

Title of the paper: Academic Entrepreneurs' Human Capital in University
Technology Transfer: An Evaluation of the External Entrepreneur Model

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INTRODUCTION

University spin-offs have received increased attention from scholars and policy makers as a potential way to commercialize university research (Locket & Wright, 2005; Rothaermel, Agung & Jiang, 2007). A university spin-off is a “*new firm created to exploit commercially*

some knowledge, technology or research results developed within the university.” (Pirnay, Surlemont & Nlemvo, 2002, p. 356). Some benefits these firms can bring to society are new job creation, lower unemployment rates, tax income and regional economic development (Shane, 2004). However, these firms also face challenges in early start-up stage, since they originate from a typical non-commercial university context (Vohora, Wright & Lockett, 2004). Such challenges can be developing a business model that matches technological and market needs (Ndonzuau, Pirnay, & Surlemont, 2002), find a target market and developing and acquiring financial and human resources (Vohora et al., 2004).

A central role in managing these early challenges is taken by the entrepreneur who initiates the new venture and who possess and acquire resources necessary to make the firm survive. The human capital (e.g. education and experience) of the entrepreneur can serve as the initial resource base from where the new venture can depart and develop (Mosey & Wright, 2007; Shrader & Siegel, 2007; Taheri, van Geenhuizen, 2011; Wright, Hmieleski, Siegel, Ensley, 2007).

A main premise in university spin-off research is that university researchers assume the role as an entrepreneur (e.g. Mosey & Wright, 2007). This entrepreneur model has been called the inventor entrepreneur model (Radosevich, 1995). In contrast to this, is the surrogate entrepreneur model (Radosevich, 1995) or the external entrepreneur model i.e. someone who is not the original academic inventor but who, for various reasons, have acquired the rights to develop university technology (Lindholm Dahlstrand, 2008; Politis, Gabrielsson & Shvekina, 2012).

Few studies have criticized the applicability and generality of the inventor entrepreneur model (Clarysse, 2004). Previous research has primarily focused on inventor entrepreneurs' human capital (see e.g. Este et al., 2012; Mosey & Wright, 2007; Shrader & Siegel, 2007) while largely ignoring the human capital of external entrepreneurs. Este et al. (2012) reveal that inventor entrepreneurs' experience in terms of research productivity is associated with the discovery of technological opportunities and previous industrial collaborations, scientific breadth and experience of technological discovery. Mosey and Wright (2007) suggest that inventor entrepreneurs with more entrepreneurial experiences have broader social networks and can build network ties more effectively than less experienced entrepreneurs. In conclusion, human capital from both a university/research context and business context is needed when creating university spin-offs. Additionally, the inventor entrepreneur and external entrepreneur model are simplified models and needs to be further investigated (Djokovic & Souitaris, 2008; Franklin et al., 2001). Finally, has only fragmented empirical findings about external entrepreneurs transferring university technology been provided.

The aim of this study is to extend the limited and largely stereotypical description of entrepreneurs creating university spin-offs by exploring the human capital of external entrepreneurs and inventor entrepreneurs. By doing this, the paper contributes to the literature in three ways. First, it challenges and evaluates the simplified dichotomization and contents of external entrepreneurs' and inventor entrepreneurs' human capital proposed by Radosevich (1995). This is achieved by adding and contrasting recent empirical results to the so far limited discussions and suggestions in academic literature about external entrepreneurs' human capital. Second, by studying external entrepreneurs' human capital this paper complements existing research tradition assuming inventor entrepreneurs are creating university spin-offs. This study also adds to the few studies of external entrepreneurs' role in

financing the new business (Politis et al., 2012) and utilization of funding sources (Kassicieh, 2012). This paper provides empirical findings that complement previous research on inventor entrepreneurs' human capital and the few papers suggesting external entrepreneurs' human capital are needed to develop university spin-offs (see for example Franklin et al., 2001). Third, this study informs human capital theory and extends its usefulness to a wider scope of university spin-offs to include not only inventor entrepreneurs' human capital (see for example Mosey & Wright, 2007; Shrader & Siegel, 2007) but also include external entrepreneurs' human capital. This paper shows that human capital theory is applicable to external entrepreneurs in the context of university technology transfer.

FRAME OF REFERENCE

This chapter is built upon human capital theory that refers to intangible resources or the stock of knowledge and skills that the individuals or a team of individuals possess (Becker, 1962). In university spin-off context previous research has investigated the entrepreneur's human capital in terms of different types of education and experiences (see for example Shrader & Siegel, 2007). Examples of such experiences are; financial-, industrial-, international-, marketing-, start-up-, technical- (Shrader & Siegel, 2007), managerial- (Columbo & Grilli, 2005) and scientific experience (Este et al., 2012). Because it is unlikely that entrepreneurs have all these types of experiences themselves, it is important to explore what types of experiences the external entrepreneur possess and acquire. It is also necessary for the entrepreneur to both develop own and acquire experiences and knowledge in in the early stages of new venture (Mosey & Wright, 2007; Vohora, Wright & Lockett, 2004).

Previous research suggests there are differences in human capital (i.e. experiences and knowledge) between inventor and external entrepreneurs (Radosevich, 1995). On one side of

a dichotomy is the inventor entrepreneur with strong commitment to the technology source, extensive knowledge about technology development, limited commercial experience and high dependence on external support. On the other side of the dichotomy is the external entrepreneur with weak commitment to the technology source, limited knowledge about technology development, extensive commercial experience and low dependence on external support. This paper uses this dichotomy as a frame of reference to identify, evaluate and extend the human capital theory among the two types of entrepreneurs.

METHODOLOGY

The paper employs a case study design (Eisenhardt, 1989; Yin, 2003). Theoretical sampling was used to identify relevant cases (i.e. firms) since the goal was to make analytical rather than empirical generalizations (Yin, 2003). Three inclusion criteria were used; (a) cases had to be developed in the same university context to minimize potential differences coming from variations in technology transfer policies across institutions (Rasmussen et al., 2011). (b) Cases had to be initiated in a university setting and based on a technology developed at a university (Rasmussen 2011; Rasmussen and Borch, 2010). (c) The cases had to represent one of the two polar types of academic entrepreneurs to extend emergent theory (Eisenhardt, 1989). These types were based on two characteristics of the entrepreneur (e.g. CEO), either external or internal to the invention and internal or external to the university setting (i.e. Politis et al., 2012). Six cases were identified; three firms founded by an external entrepreneur and three firms founded by an inventor entrepreneur. Several sources of data were collected (Yin, 2003), including interviews, documents such as annual reports, press releases, project descriptions and incubator and firm websites. A total number of nine face-to-face interviews were transcribed word-by-word and thereafter analysed based on a within-case and a cross-

case analysis (Eisenhardt, 1989). The data was collected between January 2011 and September 2012.

FINDINGS

The findings showed differences between the two entrepreneurs in their human capital profiles (i.e. education and experiences). Inventor entrepreneurs showed a high level of education within their field of research. Two of the three interviewed inventor entrepreneurs were professors and the third respondent was a PhD student. All the inventor entrepreneurs have started their firms within their academic discipline. The three interviewed external entrepreneurs presented a wider scope of education ranging from technological degrees to management degrees. The inventor entrepreneurs have a variety of experiences from research projects and collaborations with industry. Only one of the inventors has previous management and business experiences from working a period in a corporation. This experience was perceived valuable in the start-up process. This is in line with previous research which suggests that researchers also can have management experiences (see for example Rasmussen & Borch, 2010). The external entrepreneurs have general experiences from both research and technology development positions to management positions in corporations. Sometimes external entrepreneurs are supporters assisting the researcher in research and development activities. This is similar to inventor entrepreneurs who sometimes are involved in management tasks that enhanced their business experiences.

CONCLUSIONS

The research results contribute in three ways. First, it extends the limited description of external and inventor entrepreneurs' human capital. Second, empirical findings of external entrepreneurs' complement the few studies of external entrepreneurs' financing and

utilization of funding sources. Third, the usefulness of human capital is extended to a wider scope of university spin-offs included also external entrepreneurs. Finally it is concluded that both inventors and external entrepreneurs' human capital are needed in university technology transfer because they contribute with certain expertise. A combination of these roles may be fruitful in an entrepreneurial team founding a university spin-off. Further research is needed to investigate the importance of external entrepreneurs in the formation and development of entrepreneurial teams' and board of directors' human capital in a longitudinal study.

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