Research Policy xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

From the ivory tower to the startup garage: Organizational context and commercialization processes

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ARTICLE INFO

Article history:
Received 31 March 2013
Accepted 31 January 2014
Available online xxx

Keywords:
Commercialization
University research
Technology transfer
Academic entrepreneurship
Startups
Organizational context

ABSTRACT

An impressive literature documents how individual-level factors correlate with entrepreneurship and commercialization behaviors. We have far less insight, however, into how different organizational contexts may, in fact, play a dominant role in shaping these individuals and their behaviors. In this paper, I leverage a unique case of commercialization in which a largely overlapping team attempted to commercialize a technology in two different organizational contexts – first, in a university and later in a startup firm. By detailing the contextual features in each organizational environment and by linking these features to the participants' differing approaches and attitudes toward commercialization, I extend the current literature through a demonstration of how organizational context shapes not only the initial decision to become an entrepreneur, but also the specific ways in which individuals interpret and act upon an entrepreneurial mission. More generally, I contribute to the literature on the commercialization of university research by highlighting some of the challenges inherent in adapting a context optimized for exploration to the task of exploitation.

1. Introduction

The commercialization of research – the process of moving scientific or technological developments into saleable products – is a key component of entrepreneurship. Although the literature on entrepreneurship has been dominated by attention to individual-level factors (e.g., Baron and Ensley, 2006; Baumol, 2002; Kuemmerle, 2002; Shane and Venkataraman, 2000; Eesley and Roberts, 2012; Hmieleski and Baron, 2009; Markman and Baron, 2002; Roberts, 1991; Shaver et al., 2001), recent work also emphasizes the role of context (Aldrich, 1999; Dobrev and Barnett, 2005; Lee et al., 2011; Levie and Autio, 2011; Sørensen, 2007a; Stuart and Ding, 2006; Thornton, 1999). This research has offered particular attention to local, regional and national initiatives aimed at promoting entrepreneurship and commercialization, especially in connection with university-invented technologies (e.g., Audretsch et al., 2007; Eesley, 2009; Grimaldi et al., 2011; Lockett et al., 2005; Mustar and Wright, 2010; Wright et al., 2007). The implicit assumption of this literature, therefore, is that individual entrepreneurial efforts are malleable, at least to some degree; although individual-level characteristics are important, contextual features are critical toward understanding entrepreneurial behaviors such as commercialization.

Assessing the role of context, however, is difficult since participants and features of the opportunities themselves (such as the related technologies) typically vary across contexts. For example, if we witness different entrepreneurial behaviors in universities versus commercial firms, it can be difficult to determine if those differences are due to (1) contextual features associated with universities versus firms, (2) the fact that different types of individuals choose to work in universities versus firms (e.g., "entrepreneurially-inclined" individuals may select into firms over universities), or (3) the fact that universities and firms may work on different kinds of technologies, varying in field, "basic-ness," and other important features that shape commercialization processes. Moreover, the literature on context has emphasized "entry" into entrepreneurship – in other words, the initial decision to engage in commercialization or to start a firm – without simultaneous attention to entrepreneurial *processes*, or the activities that take place after this decision. As a result, even as research on context has made important contributions, it has left unaddressed the ways in which "organizational context" shapes entrepreneurship and commercialization activities (Sørensen, 2007a).

In this paper, I employ a novel qualitative case study to unpack the role that organizational context plays in shaping how participants approach technology commercialization. I focus on the commercialization of waveguide physical modeling (PM)

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http://dx.doi.org/10.1016/j.respol.2014.04.011
0048-7333/

technology, an advanced sound-generation technique developed at Stanford University. The commercialization of PM is unique in that Stanford hired external developers and graduate students to work in the inventor's laboratory for the express purpose of commercializing the technology; rather than a university spin-out, in which the participants leave the university context, this attempt might be labeled a "bring in," in that commercialization resources were brought into the academic environment with the aim of moving the technology toward a saleable product. Later, these same individuals left Stanford to form an independent startup aimed at commercializing the same technology. Thus, the PM case offers an opportunity to examine a technology development effort that intertwined two different organizational contexts in what might be termed a "hybrid-organization commercialization strategy." On the basis of a grounded qualitative analysis of 17 interviews and extensive archival materials, I detail the specific features associated with each organizational context and I explore the ways in which these contexts both contrasted and interacted over time through the PM development effort.

My analysis illuminates how organizational context shapes entrepreneurial processes beyond "entry." It also contributes to debates about the role of individual versus contextual factors in shaping entrepreneurship by illustrating how these approaches can interact with one another over time. Finally, I address the challenges and opportunities associated with attempts to change organization contexts, focusing on the implications of these findings for the literatures on university commercialization and on entrepreneurial innovation.

2. Contextual approaches to entrepreneurship and commercialization

"Context" is an enduring theme in organization studies. March and Simon (1993, p. 5), for example, emphasized the importance of understanding "the historical, social, and interpretive contexts of organizations" in order to understand behaviors undertaken within these organizations. Schein (1996), too, highlighted how organizational psychology – which traditionally emphasized an individualistic point of view – moved its emphasis away from individual characteristics and toward an exploration of how social context – evident in shared norms, values and assumptions – shapes behaviors. Barley (1986) offered a powerful example of the empirical fruits of such an approach: in his study of the introduction and use of medical imaging technology in two hospitals, he showed that the same technological shift can be associated with dramatically different outcomes depending upon the organizational context. By contrast, had Barley overlooked the contextual elements in his study, he would have missed a critical influence on the technology's dynamic.

In the entrepreneurship literature, attention to context is a more recent phenomenon. Although entrepreneurship scholars have long acknowledged the role of context in explaining entrepreneurial behaviors (for reviews, see Aldrich, 1999; Thornton, 1999 and Shane, 2003), individual-level and dispositional approaches dominated the literature historically. In turn, Sørensen (2007a, p. 387) has described the contrast between contextual and dispositional approaches to entrepreneurship as "one of the central and most long-lasting debates in entrepreneurship research." Aldrich (1999, p. 76) goes so far as to argue that, "personal traits, taken out of context, simply do not explain very much" and he encourages scholars to conduct detailed historic or longitudinal investigations into the role of context in entrepreneurship.

In the past 10 years, especially, a number of scholars have taken up this charge, conducting research that highlights the role of context in shaping entrepreneurial behaviors (e.g., Audretsch et al., 2007; Autio and Acs, 2010; Eesley, 2009; Grimaldi et al., 2011; Levie and Autio, 2011; Klapper et al., 2006). Much of this work focuses on the role of national-level policies and, specifically, on the ways in which these policies may shape entrance into entrepreneurship. Often times, scholars contributing to this stream of research investigate the legal or regulatory environment around a particular industry. For example, Sine and David (2003) show how the Public Utility Regulatory Policy Act of 1978 created a new niche for wholesale electricity markets, thus supporting new entrepreneurial opportunities and the entrance of new organizations. Hiatt et al. (2009) show how social and regulatory changes around the alcohol temperance movement in the United States led to brewery failures but also to new entrepreneurial activity and startups in the field of soft drinks. Webb and colleagues (Webb et al., 2009) offer several examples of legal context shaping entrepreneurial opportunities in a variety of fields, ranging from Internet music distribution to marijuana dispensaries.

Other scholars have focused on the role of more general policies that are not directly tied to a specific industry. For example, Levie and Autio (2011) create a "regulatory burden index" to measure the extent to which a country regulates entry, exit, and labor. This index, therefore, includes items such as the number of procedures required to start a new business, the difficulty of redundancy or layoffs, and the bankruptcy recovery rate. Based on a six-year panel of 54 countries, they find that lighter regulatory burdens are associated with higher rates of strategic entrepreneurial entry. Klapper et al. (2006) also investigate regulatory barriers – defined as bureaucratic costs, income taxes, and the costs of bankruptcy proceedings – in a wide range of European countries. They, too, find that those countries with lower regulatory barriers have higher rates of entry into entrepreneurship. Focusing on bankruptcy specifically, Fan and White (2003) find that U.S. states with higher bankruptcy exemption levels have higher levels of household-owned businesses – one proxy for entrepreneurship – than do states with low exemptions. These studies, therefore, demonstrate how regulatory context is associated with entrepreneurial entry.

It is important to note, too, that studies of regulations and entrepreneurship do not always find a negative relationship. For example, Eesley (2009) studied a 1999 Chinese constitutional amendment that outlawed discriminatory policies preventing the growth of entrepreneurial firms. He found that this legislation increased rates of entrepreneurship, particularly among high human-capital individuals.

Although most studies of "entrepreneurship in context" have focused on formal national regulations, some scholars have investigated the relationship between *organizational*-level context and entrepreneurial entry. For example, Stuart and Ding (2006) find that people whose colleagues are entrepreneurial are more likely to become entrepreneurs themselves. Similarly, Dobrev and Barnett (2005) and Sørensen (2007a) both find that younger and smaller organizations are more likely to spawn entrepreneurs. Finally, Lee and colleagues (2011) find that work environments with an unfavorable innovation climate or a lack of technical-excellence incentives can lead skilled and ambitious employees to engage in entrepreneurship due to their low job satisfaction. More generally, therefore, these studies build upon a long tradition of research that explores the ways in which different dimensions of organizational culture – as reflected in both incentives and structures – can shape employees' behaviors (e.g., Barley, 1986; Cha and Edmondson, 1996; Kunda, 1992).

Research on universities and entrepreneurship has addressed the role of both organizational and extra-organizational context. At the national level, researchers have subjected the Bayh-Dole Act in the United States, in particular, to considerable scrutiny as to its effects on university entrepreneurship (Grimaldi et al., 2011). Several other countries have imitated this specific legislation or have

Please cite this article in press as: Nelson, A.J., From the ivory tower to the startup garage: Organizational context and commercialization processes. Res. Policy (2014), http://dx.doi.org/10.1016/j.respol.2014.04.011