ranking of 2015. The selected journals represent the highest-quality research across management disciplines. Top academic journals tend to promote the reliability of research over creativity; therefore, some interesting but more speculative findings and perspectives have undoubtedly been left out of the review.

Initially, I found it difficult to construct an effective keyword search strategy to identify relevant articles in the literature corpus. The topic is diffuse and touches upon many aspects of management research that may not always use the same terminology. Therefore, I felt that relying on keyword searches would necessitate using broad and unspecific searches, which would result in a very large number of matches and still miss relevant studies. I opted for systematically browsing the table of contents of each selected journal as the method of identifying relevant articles. For each research article, my research assistant or I read the title and, if necessary, the abstract to assess its potential relevance to the review. We manually browsed 2,132 issues from 60 journals dated from the beginning of 2010 to mid-2015 and identified 386 articles for further inspection.

For each identified article, we summarised the research design, key findings and empirical context, looking for factors that affect the emergence and sustainability of entrepreneurial ecosystems. Particular attention was paid to high-technology industries and any

[2] http://charteredabs.org/

regional attributes that such ecosystems might have. In our database, the research design identifies the overall logic of the reasoning, that is, the type of methods employed in the study; key findings summarise the main findings from the perspective of the review, and the empirical context describes the setting from which the data was obtained. During the process, 134 initially identified articles were found not to be related to the topic of the study and were excluded from further analysis. These include non-research articles such as editorials, articles discussing corporate entrepreneurship and entrepreneurial orientation in established companies and articles that otherwise did not inform about high-technology entrepreneurship.

The summarising and filtering process left me with 252 articles that represent a range of methods, theories and settings as the effective material corpus. Then, I coded the summaries inductively, following an open coding approach to identify the main theme of each article in a few words (Strauss and Corbin, 1998). The open codes were grouped together into ten categories to make sense of important factors in entrepreneurial ecosystems. These categories form a simple framework to view entrepreneurial ecosystems and the rise of entrepreneurship comprehensively. In this report, they also structure the discussion of more detailed findings.

The reviewed articles represent the latest and most reliable academic research on entrepreneurship.

I

Ten generic factors that shape entrepreneurship

Ten generic factors that shape entrepreneurship

The literature paints a broad if somewhat sterile picture of entrepreneurship as a social and economic phenomenon. Any entrepreneur knows that entrepreneurship is not just about performing entrepreneurial activities but also about being an entrepreneur and having an entrepreneurial identity and passion. Nevertheless, studies focusing on the latter aspects are rare in top academic journals. This is undoubtedly partly due to the preference for a set of quantitative methods in many top journals. Most of the studies are quantitative, primarily regression analyses, while the rest represent a broad variety of methods ranging from qualitative case studies to literature reviews and theoretical studies. I will briefly address potential methodological biases in the limitations section at the end of the paper.

The benefit of having a large number of studies based on a typical causal inference setup is that it is relatively straightforward to aggregate key findings from such studies. The dependent variable in quantitative studies is usually some sort of performance measure. Studies attempt to explain, for instance, new firm creation, growth and survival; innovation and product development success and failure; product launch and commercialisation performance; personal transition to and withdrawal from entrepreneurship; entrepreneurial exit; or regional innovation performance. The synthesis of the literature proceeds in two steps introduced below.

First, I used an inductive, open coding approach to capture the main theme of each article (Strauss and Corbin, 1998). The open codes are firmly grounded in the content of articles; they were subsequently used to synthesise ten categories that represent generic factors shaping entrepreneurial ecosystems and the rise of entrepreneurship. The categories described in Table 1 meet two criteria. First, they are intuitive and easy to understand in the context of policymaking and by entrepreneurs themselves, and, second,

each category is observed across a number of studies. This suggests that they represent a valid – if not the only possible – approach for organising observations for a more detailed inspection. The categories offer a simple framework to help in planning policy interventions, evaluating investment opportunities and understanding areas that an entrepreneur needs to pay attention to.

Second, I identified and narrated mechanisms within each category based on a more careful reading of the selected studies. The categories are covered with a variable amount of detail in our literature corpus, which emphasises reliability and coverage across management disciplines at the cost of depth in a particular topic. Undoubtedly, it would be possible to find more insights in the literature by focusing on a particular aspect of entrepreneurship.

FACTOR	ARTICLES	BRIEF DESCRIPTION
Regional context for entrepreneurship	48	• Both local proximity and cross-border connections matter in entrepreneurship.
Knowledge, learning and resource acquisition	32	• A startup company requires plenty of varied knowledge and learning to cope with typically severe resource constraints.
Funding, ownership and remuneration	19	• Different types of funding interact with each other and support entrepreneurial success unevenly.
Founders and founding conditions	50	• Founders imprint their companies with specific knowledge and personality, which has a lasting impact on the organisation.
Innovation and product development	35	• A startup company needs to justify its existence, usually by bringing a some sort of innovation to the market.
Product architecture	13	• Product modularity and platforms shape appropriate marketing approaches, strategy and relationships with other companies.
Marketing	14	• The launch of the first product may define the fate of an entrepreneurial startup.
Intellectual property	11	• Innovation results often in intellectual property that can be exploited in different ways.
Startup strategy	19	• Entering or creating a market is a matter of strategy, whether the entrepreneur recognizes this or not.
Exit, failure and restart	11	• Entrepreneurship is a project that may end in three different ways.
TOTAL ARTICLES	252	

Table 1. Generic factors that shape entrepreneurial ecosystems

Table 1 describes ten categories that represent the types of factors that have been found to shape entrepreneurial ecosystems and the rise of entrepreneurship. The categories are hardly surprising to anybody involved with the industry; however, funders, policymakers and entrepreneurs themselves should be aware that all of these matter in high-technology entrepreneurship.

Finally, although the review focuses exclusively on entrepreneurial startups, this does not mean that big, established companies do not matter for entrepreneurship. They do – to the extent that a vibrant startup ecosystem can hardly exist without big corporations. Large companies are a source of inventions, entrepreneurs and whole founder teams; they also fund startups through corporate venture capital operations. An acquisition by a large company is often the most realistic exit opportunity for an entrepreneur, which is a little understood but important factor drawing promising startups toward Silicon Valley and its innovation-hungry tech giants.

The next section opens up the findings within each category in more detail. Some of the categories are more thoroughly studied in top management journals than others, allowing us to further divide them into sub-themes. A few categories remain clearly underdeveloped in top management research.

Regional context for entrepreneurship

There are significant differences in how regions support entrepreneurial ecosystems and make successful entrepreneurship possible. The differences fall into three broad categories: 1) cultural, institutional and demographic differences, 2) geographical proximity, industrial clusters and agglomeration, and 3) government and public interventions. Regional differences are even more dramatic in emerging economies than in highly developed countries (Anokhin and Wincent, 2012; Chan, Makino and Isobe, 2010).

Cultural, institutional and demographic differences

Numerous examples show how national culture shapes potential entrepreneurs' propensity to create businesses and to innovate (Chua, Roth and Lemoine, 2015; Wyrwich, 2012). For instance, high individualism is often associated with innovation, but certain types of collectivism have also been found to positively drive innovation (Taylor and Wilson, 2012). Societal collectivism tends to reduce new firm creation, but it can actually increase the growth aspirations of those who become entrepreneurs (Autio, Pathak and Wennberg, 2013). The landscape of regional social institutions has an influence on innovations by shaping technological and market opportunities (Radosevic and Yoruk, 2013; Vaz, Vaz, Galindo and Nijkamp, 2014). Local demand is an important driver of innovation (Fabrizio and Thomas, 2012) and a larger market size because of higher population density has been found to drive conversion to entrepreneurship (Sato, Tabuchi and Yamamoto, 2012).

Regional human capital together with appropriate innovation infrastructure drives innovation (Sleuwaegen and Boiardi, 2014). Universities raise the overall competence level of the population,

which may be even more important to entrepreneurship than knowledge spillovers from research (Ahrweiler, Pyka and Gilbert, 2011; Fallah, Partridge and Rickman, 2014). Young workers such as university graduates are often capable of taking risks and have the capacity to acquire skills required by entrepreneurship; hence, a younger labour force can be positively associated with new firm creation (Ouimet and Zarutskie, 2014). However, others have found a curvilinear relationship in which both countries with young and old populations are more likely to show low levels of entrepreneurship (Lévesque and Minniti, 2011).

Labour mobility is important for international knowledge flows (Liu, Wright, Filatotchev, Dai and Lu, 2010). Returnees to their home region can make a positive impact once the entrepreneurial industry has been created by local entrepreneurs and, perhaps, government support (Kenney, Breznitza and Murphree, 2013). Interestingly, if founders have lived longer in the region, their ventures tend to perform better (Dahl and Sorenson, 2012), and, despite a common belief, cross-firm labour mobility is not always good for regional learning (James, 2014). Finally, GDP per capita, unemployment, the marginal tax rate and the volatility of inflation are macroeconomic factors commonly associated with the national level of entrepreneurship (Arin, Huang, Minniti, Nandialath and Reich, 2015)

Geographical proximity, industrial clusters and agglomeration

Geographical proximity helps in terms of knowledge acquisition and creating collaborative ties in startups. In early stages and with less developed external relations, geographical proximity is particularly important for knowledge acquisition, while its importance may decline over time as the ability of the firm to invest in research and development grows (de Jong and Freel, 2010; Nathan and Vendore, 2014; Presutti, Boari and Majocchi, 2013; Ter Wal, 2014).

The presence of a technology cluster significantly benefits entrepreneurship (Delgado, Porter and Stern, 2010). The most innovative companies have a positive influence on other local innovators, albeit often with a time lag (Menon, 2015). Yet cluster benefits in terms of knowledge spillovers may not always occur and local high-technology industry does not necessarily bring cluster benefits unless the companies establish rich regional connections (Breznitz and Taylor, 2014; Huber, 2012). The types of benefits may also differ in terms of the evolutionary stage of the cluster. Emerging clusters have been found to attract newly created firms, while mature clusters support firm survival (Wang, Madhok and Li, 2014).

Agglomeration, especially in urban milieus, makes it easier to legitimise new ventures, discover market opportunities and tap a flexible labour market (Jansson, 2011). For instance, multinational enterprises create opportunities for knowledge-intensive business services around them (Jacobs, Koster and van Oort, 2014). Agglomeration can also facilitate market-oriented product development, while interregional collaboration is often more important for science-based innovations (Varga, Pontikakis and Chora-

fakis, 2014). In some cases, agglomeration can lead to diseconomies and creative destruction in a cluster, which may be detrimental to regional social welfare (Nathan and Vendore, 2014). Income inequality in cities has been found to be positively associated with innovation (Breau, Kogler and Bolton, 2014).

Government and public interventions

Entrepreneurship and entrepreneurial ecosystems cannot be directly created by public intervention; sometimes they emerge completely under the radar as in the case of the London Silicon Roundabout (Nathan and Vendore, 2014). Nevertheless, the level and quality of regulation affect both formal and informal entrepreneurship and the regional capacity to innovate in a number of ways (Dau and Cuervo-Cazurra, 2014; Rodríguez-Pose and Cataldo, 2015). Governments typically try to encourage entrepreneurship by direct interventions, such as funding, as well as indirectly by creating a fertile ground for innovation with varying results (Kasabov, 2015; Lin, Chang and Shen, 2010; Nathan and Vendore, 2014). For instance, maintaining a strong regional knowledge ecosystem (e.g., universities) can be tremendously helpful but does not automatically generate business ecosystems and entrepreneurship (Clarysse, Wright, Bruneel and Mahajan, 2014). Highly developed financial markets foster innovation, whereas tight product and labor market regulation tends to obstruct the regional capacity to innovate (Barbosa and Faria, 2011). Sometimes, government championing and regulatory protection of a disruptive innovation can be more effective than direct subsidies and funding in promoting entrepreneurship (Caerteling, Halman, Song, Dorée and Van Der Bij, 2013; Pinkse, Bohnsack and Kolk, 2014).

Knowledge, learning and resource acquisition

Developing an entrepreneurial startup requires various forms of knowledge – even more than established companies whose structures and routines embed much of the knowledge needed for day-to-day operations (Wales, Parida and Patel, 2013). Entrepreneurs require practical, analytical and creative intelligence, which enhances the chances for success together with self-efficacy (Baum and Bird, 2010). Much of the knowledge and intelligence must come embodied in the founders of the firm to get past its initial stages, but, over time, plenty of new knowledge must be created and sourced by other means as well (Friesl, 2012). This requires a high degree of absorptive capacity from an entrepreneurial startup; without the capacity to filter and fully digest massive amounts of knowledge, the business is not able to harness whatever knowledge is at its disposal (Larrañeta, Zahra and González, 2012; Qian, Acs and Stough, 2013). In addition, managerial knowledge becomes increasingly important when the firms start to grow.

Relevant new knowledge and learning may relate, for instance, to understanding strategic options in an uncertain and changing environment (Fernhaber and Patel, 2012; Larrañeta, Zahra and González, 2012), foreign market opportunities and expansion (Banerjee, Prabhu and Chandy, 2015) and product innovations (Chuang, Morgan and Robson, 2015; Kelley, Ali and Zahra, 2013). Marketing operations can contribute to understanding customer needs (Reid and de Brentani, 2010) and help successfully frame and envision a market that is still emerging.

Both internal and external sources of knowledge are important for innovation (Ganotakis and Love, 2012), as is the ability to balance between different learning orientations and sources (Giarratana and Mariani, 2014; Yannopoulos, Auh and Menguc, 2012). For instance, foreign contacts and the ability to acquire knowledge and resources

through them may be strategically more valuable than being embedded in cosy local buzz (Fitjar, Gjelsvik and Rodríguez-Pose, 2013). A good balance between foreign and local connections can help in bringing products to international markets more rapidly (Patel, Fernhaber, McDougall-Covin and Van der Have, 2014).

Entrepreneurs often pursue various forms of social networking as a means of tapping external resources and knowledge (Grossman, Yli-Renko and Janakiraman, 2012; Hallen and Eisenhardt, 2012). However, not all connections are equally valuable, and there are diminishing returns to growing one's network indefinitely (Semrau and Werner, 2014; Sigfusson and Chetty, 2013; Vissa, 2011). The business value of networking varies significantly depending on the type of resource sought and the personality of the entrepreneur (Ho and Pollack, 2014). Sometimes, knowledge may become shared freely among various actors, even competitors, in an open innovation system because of collective benefits that accrue from openness to all members (Cheng and Huizingh, 2014).

Funding, ownership and remuneration

Funding and ownership structures are vital to new firm creation and entrepreneurial performance. Without the right motivational structures and adequate funding that matches the ambitions and competitive landscape of the venture, it is difficult to launch a company to a successful trajectory. Personal wealth plays a role in the founder's ability to take an appropriate level of risk and to remain motivated in the face of adversity. While financial slack allows founders to take adequate personal risks, having too much personal founder wealth tends to decrease venture performance (Hvide and Møen, 2010). There are four types of funding: independent venture capital, corporate venture capital, angel investments and public government funding. Importantly, the different types of funding interact and perform differently in terms of driving successful entrepreneurship.

Independent venture capital. Apart from providing funds to operate, private investment improves firm performance through the 'coaching' function (Bertoni, Colombo and Grilli, 2011, Colombo and Grilli, 2010; Croce, Martí and Murtinu, 2013). Interestingly, the 'selection' of the best companies by private investors has been found to be less important in explaining the difference from non-venture funded firms. The investment criteria may change during the evaluation process and reacts to the portfolio composition and required time commitment from the fund managers (Petty and Gruber, 2011).

Corporate venture capital. Corporate venture capital exhibits somewhat different investment approaches than independent venture capital, but it may sometimes perform even better than the latter (Park and Steensma, 2013; Wadhwa and Basu, 2013). Corporate venture

capital can be particularly beneficial not only to firms that require specialised complementary assets but also when corporate venture capital managers are on a performance-based pay scheme (Dushnitsky and Shapira, 2010; Park and Steensma, 2012).

Public government funding. Public funding performs generally worse than private investment and ownership in terms of driving firm productivity (Alperovych, Hübner and Lobet, 2015) and strategic focus (Gedajlovic, Cao and Zhang, 2012). However, it can support firm survival (Rotger, Gørtz and Storey, 2012) and, if combined with independent venture capital, amplify sales and growth (Grilli and Murtinu, 2014) and innovation and entrepreneurship in general (Samila and Sorenson, 2010). It would therefore seem that government intervention to promote entrepreneurship by direct funding usually requires private co-investment and hence private investors who provide more effective selection and coaching of target companies.

Venture capitalists often have a regional focus (Fuller and Rothaermel, 2012). This is probably due to information advantages resulting from social, physical and cultural proximity with entrepreneurial startups that are difficult to evaluate using standard, decontextualised metrics. Local venture capitalists can help entrepreneurs to become investment ready for distant sources of funding with their global connections (Wray, 2012). Regions that have local venture capitalists can therefore be better positioned to attract global capital flows.

Founders and founding conditions

Founders and founding conditions have a significant impact on entrepreneurial firms. Founders imprint a new firm with their personality and endow it with specific knowledge and resources, setting the firm on a trajectory that is difficult to change afterwards (Fauchart and Gruber, 2011; Marvel, 2013; Rauch and Rijsdijk, 2013). It is often heard that startups pivot their plans, but even such pivoting must happen around a core that is largely laid at the founding. However, even the same founders may behave quite differently under different founding conditions, such as a spin-off from a large organisation, an academic incubator or a user community (Agarwal and Shah, 2014; Geroski, Mata and Portugal, 2010; Nelson, 2014; Walter, Heinrichs and Walter, 2014; Rubera and Tellis, 2014).

Founding team composition

The value of previous experience and skills depend on the environment. High-risk opportunities tend to favor founders with managerial experience, whereas low-risk opportunities favor founders with applicable industry experience (Dencker and Gruber, 2015). Previously successful entrepreneurs are much more likely to succeed again than first-time entrepreneurs and those who have failed (Gompers, Kovner, Lerner and Scharfstein, 2010). Under familiar market and technological conditions, experience tends to be important, whereas, in an unfamiliar context, talent is often more important to succeed (Eesley and Roberts, 2012). For instance, founding teams with less entrepreneurial experience may need more complementary marketing resources to come up with appropriately differentiated products (Zhao, Libaers and Song, 2015) – a lack of commercial capabilities tends to mean less proactive sales orientation, which is especially important for the sales of the critical first product (Pitkänen, Parvinen and Töytäri, 2014).

Diversity in the founder team is often beneficial for introducing new innovations and tapping international markets (Nathan and Lee, 2013), firm profitability (Muñoz-Bullon, Sanchez-Bueno and Vos-Saz, 2015) and the ability to adapt strategy to the environment (Fern, Cardinal and O'Neill, 2012; Saemundsson and Candi, 2014). However, these relationships may hold mainly when the commercialisation environment is competitive, whereas a more technically focused and homogenous team may perform better in a cooperative commercialisation environment (Eesley, Hsu and Roberts, 2014). Finally, considerable gender stereotypes shape startup entrepreneurship and opportunities for women entrepreneurs (Gupta, Turban and Pareek, 2013; Marlow and McAdam, 2012; Orser, Riding and Stanley, 2012).

Opportunity identification

The capacity to identify promising opportunities is an important precondition for entrepreneurship. Opportunity confidence and industrial experience both support new venture emergence (Dimov, 2010). Startup experience and aspirations, knowledge of customer problems and management experience support opportunity discovery, but prior marketing and technological experience may actually constrain the identification of entrepreneurial opportunities (Grégoire and Shepherd, 2012; Gruber, MacMillan and Thompson, 2012; Marvel, 2013). While entrepreneurs are often overconfident in their chances of success (Cassar, 2010) leading to excess creation of new firms, underconfidence results in missed opportunities on the whole (Hogarth and Karelaia, 2012).

Motivation to start a business

Various factors shape nascent entrepreneurs' motivation to start a business. Employees in large organisations who are confident about their skills and experience low job satisfaction may be motivated to leave the company and start a new business (Lee, Wong, Foo and Leung, 2011). Confidence in the ability to perform tasks necessary to entrepreneurship motivate starting a new business, while the expectations of success are less important (Townsend, Busenitz and Arthurs, 2010). An individual's transition to entrepreneurship is supported by coworkers' and former university peers' entrepreneurial experience (Nanda and Sørensen, 2010; Kacperczyk, 2013), as well as by opportunities to learn about entrepreneurship through hybrid employment/entrepreneurship status (Folta, Delmar and Wennberg, 2010). In addition, complexity and the lack of commercialisation of an invention in a large organisation may motivate an inventor to leave and start a company to commercialise the invention (Gambardella, Ganco and Honoré, 2015; Ganco, 2012). In a university environment, recent graduates are much more likely to found new companies than faculty members (Åstebro, Bazzazian and Braguinsky, 2012).

Entrepreneurial identity and personality traits

Entrepreneurship is not an occupation. It becomes a part of founder's personal identity and passion. A possible future self as an entrepreneur is one of the motivators for creating a startup company (Farmer, Yao and Kung-Mcintyre, 2011). The construction

of an entrepreneurial identity draws from available entrepreneurial narratives in the region (Gill and Larson, 2014) and often involve a passionate relationship with the entrepreneurial project (Murnieks, Mosakowski and Cardon, 2014). To attract private investment, an entrepreneur may need to build a legitimately distinctive identity that is sensitive to market conditions and institutionalised sense-making narratives (McAdam and Marlow, 2011; Navis and Glynn, 2011).

Many of the positive entrepreneurial personality traits, such as energy, self-confidence, ambition and independence, can also degenerate into aggressiveness, narcissism, ruthlessness and irresponsibility (Miller, 2015). When entering specific innovation ecosystems, entrepreneurs should consider whether their personality and skills fit with the demands of the particular environment (Nambisan and Baron, 2013). For instance, to develop a sustainability-oriented venture, an entrepreneur may need a conformist identity to operate in a context that is supportive of sustainability projects, whereas in other, less benign environments, one may to need adopt a completely different, change agent identity (Muñoz and Dimov, 2015).

Innovation and product development

Some sort of innovation usually gives an entrepreneurial firm the capacity to compete with much better resourced incumbents or to create a whole new market for a new product (Criscuolo, Nicolaou and Salter, 2012). Both transformational and transactional leadership styles can drive innovation in entrepreneurial startups, while the latter is believed to be detrimental to innovation in large organisations (Kang, Solomon and Choi, 2015). Private ownership or acquisition by a private company tends to support innovation the most, whereas an initial public offering tends to weaken the innovation quality of a company (Aggarwal and Hsu, 2014).

Sources of entrepreneurial innovations range from state-of-the-art technological resources and customer understanding to under-utilisation of inventions in large companies and university-based research. At the same time, the innovativeness of a startup company is negatively associated with its survival (Hyytinen, Pajarinen and Rouvinen, 2015), and increasing uncertainty reduces risky innovation by entrepreneurial firms (Caggese, 2012). The performance of the company's first product is often particularly critical to the company's survival (Song, Song and Parry, 2010).

Technology vision

Turning an invention into successful innovation is often related to a broader technology vision, which requires the ability to imagine the future and to articulate the vision on the right occasions (Garud, Gehman and Giuliani, 2014; Reid, Roberts and Moore, 2015). The capability for technology visioning helps pin down and legitimate initially vague opportunities and thus seize them before others. However, successful entrepreneurial innovation is not only a matter of an entrepreneur's aspiration, vision and ability but also shaped by various other factors (de Jong, 2013).

Effectuation vs causal logic

Entrepreneurial innovation can be driven either by the availability of new, exciting means without a distinct problem to be solved or by a clear problem that directs efforts from the beginning (Berends, Jelinek, Reymen and Stultiëns, 2014). For instance, while science and technology often provide the basic invention, it still requires market demand and complementary assets to become an innovation. In contrast, pure demand pull also requires adequate technological capabilities to be developed for an innovation to be realised (Di Stefano, Gambardella and Verona, 2012). The balance between the former, effectuation logic, and the latter, causal logic, usually needs to shift over time as the company and its product mature.

Collaboration

Successful innovation is often associated with effective social networks and knowledge acquisition beyond the local region (Fitjar and Huber, 2015; Leyden, Link and Siegel, 2014; Sullivan and Marvel, 2011), functional ties with service intermediaries such as technology service firms, accounting and financial service firms, and law firms (Zhang and Li, 2010) and collaboration with user communities (Chatterji and Fabrizio, 2014; Coviello and Joseph, 2012; Jang and Chung, 2015). If a startup is going to commercialise an invention based on academic research, having relevant scientists on the founder team enhances the chances of success (Fuller and Rothaermel, 2012). A star scientist can be highly beneficial for an entrepreneurial startup, but the relationships between the star and the rest of the team need to be managed carefully (Kehoe and Tzabbar, 2015).

Bricolage

Entrepreneurs often need to resort to bricolage and the creative recombination of limited means as well as disregard for formal procedures to bring an innovation to market (Marion, Friar and Simpson, 2012; Senyard, Baker, Steffens and Davidsson, 2014). Firms developing physical products should nevertheless consider implementing both industrial design and cost engineering together, as this tends to improve the efficiency and effectiveness of product development in early-stage firms (Marion and Meyer, 2011). Appropriate emphasis on aesthetic design facilitates the beneficial product perception of new products, resulting in higher product performance (Candi, 2010; Hoegg and Alba, 2011).

Product architecture

Different product architectures and platforms shape competition and innovation in high-technology industries. Today, many technological innovations take place in platform ecosystems, which differ significantly from non-platform, standalone product development. For instance, complementarities between software products have grown considerably over the years, making the products in the software market increasingly interdependent (Lee, Venkatraman, Tanriverdi and Iyer, 2010). Under such circumstances, the users of a company product see it less as a standalone product but rather as a part of the portfolio of tools that he or she uses. The control of a firm's product architecture should be allocated according to its business logic, taking into consideration, for instance, the importance of supply-side and demand-side aspects and centralising architectural decisions in the right place (Magnusson and Pasche, 2014). Most high-technology product architectures have to deal with two related issues: modularity and platforms.

Modularity

The ability to modularise product architecture is largely based on a firm's underlying IT infrastructure (Marion, Meyer and Barczak, 2015). Modular internal product platforms allow the reuse of assets across different products (Magnusson and Pasche, 2014), while external platforms can reduce the need for interorganisational coordination if the components are stable (Furlan, Cabigiosu and Camuffo, 2014). Overall, complex modular systems tend to evolve faster than non-modular systems of similar size (Simon, 2002).

Platforms

Industry platforms and platform ecosystems typically comprise 1) a platform owner, who controls the platform architecture and its core

components, 2) complementors, whose business is to extend the platform with specific solutions, and 3) users. The platform owner needs to carefully govern its platform ecosystem so that all the parties can gain benefits from the ecosystem (Gawer and Cusumano, 2014; Wareham, Fox and Giner, 2014). Firms hoping to develop a product platform should acknowledge that developing and maintaining a product platform is a distinct competence on its own (Chai, Wang, Song, Halman and Brombacher, 2012). For instance, the platform owner needs to balance its own involvement in the production of complementary products that are crucial to complementors and, hence, the viability of the overall platform ecosystem (Jain, 2012; Van den Ende, Jaspers and Rijsdijk, 2013). Rivalry between industry platforms can easily become a competition in a winner-take-all market, but platforms can also coexist if the quality and positioning of their products are different enough (Cennamo and Santalo, 2013). Understanding relevant platform dynamics and skillful platform management (internal and external platforms) and governance (external platforms) are critical to those involved in the platform business as a producer of complementary products, a platform owner or a startup hoping to turn its products into a platform.

Marketing

New, entrepreneurial firms do not have a broad portfolio of products but typically revolve around a few projects or just one. This often makes the launch of the first product critical to firm survival and success. At the same time, startups lack experience and structures that support marketing and sales activities, as these are usually built by learning from repeated product launches and sales. Experience from previous projects may help, but it is important to bear in mind that different types of innovation require different launch approaches (Frattini, Dell'Era and Rangone, 2013; Rubera, Griffith and Yalcinkaya, 2012). In addition, market creation for a radical innovation may require as much time as its technological development (O'Connor and Rice, 2013).

The product presentation, social influence and user interface can support or hinder effective consumer evaluation of a product (Talke and Snelders, 2013). The way a new product is presented should consider whether the product will be seen as a really new product by customers or merely an improvement to an existing category of products (Feiereisen, Wong and Broderick, 2013; Mugge and Dahl, 2013; Radford and Bloch, 2011; Zhao, Hoeffler and Dahl, 2012). If the consumers cannot affix a category to the product, they may not appreciate its newness and, as a consequence, evaluate the product negatively (Goode, Dahl and Moreau, 2013). For this purpose, courting early adopters who shape other consumers' capacity to evaluate and learn to use especially radical innovations plays an important role for platform and non-platform products, although in different ways (Chiesa, Frattini, 2011; Frattini, Bianchi, De Massis and Sikimic, 2014). Finally, whether the firm likes it or not, consumers use social media to publicly evaluate products and to impose a positioning on them (Droge, Stanko and Pollitte, 2010).

Intellectual property

An entrepreneurial firm's core innovation is often based on or results in specific intellectual property. The firm may have been founded to commercialise output from scientific research, or the founders may have an idea for a commercially valuable invention they wish to create. The firm can treat the resulting intellectual property in a number of ways, which constrain and support the commercialisation of the innovation and available models for generating revenues (James, Leiblein and Lu, 2013). Over-controlling the firm's intellectual property beyond its primary application area may actually be more harmful than beneficial to the firm (Carson and John, 2013).

Patenting

Patenting is a common way to make intellectual property explicit and to ensure that the firm can exploit it (Andries and Faems, 2013; Jensen, Thomson and Yong, 2011). However, patenting serves also other purposes, such as signalling the viability of the venture to potential funders and acquirers (Hsu and Ziedonis, 2013; Shu, Wang, Gao and Liu, 2015). Patenting also reveals information about new products that the firm may prefer to keep secret. A firm may strategically share its intellectual property in an attempt to force its competitors to adopt imitation behavior rather than developing their own innovations (Pacheco-de-Almeida and Zemsky, 2012).

Patent thickets and pools

Even if an entrepreneurial firm does not pay any attention to its own intellectual property, other actors in the same market may well do so. Some areas of economic activity are covered with patent thickets that make it very difficult for new entrants to operate (Lin, 2011). Patent pools are intended to allow pool members to commercialise complex technologies that are covered by numerous patents from different pool members while barring this opportunity from others. The existence of both patent thickets and patent pools shapes innovation in the relevant area of economic activity (Joshi and Nerkar, 2011). They also form an area for potential regulatory intervention.

Startup strategy

Entrepreneurial, *de novo*, entry into an existing market or an attempt to create a whole new market is a matter of strategy, whether the entrepreneur recognises this or not. Leaders' belief structures and capacity to interpret environmental signals shape the ability of a firm to form and adapt its strategy (Kiss and Barr, 2015). It has been found that entrepreneurs tend to be particularly overconfident in entering markets with easy tasks in which they believe they can outperform rivals more easily (Cain, Moore and Haran, 2015). Any entrepreneurial firm has to consider at least two strategic issues irrespective of the market they are planning to enter: timing and incumbent reactions.

Timing

The emergence of a new dominant product category signals the existence of a new market, while establishment of a dominant design diminishes the opportunities to commercialise new product designs (Suarez, Grodal and Gotsopoulos, 2015). Smartphones are a good example. Apple established a new smartphone market category by launching the iPhone, while Google established a dominant design with its Android devices. These moves left little space for the Windows Phone to enter the market. The appearance of a new market category also tends to shift the focus from the category as such to the differences between the firms competing in that category (Navis and Glynn, 2011).

A first-mover advantage can be critical to gaining market share, but it often involves the cost of educating the market and risks betting on a technology that may initially look superior but turn out to be inferior in the long run (Eggers, 2014; Zhao and Parry, 2012; Zhao, Erekson, Wang and Song, 2012). This is particularly true for network products and platforms, which, contrary to a common belief, do not always end up as winner-takes-all types of markets (McIntyre, 2011). Even in a

market driven by network effects, product quality can sometimes matter more than being the first to the market (Zhu and Iansiti, 2012).

Incumbent reactions

In an existing market, a new firm may become a target for retaliation, especially if the incumbents are forced to react to a disruptive innovation (Argyres, Bigelow and Nickerson, 2015). A startup can sometimes reduce such a risk by remaining under the radar as long as possible (Katila, Chen and Piezunka, 2012) or by positioning the product so that it targets simultaneously many incumbents but each of them only marginally (Fan, 2010). Large corporations diversify to new markets both by founding new internal units and by acquiring smaller firms. The latter represents an opportunity for a successful exit from entrepreneurship for startup entrepreneurs. Diversifying firms are able to harness their competencies from other industries to grow faster than entrepreneurial startups in the same market, while the latter tend to focus on better technological performance as their competitive advantage (Chen, Williams and Agarwal, 2012; Kapoor and Furr, 2015). Large companies can also use their existing user base in one platform market to strategically envelop another or an emerging platform business (Eisenmann, Parker and Van Alstyne, 2011), which is rarely possible for a startup.

Exit, failure and restart

An entrepreneurial project can end in three ways.

Growth

A successful startup company may hit a growth path and eventually become an established company. The likelihood of an initial public offering or an acquisition is sometimes boosted if an entrepreneurial organisation has built a portfolio of partnerships along the way (Hoehn-Weiss and Karim, 2014). Such liquidity events are, however, rare, as entrepreneurial startups tend to pursue high-value, risky innovations (Henkel, Rønde and Wagner, 2015).

Acquisition

An entrepreneurial startup competes both against other startups developing similar solutions and large companies entering the same market. As a result, startups can sometimes be understood to be in a competition to be acquired by an incumbent that will then commercialise the innovation. Incumbent companies use acquisitions both to fill gaps in their offering for their existing markets and to enter new markets (Lee and Lieberman, 2010).

Failure

Failure is an inherent and common part of entrepreneurship and innovation. Some entrepreneurs withdraw in the face of failure or likely failure or never become entrepreneurs because of perceived barriers to success; that is, they fail without learning (D'Este, Iammarino, Savona and von Tunzelmann, 2012). Such withdrawal intention is mediated by a social setting and an entrepreneur's social network (Pollack, Vanepps and Hayes, 2012). Failed entrepreneurs use various strategies to cope with failure, which can also lead to recovery and re-emergence through learning (Cope, 2011). The impact of previous failure on a subsequent attempt is complicated and depends on the nature of the motivation to

II

Creating ecosystems for the next stage of high-technology entrepreneurship

Creating ecosystems for the next stage of high-technology entrepreneurship

start a new business (Yamagawa, Peng and Deeds, 2015).
The Internet of Things is currently at the top of Gartner's hype cycle[3], but the dream of computing without the computer goes back to the concept of ubiquitous computing coined by Mark Weiser (1991) at Xerox PARC. Today, the IoT is driven by strong commercial interests and the maturing of many technologies that are needed to make the vision of ubiquitous computing reality. Whether the next era will be based on open infrastructures like the Internet or more of a walled-garden approach like mobile ecosystems remains to be seen. Computing systems may evolve in different directions depending, for instance, on the outcome of various and competing standardisation efforts[4].

The highly interconnected nature of digital technology, regional funding and exit constraints and often small domestic markets mean that most technology companies have to brace for global competition from the beginning. Not every great technology has to come from Silicon Valley, yet no startup can afford to ignore what happens in the Valley. The nature of product platforms will have a major impact on the types of innovations, innovators and business models that will rise together with the IoT. It is impossible to predict how different technological, political and commercial forces will play out, but those in the game will be forced to make more or less educated guesses. Envisioning the future wrongly can have major consequences even for the current incumbents, which can provide opportunities for new players to seize the initiative in developing our hyperconnected future.

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[3] http://www.gartner.com/newsroom/id/3114217

[4] http://www.theregister.co.uk/2016/02/20/new_iot_foundation/

The reviewed articles highlight numerous aspects of entrepreneurial ecosystems and the rise of entrepreneurship, but there are also some clearly understudied areas, a few of which will be discussed with respect to the limitations of the current study. Most importantly, nothing in the review suggests that a vibrant entrepreneurial ecosystem can be created in a top-down fashion. Entrepreneurship is a fundamentally self-motivated activity that must grow from the bottom up. It appears when people with entrepreneurial capabilities and motivation identify opportunities and the obstacles to seizing those opportunities are low. Although public intervention can support and, indeed, may often be needed to create fertile ground for entrepreneurship, direct interventions such as government funding are useful only if other factors supporting entrepreneurship are already in place. This section discusses the findings briefly in terms of five key actors, a vertical focus as a regional solution and the importance of product architectures.

Five key actors

The review identifies five types of actors that are necessary or often very important to entrepreneurial ecosystems.

Entrepreneurs and potential entrepreneurs

There is no entrepreneurship without entrepreneurs and potential entrepreneurs who identify opportunities to create companies around them. Fortunately, there are many sources of potential entrepreneurs who may have the skills and capabilities required for startup entrepreneurship. These include previous entrepreneurs, employees in large organisations, university graduates, academics, etc. Motivations to become an entrepreneur range from building the entrepreneurial self to financial gain; the number of skills and capabilities required in entrepreneurship vary, and the opportunity costs of entrepreneurship differ a great deal between people. The overconfident entrepreneur may look sometimes naive or even annoying in his childish belief in his company, but lack of confidence may be just as big a problem for social welfare, as it leads to missed opportunities without the potential to learn from failure. While entrepreneurial motivation must grow from within, plenty of things can be done to remove obstacles for those who would like to convert to entrepreneurship. Some of these may be societally more controversial, such as tax breaks for entrepreneurs investing in their own companies, while others require little more than a change of mindset and a few policies. For instance, it could help highly skilled professionals and academics to try entrepreneurship if you could go on a three-year 'entrepreneurship leave' from which you can return to your previous position under certain conditions. This would dramatically reduce the opportunity costs for people in established positions to try entrepreneurship.

Private investors

Private investment funds and angel investors look for opportunities to invest in the most promising startups. Because of their incentive structure and considerable experience from numerous startups, private investors are often good at coaching startups. Interestingly, there is less evidence about the ability of private investors to select the most promising startups. Local investors are extremely important for entrepreneurial ecosystems, as they often provide the initial seed funding for founders and help promising startups to connect to global capital flows later on. In addition, without co-investing private investors, direct public funding for startups tends to be inefficient. According to a simple economic logic, investors should be attracted to regions where undervalued investment opportunities are available. However, government may also want to attract investors to kick off entrepreneurial ecosystems by offering tax breaks and matching funding. The review says little about such strategies and whether they are efficient or not in general.

Large companies

An important but somewhat neglected aspect in high-technology entrepreneurship is the role of large companies. Large companies are very important for entrepreneurial ecosystems. They shape the competitive environment and sometimes compete directly with entrepreneurial startups. They also fund entrepreneurial ventures, spin off new companies and cultivate professional talent that may turn into entrepreneurs. Large companies also create excess inventions they are not interested in commercialising and are in-

volved in technology visioning and hence in shaping the ideas of possible technological futures. Most importantly, perhaps, large companies offer exit opportunities for entrepreneurial startups that fall short of commercialising an otherwise good innovation. Such exit opportunities tend to concentrate in large Silicon Valley companies, which is a major reason that the industry revolves around the Valley. Startups do not perhaps look so much for proximity with other startups in the Valley as with large incumbents. Developing and supporting the capabilities of local industrial corporations to acquire startups therefore provides an opportunity to support regional startup ecosystems.

Universities
Universities are often at the heart of regional knowledge ecosystems, providing talented labour and inventions that may be commercialised through entrepreneurship. It is, however, worth pointing out that a healthy knowledge ecosystem does not necessarily generate entrepreneurship and that the latter may exist without the direct involvement of a university. In addition, the transition from an academic career to commercialising an invention through entrepreneurship is far from straightforward in many places. Universities undoubtedly have a great deal to learn about commercialising innovations; in particular, the idea of 'entrepreneurial leave' could work very well in academic institutions. Interestingly, the academic capacity to critically assess and open up power structures embedded in high technology seem to have relatively little impact on entrepreneurship.

Policymakers and public bodies
Regional and national authorities have a number of ways to drive entrepreneurship that have been largely discussed above. Policymakers and public bodies maintain knowledge ecosystems; they shape the regional dynamics, and they can also provide smart funding that amplifies private investments. The level and quality of regulation has a big impact on lowering the threshold for entrepreneurship. They can also sometimes protect and champion technological trajectories that are more amenable to entrepreneurship than those promoted by large companies alone.

Vertical focus as a regional solution?

Few places can compete with Silicon Valley as a generic ecosystem for entrepreneurship. Less resourced regions with less mature knowledge ecosystems may be better off focusing on types of high-technology entrepreneurship that draw from region-specific assets. A good example of successful focus and agglomeration benefits from recent years in the Nordic region is the mobile game industry with companies such as Rovio and Supercell. However, it is not clear how self-motivated entrepreneurs can be steered towards such a collective aim without introducing ineffective biases. Any direct funding for kicking off startups needs to be smart. This usually means requiring newly founded firms to make their case and receive funding from private investors, which is then matched by public funding. This way, the private investors act as a selection mechanism and, especially, a coaching mechanism for promising startups, while the

impact of limited private venture funding in the region is amplified by public money. A part of the vibrant knowledge ecosystem is adequate labour mobility that allows the supply and demand of specific talent to meet. This would seem particularly important for regions where the knowledge ecosystem must expand beyond national boundaries to reach critical mass.

The importance of product architectures

The literature identifies numerous aspects that make product platforms and platform ecosystems important to high-technology entrepreneurship in general and to IoT entrepreneurship in particular. 'The Internet of Things' suggests an ecosystem of things that communicate with each other to offer services to humans. The available means of entry, control points (Eaton, Elaluf-Calderwood, Sørensen and Yoo, 2015), and ecosystem governance (Wareham, Fox and Giner, 2014) will be important for anybody who wishes to build a successful IoT business.

Even if a startup company does not aim to become a platform provider itself, choosing the right approach with respect to internal and external product platforms is of strategic importance. The evolution of platform ecosystems makes new product categories possible but also accelerates the emergence of dominant designs. The window of opportunity to enter markets may be open for shorter and shorter periods of time. These dynamics are further complicated by customers and their product evaluations that quickly spread in social media. For instance, a traditional smoke alarm may look hopelessly limited and clumsy compared to the Nest Protect smoke and carbon monoxide alarm. Yet the latter communicates (currently) only with other Nest products, which may seem unacceptably limited if the ecosystem evolves towards open standards.

Those who wish to become platform owners need to not only solve all the challenges of igniting a new platform (e.g., Evans, 2009) but also face the risk of platform envelopment by an incumbent that can leverage its existing customer base and assets to gain market share for its platform. For instance, although Dropbox built the first and in some ways still most user-friendly consumer cloud storage service, companies such as Apple, Microsoft and Google leveraged their massive existing user bases to relatively easily bring their own cloud solutions to the market (Govindarajan, Govindarajan and Stepinski, 2016).

III

Limitations

Limitations

Academic research is constrained by factors that need to be taken into consideration when applying results to practice. The following briefly describes such limitations to help the reader critically interpret the findings and identify opportunities for further research. Indeed, this applies to all knowledge – academic research has the upside that it exposes its methods and limitations more readily than other forms of knowing.

Limited availability of data

Opportunities for empirical study are always limited by the availability of data and suitable methods. Academic research tends to emphasise methodological rigour and reliability over relevant but perhaps more speculative findings. As a result, important topics may not be studied simply because good enough data or methods are not available. This review reflects a similar attitude by focusing exclusively on the most highly-rated research available.

Potential methodological bias

Related to the limitations of high-quality data, there is also a risk of methodological bias, that is, overemphasising matters that can be observed with a specific methodology. The high proportion of quantitative studies in the literature corpus may inconspicuously emphasise matters that are more readily analysed using quantitative measures. Extracting the main findings from quantitative analyses is relatively straightforward because of the consistent formatting of articles. The same cannot be said about qualitative studies, which are often much more difficult to synthesise. This may result in further overemphasising quantitative results. For example, the literature corpus is relatively mute about entrepreneurial experience and what it means to be

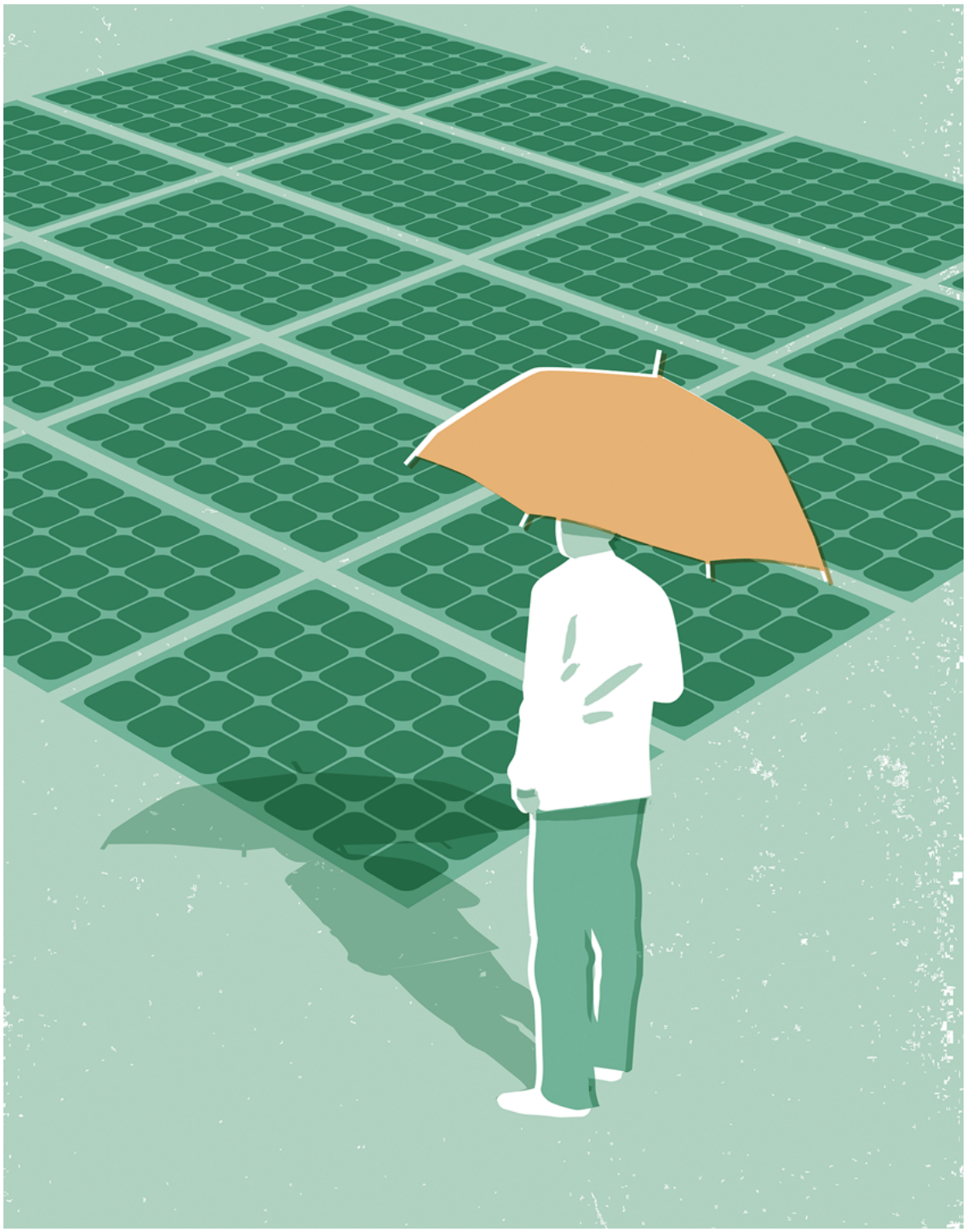
an entrepreneur, which may be partly due to the fact that such issues are difficult to capture in numbers. In addition, patents are commonly used in research (and hence accepted) as a proxy for innovation, which is not universally true (Shu, Wang, Gao and Liu, 2015).

Priorities in the academic community

Priorities in the academic community (not practitioners) define what types of topics are considered interesting and worthy of limited scholarly resources and attention in the community. The current review was designed to cover the top management literature broadly, without being limited to any particular subdiscipline or field. This guards against an idiosyncratic focus that may exist within any specific subdiscipline or journal. At the same time, it is possible to identify omissions in such scholarly attention. The following issues remain understudied given their likely importance to the topic:

1. Full funding trajectory of a startup from the first seed investment to major capital investments towards sustainable growth
2. The actual experience of being an entrepreneur – what it means to be an entrepreneur
3. The role of increasingly popular incubators and accelerators in entrepreneurship and innovation
4. The strategic importance of product platforms

Overall, the limitations mean that the findings of our review should be treated as a generally reliable yet incomplete picture of entrepreneurship.



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