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University spin-off's performance: Capabilities and networks of founding teams at creation phase

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ABSTRACT

The extant literature highlights that environmental conditions, during the creation phase, imprint on a start-up's survival and growth. However, there are few studies that explore the composite nature of a founding team's capabilities and networks, developed within this phase, and the contribution made to future performance. This paper uses the distinctive context of university spin-offs, where early stage ventures are fostered by institutional interventions, to analyse the influence that the capabilities and networks of a founding team, at incorporation, have upon the future performance of the spin-off. Based on data from 181 university spin-offs, this paper empirically demonstrates that the entrepreneurial capabilities of a founding team, augmented during the 'creation' phase, have a positive influence on the performance of a spin-off during the 'growth' phase, and that the networks of a founding team indirectly affect a spin-off's performance through the enhancement of a team's entrepreneurial capabilities.

1. Introduction

University spin-offs have received increasing attention from academia, governments, and policymakers because they not only generate new innovations, productivity, and jobs in regional economies (Hayter, 2013) but also make a significant contribution to university productivity and creativity (Urbano & Guerrero, 2013). A university spin-off has been defined as a new venture founded by current students or faculty members of a university to develop and exploit their ideas based on an entrepreneurial process (Smilor, Gibson, & Dietrich, 1990); subsequently this process has been broken down into a number of phases (see Lockett & Wright, 2005; Rasmussen, Mosey, & Wright, 2011; Shane, 2004a; Vohora, Wright, & Lockett, 2004a). For the purposes of this paper we identify two phases 'creation' and 'growth'. 'Creation' is the period up to incorporation and includes idea generation, 'proof of concept', setting out a business plan for commercialisation and the formation of a team charged with its execution. The 'growth' phase is the period after incorporation that sees the introduction of products/services and their subsequent entry and positioning within a market.

While the capabilities and networks of entrepreneurial teams have been discussed in the literature (Eisenhardt, 2013; Lundqvist, 2014; Walter, Auer, & Ritter, 2006) such issues have not been analysed in the context of university spin-offs (Gonzalez-Pernia, Kuechle, & Pena-Legazkue, 2013). University spin-offs can have similar characteristics to other new ventures, but they face a fundamentally different set of challenges due to the context in which they are created (Vohora et al., 2004a). The founding teams originate from a non-commercial environment where sophisticated technical capabilities are valued and fostered; often at the expense of commercial understanding that could help facilitate the exploitation of ideas (Clarysse & Moray, 2004). A university spin-off is therefore characterised by highly innovative products/services that are often new and unique to the market (Heirman & Clarysse, 2004). However the performance of these spin-offs is poor, compared to other new ventures, because the founding teams have to deal with complex tasks in unfamiliar and uncertain business environments (Shane, 2004a) which is further exacerbated by their limited industrial experience and/or access to non-technical networks (Cooper & Daily, 1997). To offset these limitations the university sector will often provide ideas with commercial potential a supportive environment via a technology transfer office (TTO) and in some cases incubation facilities (Clarysse & Moray, 2004). Such interventions lead to an artificial time lag between idea generation and company formation; creating an opportunity to fine tune the idea and explore possible changes to the structure and composition of the founding team before incorporation (Vanaelst et al., 2006). Changes to the structure are necessary because the technological founders, typically, exhibit less commitment to the commercialisation of the idea, have lower growth aspirations (Clarysse & Moray, 2004; Vanaelst

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et al., 2006) and view themselves more as part-time entrepreneurs (Müller, 2010). The time lag, therefore, provides an opportunity when possible weaknesses in the founding team of the university spin-off can be addressed through the introduction of individuals with more commercial experience, particularly in the market segments targeted by the spin-off (Filatotchev, Toms, & Wright, 2006; Vohora, Wright, & Lockett, 2004b). The extant literature on the development of start-ups, while identifying the contribution of enhanced networks and capabilities to a ventures development, does not address the underlying factors that facilitate such enhancement. In the context of university spin-offs, with the acknowledged commercial limitations of academic founders, this paper posits that the quality of the founding team, identified by its networks and capabilities at incorporation, significantly influence a spin-off's future performance.

Hence, this paper addresses two questions; whether the capabilities of founding teams at incorporation influence the future performance of university spin-offs and if networks, accessible at this time to founding teams, contribute to this process. The analysis of the capabilities and networks of founding teams is undertaken in the 'creation' phase up to incorporation and this is assessed against the performance of spin-offs in the 'growth' phase, post incorporation. To analyse entrepreneurial capabilities the constructs of technology, strategy, human capital, organizational viability, and commercial resources are employed through the lens of the resource-based view (Barney, 1991). In addition, the analysis also considers the contribution of networks to the development of entrepreneurial capabilities and examines the nature of this relationship based upon the structure, governance and content of the constituent elements of such networks (Amit & Zott, 2001; Hoang & Antoncic, 2003; Newbert & Tornikoski, 2013; Tsai & Ghoshal, 1998). This analysis is employed to develop and test a theoretical framework, which uses imprinting theory (Marquis & Tilcsik, 2013) to propose that the capabilities and networks of founding teams influence the performance of university spin-offs beyond incorporation. The results presented are based upon a sample of 181 Spanish university spin-offs based in 35 universities across all regions of Spain; each spin-off was created and developed by a founding team and responses were obtained from a member of each team. The findings indicate that the capabilities of founding teams have a direct affect upon the performance of spin-offs' and that the networks of founding teams have an indirect influence through their impact on the capabilities of the founding teams.

2. Literature review and theoretical framework

University spin-offs are often conflated with other technology or research-based start-up ventures as they share common characteristics and face similar difficulties in establishing market legitimacy and mobilizing their growth potential (Zahra, Van de Velde, & Larrañeta, 2007). However, it is argued that they are distinctive from a broader category of technology start-ups, or start-ups in general, due to certain characteristics. University spin-offs usually involve the development of a business opportunity based on novel and potentially disruptive technology or tacit knowledge emerging from academic research (Ardichvili, Cardozo, & Ray, 2003; Markman, Siegel, & Wright, 2008; Rasmussen et al., 2011); the early founders, therefore, originate from a non-commercial environment and often lack the skills and resources necessary to facilitate the commercialisation process (Hayter, 2011). To improve their commercial skill set spin-offs, from an early stage, are more likely to engage a broad range of stakeholders (academic inventor, the university, the founding team, and equity investors) with diverse requirements; thus increasing the potential for conflicting objectives (Boardman & Ponomariov, 2009; Colombo & Piva, 2012). Therefore, while start-ups per se face liabilities of newness (Stinchcombe, 1965), it is suggested that these contextual issues intensify such problems and negatively impact upon a university spin-off's ability to reach the growth phase (Vohora et al., 2004a). This increases their reliance upon the reputation of the host university or its TTO/incubator (Pries & Guild, 2007) and leads Rasmussen et al. (2011, p. 1315) to argue that the examination of the 'genesis and early development' of university spin-offs can offer insight into how they build a distinctive resource base that supplies the necessary credibility in fast moving markets.

2.1. Imprinting theory and university spin-off's performance

To examine the impact that the capabilities and networks of early stage spin-offs have upon the ventures ability to grow, this paper employs imprinting theory. Imprinting is defined as "a time-sensitive (occurring at sensitive stage of life) learning process (a stamping process whereby the focal entity reflects elements of its environment) that initiates a development trajectory (i.e., produces persistent outcomes)" (Mathias, Williams, & Smith, 2015, p. 12). Within the entrepreneurship context, imprinting research posits that early founding conditions – resource endowments, collaborations, and other internal and external factors - have a lasting impact on the future outcomes of a new venture (Ganco & Agarwal, 2009; Milanov & Fernhaber, 2009; Sapienza, Autio, George, & Zahra, 2006). As Rasmussen and Wright (2015) indicate that a spin-off in the early formative stages will rely heavily on university resources and decisions made in this period are likely to have a long lasting effect on future venture development. In other words, "as for a child, the conditions under which an organization is born and the course of its development in infancy have important consequences for its later life" (Kimberly, 1979, p. 438). Thus, university spin-offs can be said to be imprinted by the conditions of "groups, institutions, laws, population characteristics, and sets of social relationships that form the environment of the organization" prevalent at the creation phase (Stinchcombe, 1965, p. 142). While a number of researchers argue that the networks and resources embedded within a founding team quickly dissipate after a new venture is created (Brüderl & Schüssler, 1990; Shane & Stuart, 2002), this conflicts with other research that suggest such factors, with the help of university support, can address inherent weaknesses in spin-off formation and facilitate growth ambitions (Agarwal & Chatterjee, 2007; Bathelt, Kogler, & Munro, 2010; Heirman & Clarysse, 2004; Kakati, 2003; Lockett & Wright, 2005; Soetanto & van Geenhuizen, 2015). It is therefore important to understand the process by which networks and capabilities that originate with the founders evolve through interactions with the university, before incorporation, and the impact this imprint has on the growth phase of a spin-off.

2.2. Hypotheses development

2.2.1. Capability development

Research suggests that founding teams need to exploit resources embedded within their networks to support the growth and development of spin-offs (Shane, 2004a; Vohora et al., 2004a; Walter et al., 2006). However, academic founders originate from non-commercial environments and are constrained by relatively insular networks that provide limited access to individuals from industry integral to spin-off development (Mosey & Wright, 2007). Broadening the scope of networks is problematic as academic founders lack legitimacy with potential industry partners (Stinchcombe, 1965; Zahra et al., 2007) and relationships created, under such conditions, are characterised by resource dependency and asymmetric power that limit a spin-off's ability to broker advantage. This is of concern as, where good industry links exist, a variety of resources (ideas, market information, problem solving, social support, and financial resources) are available (Hoang & Antoncic, 2003; Mosey & Wright, 2007; Shane & Cable, 2002) which increase a spin-off's ability to exploit new opportunities, enter new markets, or sell new products or services in existing markets (Hayter, 2013; O'Gorman, Byrne, & Pandya, 2008; Tolstoy & Agndal, 2010). It is therefore important that, prior to incorporation, university