



# The influence of university departments on the evolution of entrepreneurial competencies in spin-off ventures



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## ABSTRACT

The influence of the university department upon spin-off venture evolution is complex and dynamic. We examine how the university department context influences the spin-off process from the perspectives of both the spin-off venture and the department. By comparing the development of entrepreneurial competencies within spin-offs based in different departments at the same universities we observed significant differences in early venture performance. Small differences in initial departmental support from management and senior academics for gaining commercial experience and spending time exploring the commercial opportunity were seen to have a major impact upon the subsequent spin-off development path. Supported ventures gained momentum as the department helped develop entrepreneurial competencies and influenced how these competencies were developed from external actors outside the department. By contrast, a lack of departmental support for entrepreneurship severely constrained the evolution of spin-offs regardless of university level policies and practices. This emphasizes the need for a shift in focus from the well-studied university level to the relatively neglected department level to help explain institutional differences in university spin-off activity.

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## 1. Introduction

New ventures do not emerge in a vacuum. Rather, activities pursued during the entrepreneurial process are shaped by the social and institutional environment. Yet how process and context interact to shape the outcome of entrepreneurial efforts remains largely unexplored (Aldrich and Martinez, 2001). In particular, insights are lacking regarding how the heterogeneous and multi-layered nature of context influences the process of new venture creation and development (Zahra and Wright, 2011). Gaining an understanding of these interactions can lead to the development of more fine-grained policies to support new ventures.

This issue is especially pertinent in the context of spin-offs from universities. The complex development paths and the many competencies needed to transform scientific findings into viable products and services from the traditionally non-commercial university context provide significant challenges (Vohora et al., 2004). Studies have highlighted that the impact of the institutional context

upon the development of university spin-off ventures is particularly acute at the early stages (Jong, 2006; Kenney and Goe, 2004; Moray and Clarysse, 2005; Rasmussen and Borch, 2010). Support for university spin-offs varies significantly according to central university policies, variations in structures of technology transfer offices, and a wide diversity of contractual practices (Clarysse et al., 2005).

Prior studies have mainly used either the organization (university, technology transfer office (TTO), or incubator), the firm, or the individual level as the unit of analysis (Rothaermel et al., 2007). These studies have provided important insights concerning which factors in the university context are associated with spin-off creation and development, but the evidence on their impact upon spin-off performance is decidedly mixed (Grimaldi et al., 2011). This paper builds on an emerging research stream considering the influence of the university department level upon entrepreneurial activities. The seminal study by Louis et al. (1989) showed that local group norms significantly influenced the entrepreneurial behaviour of faculty, while university policies and structures had comparatively little effect on their sample of life-scientists. Later studies assert that the level of entrepreneurial activity varies significantly between departments within the same university (Bercovitz and Feldman, 2008), and that the local environment can strongly influence faculty engagement in academic entrepreneurship (Kenney and Goe, 2004).

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There is, however, a gap in our knowledge about *how* the university department level exerts influence during the spin-off firm creation process from the perspectives of both the spin-off venture and the department (Grimaldi et al., 2011).<sup>2</sup> A limited number of studies have provided evidence that national and university policy and the local environment all need to provide consistent support to maximize the likelihood of university spin off emergence (Brint, 2005; Clark, 1998; Louis et al., 1989). There remains a lack of clarity regarding how national and university policies are either reinforced or constrained by local practices. Two trends contribute to this complexity. First is the adoption by nations and universities of intellectual property policies to encourage university spin off formation (Wright et al., 2007). Second are changes in university governance that encourage the devolution of resource allocation authority for commercialization of research towards heads of departments within U.S. and European universities (Brint, 2005; Slaughter and Leslie, 1997).

An emerging stream of research suggests that a focus upon the department level will help unpick the relative influences of heads of department, allegiance to research disciplines and influence of local laboratory peers (Boardman and Corley, 2008; Perkmann et al., 2013). Yet there is a need for multi-level analysis that connects the spin-off firm level, and the academic entrepreneurs involved, with these department level influences. Addressing this gap holds important insights for research and policy concerning how to realize the commercial potential of scientific research through spin-off ventures. Although there may be university level policies to support spin-offs, the organizational structure of universities (Ambos et al., 2008; Boardman and Bozeman, 2007; Clark, 1998) may create a schism between these policies and what actually happens on the ground. Efforts to induce changes are not likely to succeed unless accepted and practiced at the local level (Louis et al., 1989). We know from Bercovitz and Feldman's (2008) individual level analysis that department leadership and peers play important roles in evaluating performance, allocating slack resources (such as time), setting the social cues regarding the likelihood of invention disclosure and creating dissonance and symbolic compliance between individual behaviours and departmental norms. As spin-off firm creation is likely to be considerably more challenging and time-consuming than invention disclosure, and hence potentially more disruptive to the work of academics and departments, these factors may be expected to play important roles in facilitating or constraining spin-offs.

An important dimension of the challenges facing spin-offs is the development of the competencies to commercialize an invention. For example, the social capital needed to access the specific industry expertise necessary for commercialization may be more likely to reside at the department level than the university level. We therefore build on earlier work to examine how, having decided to participate in technology transfer specifically through creation of a spin-off, department level factors influence academic entrepreneurs in this process. We seek to address the following research question: *How does the university department context influence the process by which nascent university spin-offs develop the necessary competencies to overcome the initial phases of development?*

Through addressing this question, we propose that a focus on the evolution of entrepreneurial competencies (Helfat and Lieberman, 2002) may yield new insights on how the institutional context influences the genesis of the entrepreneurial process in

university spin-offs. Entrepreneurial competencies provide the ability to build a set of resources to effect new venture emergence (Danneels, 2002). Clearly such competencies are not fully formed at new venture creation but have to evolve to allow the venture to emerge and grow (Rasmussen et al., 2011).

We focus on the early stages of venture development because they are arguably the most influential in terms of the path upon which the venture evolves (Clarysse and Moray, 2004). Within this early stage we observe the evolution of competencies required to make the transition from academic research to the identification of a potential commercial opportunity and the establishment of an independent spin-off firm (Vohora et al., 2004). Studying the emergence of university spin-offs presents a methodological challenge due to the typically long timescales involved and their complex development paths (Shane, 2004). Thus, we followed the start-up processes longitudinally and use the credibility threshold (Vohora et al., 2004) as a proxy for successful venture establishment. The credibility threshold considers the initial equity investment by an external private investor. This provides a third party evaluation and is an indicator of the likely commercial viability of the opportunity (Lockett and Wright, 2005). We followed eight university spin-off venturing processes and compared the development paths of ventures that succeeded in gaining the credibility threshold with those who struggled or failed to do so.

Our study makes several contributions to the literature on academic entrepreneurship and institutional influences on the entrepreneurial process. First, we provide detailed insights into how the local context shapes the early development of spin-off ventures. Here, the university department context is shown to influence significantly how the new venture develops entrepreneurial competencies from within that department. Equally important, however, is the indirect influence of departmental support on how the new venture gains momentum in developing these competencies from external actors outside the department. Thus, we show how relatively small differences in local context can influence whether the venturing process gains the momentum necessary to develop into a fledging new business.

Second, our study explains how the local department level context strongly moderates the impact of university policies and practices on the spin-off process. Differences in managerial and senior academic support at a department level seem highly important for both the early and subsequent development paths of these ventures. This emphasizes the need for a shift in focus from the well-studied university level to the relatively neglected department level to explain institutional differences in university spin-off activity. Third, by investigating the development of three entrepreneurial competencies we contribute to a more fine-grained understanding of the relationship between local context and the earliest phases of spin-off creation and development. Each entrepreneurial competency develops differently and therefore policy to enhance venture development through local intervention is dependent upon both the type of competency needed and the new ventures' stage of development.

This article proceeds as follows. The next section presents a theoretical framework outlining three entrepreneurial competencies needed to establish university spin-off ventures and the likely influence of the institutional context on the evolution of these competencies. Section 3 explains the longitudinal study of eight university spin-off processes within two Norwegian and two UK universities. By examining spin off emergence in different national, university and departmental contexts we aim to unpick the relative influence of each level of policy and practice. The empirical findings are presented in Section 4. Here we derive propositions regarding the effect of the institutional context upon gaining entrepreneurial competencies. In Section 5, a discussion of the findings and implications for further research and policy are provided.

<sup>2</sup> We define a department as an administrative unit within a university that relates to a particular subject discipline. Terminology may differ between contexts and in some cases departments may be grouped together into 'schools' of cognate disciplines.

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