Paper to be presented at the DRUID Academy Conference 2016 in Bordeaux, France on January 13-15, 2016

Networks as Promoters of Rapid International Development: An Analysis of University Spin-Out Companies.

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Abstract

Networks as Promoters of Rapid International Development: An Analysis of University Spin-Out Companies. Lisa Messina a, b, Professor Nola Hewitt-Dundas a a Queen's University Management School, b2nd year (Oct 2014 - Oct 2017) lmessina01@qub.ac.uk State of the Art Traditional internationalisation theories have outlined international expansion as an incremental and evolutionary process (Johanson and Vahlne, 1977), whereby companies often develop their international operations in small steps, rather than making significant foreign investments at single points in time. While empirical research following the development of such theories appeared to support their findings, more recent studies have criticised and undermined their applicability (Oviatt and McDougall, 1997; Andersen, 1993) by shedding light on the emergence of a new phenomenon: Born Global firms (BGs). BGs can be understood as small to medium-sized firms that internationalise sooner, at a faster pace, and with greater scale and scope than other internationalising firms. Research Gap Despite the growing interest and research on Born Global firms, the nature and behaviour of this type of organisation is still poorly understood. Current research has largely focused on the defining characteristics of BGs (e.g. Keupp and Gassman, 2009), the drivers of early and rapid internationalisation (Zucchella et al., 2007), and how such firms stand in contrast with traditional theories (Rialp et al., 2005). However, research in this area is still rather limited. In particular, while some authors (e.g. Coviello, 2006) recognise that the early mobilisation of born globals is facilitated by network relationships, and that it is likely that such relationships emerge prior to internationalisation and, often, to firm founding, very few empirical studies have focused on the process of network evolution from the very beginning of the venture idea (Coviello, 2006). Furthermore, no framework outlining the pattern of born global expansion has received general acceptance. This research aims to extend our understanding of the phenomenon by investigating the role that pre-foundation networks and social capital play in increasing the willingness and ability of born global firms to internationalise early and rapidly.

Specifically, this study will observe a specific type of firm, University Spin-Out companies (USOs). Given the niche-orientation of their market strategies and limited domestic demand, USOs are often found to be international at or shortly after their foundation. Yet limited studies have explored USOs' international behaviour. Furthermore, USOs offer a transparently observable formation process, thus providing the study with the opportunity to explore the pre-foundation period of BGs, which is often difficult to analyse. Theoretical Argument and Contribution As part of a larger PhD study whose purpose is to attain such research aims by adopting a mixed methods approach, this paper will present a conceptual framework with the aim of graphically visualising the phenomenon under study. The model is composed of three tiers. The first tier represents the key players involved in the development process of the USO, and attempts to capture the characteristics of such players and their influence on the USO's ability to become a Born Global. The second tier focuses on the pre-foundation networks and social capital possessed by the key players and attempts to capture their role as moderators in the USO's early and rapid international expansion. The third and final tier represents the development process of the USO, which draws upon the Vohora et al. (2004) model of USO development; this tier attempts to capture the time-bound nature of the phenomenon and at what stages pre-foundation relationships influence the firm's internationalisation behaviour. Drawing from prior research, we propose that the pre-foundation period of BGs plays a pivotal role in enabling such firms to expand early and rapidly across country-boundaries. In particular, we predict that the relationships and social capital which are present during the gestational period of USOs are key determinants of USOs' subsequent international behaviour. This conceptual model can be used to inform testable propositions to explore these relationships and will aid to extend understanding of USOs' international behaviour, leading to theory building within this under-researched area. Bibliography Andersen, O. (1993) 'On the Internationalization Process of Firms: A Critical Analysis', Journal of International Business Studies, 24(2), pp. 209-231. Coviello, N. (2006) 'The network dynamics of international new ventures', Journal of International Business Studies, 37, pp. 713-731. Johanson, J. and Vahlne, J.E. (1977) 'The Internationalization Process of the Firm - A Model of Knowledge Development and Increasing Foreign Market Commitments', Journal of International Business Studies, 8(1), pp. 23-32. Keupp, M.M. and Gassmann, O. (2009) 'The Past and the Future of International Entrepreneurship: A Review and Suggestions for Developing the Field', Journal of Management, vol. 35(3), pp. 600- 633. Oviatt, B.M. and McDougall, P.P. (1997) 'Challenges for Internationalization Process Theory: The Case for International New Ventures', Management International Review, 37(Special Issue), pp. 85-99. Rialp, A., Rialp, J. and Knight, G.A. (2005) 'The phenomenon of early internationalizing firms: what do we know after a decade (1993–2003) of scientific inquiry?', International Business Review, vol. 14(2), pp. 147-166. Vohora, A., Wright, M. and Lockett, A. (2004) 'Critical junctures in the development of university high-tech spinout companies', Research Policy, 33(1), pp. 147–175 Zucchella, A., Palamara, G. and Denicolai, S. (2007) 'The drivers of the early internationalization of the firm', Journal of World Business, vol. 42(3), pp. 268-280.

Jelcodes:L29,F23

Human Capital and Social Capital as Promoters of Rapid International Development: An Analysis of University Spin-Out Companies.

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Abstract

The globalisation of markets in recent decades significantly reduced the costs of doing business in international markets, thus driving the emergence of Born Global firms (BGs). In an effort to extend our understanding about these firms, this study explores the pre-foundation dynamics of the firm and adopts a process-based approach in the observation of a particular type of BG: University Spin-Out companies (USOs). Through the theoretical lenses of human capital and social capital, we present a conceptual framework of a born global USO and develop propositions pertaining to the pre-foundation factors affecting the firm's willingness and ability to internationalise early. The paper is finally concluded with suggestions for future research.

INTRODUCTION

The pattern of firm internationalisation has traditionally been conceptualised as an incremental and evolutionary process (Johanson and Vahlne, 1977), and extensive amounts of research have been dedicated to either support or dispute such view. Indeed, while there is general agreement that internationalisation is a complex process that evolves over time, and is thus not the result of a single set of decisions or specific events (Welch and Paavilainen-Mäntimäki, 2014), the form in which this process is understood to take place differs across the literature. There are two main, contrasting streams in the internationalisation literature that attempt to conceptualise the process of cross-border expansion. On the one hand, the internationalisation process theories, mainly represented by the stages model, depict an incremental, risk-averse view of internationalisation that was conceptualised following the observation of large and resource-rich MNEs (e.g. Johanson and Vahlne, 1977; Cavusgil, 1980). On the other hand, the International Entrepreneurship (IE) literature, which explores entrepreneurial ventures in an international business context, argues that internationalisation does not necessarily occur in an gradual manner, and that recent environmental changes have enabled even small, resource-constrained firms to venture into foreign markets.

The IE view gained particular momentum following the emergence of Born global (BG) firms, i.e. SMEs that were found to be international at or shortly after inception. Indeed, the globalisation of markets in recent decades, together with advances in information, production and communication technologies, significantly reduced the costs of doing business in international markets, which in turn enabled Small and Medium-sized firms (SMEs) to overcome many barriers associated with cross-border expansion (Knight and Cavusgil, 2004; Oviatt and McDougall, 1994). This led to an increasing number of young, entrepreneurial firms pursuing business opportunities in foreign markets (Cavusgil and Knight, 2015) much faster and at lower costs, thereby resulting in the widespread emergence of early and rapidly internationalising firms, known as born globals (Knight and Cavusgil, 2005). Scholars and practitioners have defined BGs as young, entrepreneurial start-ups that conduct international business activities, usually exporting, soon after their official founding (Knight and Cavusgil, 2004; Cavusgil and Knight, 2015).

While little consensus exists with regards to the operational definition of born globals, for the purpose of clarity and due to its wider use in the literature, this study will adopt the definition proposed by Knight and Cavusgil (1996), whereby a BG is a firm that is international within three years of inception and whose foreign sales, understood in terms of exports, represent at least 25% of all company sales.

The purpose of this research is to further explore the born global phenomenon by investigating the antecedents and dynamics driving them. In particular, this study will explore the pre-foundation dynamics of early internationalising University Spin-Out (USO) companies through the theoretical lenses of Human Capital and Social Capital. Ultimately, this research will provide further insight into the factors and processes that influence the USO's willingness and ability to internationalise early. It must be noted that, while BGs are understood to internationalise both early and rapidly, this study will mainly focus on the variable of earliness, as we deem rapidity to be beyond the scope of the pre-foundation effects of the firm.

Born Globals: Literature Review and Research Gaps

As noted by Zander et al. (2015), "the explosion of research pertaining to firms that internationalise early and rapidly has shed considerable light on the born global phenomenon" (p. 30). While our understanding of such firms has been considerably extended, significant gaps in the literature still exist.

Cavusgil and Knight (2015) argue that early scholarly attention to the BG phenomenon largely focused on the fundamental characteristics of these firms, how they contrasted with traditional internationalisation process theories, the business strategies they adopted, and how they attained early international success while operating in conditions of resource poverty. As the field of research matured, the authors note that certain key themes and contributions have become particularly prominent in the context of born global studies, including the role of resources, both internal and external, in BG growth; the role of Entrepreneurial Orientation (EO) in the driving such firms (Mathews and Zander, 2007); the influence of the background and pre-existing knowledge of the individual founder or founding team; and, finally, the role of networks and networking competencies as a driver of BG development.

While our knowledge and understanding of born global firms has made considerable progress, significant gaps still exist in the literature. Firstly, very few studies have attempted to capture the process and antecedents of these firms by extending their scope to the pre-foundation period of the firms, although it is likely to have significant influence on their post-foundation behaviour. Secondly, while the various streams of research cover a wide range of aspects, the studies have largely neglected their complementarity and potential interaction; for example, it would be reasonable to assume that founder characteristics will have an impact on how he/she will exploit network relationships, ultimately influencing the firm's international behaviour. These gaps will now be explored in greater detail.

<u>A Process-Based View of Born Globals: The Influence of Human Capital and Social Capital</u>

A first, major limitation affecting the literature is associated with the severe dearth of longitudinal, process-based studies and the consequential poor understanding of the entrepreneurial process in born global firms. As previously mentioned, the key characteristic of BGs is that they commence their international activity at or shortly after inception; however, some scholars have cautioned that the moment of firm inception is extremely difficult to establish (Oviatt and McDougall, 1994), and cannot be operationalised unambiguously (Aspelund et al., 2007). In their review of empirical studies on BGs, Hewerdine and Welch (2013) found that of the 87 journal articles that they analysed, none explicitly defines inception or explains how it was measured. Furthermore, the majority of BG studies consider firm inception as a single event at a particular point in time, instead of a process that evolves over time. This has led to a surprising lack of studies dedicated to capturing the evolution of the firm over time, aggravated by the fact that existing studies generally do not include the firm's gestation period in their analysis, despite Zahra's (2005) argument that it significantly affects the firm's attitudes towards the risks of internationalisation, as well as towards the firm's own capabilities and competitive advantage. This trend in the literature has led researchers to erroneously regard born globals as firms that lack "organisational histories", thus leading our knowledge about the early stages of internationalisation to be extremely limited, and ultimately affecting our understanding of why these firms are willing and able to internationalise early (Hewerdine and Welch, 2013).

The first contribution of this study will be to address this gap by going beyond the traditional variance-based approach, which attempts to understand *what* the antecedents and consequences of the issue are (Welch and Paavilainen-Mäntimäki, 2014), by adopting a process-based approach, in an effort to understand *how* issues "emerge, develop, grow or terminate over time" (Van de Ven, 2007:145). This study will do so by dedicating particular attention to the pre-foundation period of the firm and its influence on the organisation's willingness and ability to internationalise early; the pre-foundation period will begin from the moment in which the business idea or opportunity is first conceived.

A second contribution is obtained by observing the BG's pre-foundation period through the theoretical lenses of human capital and social capital. Human capital theory posits that knowledge is a heterogeneous resource that is distributed unevenly throughout society (Hayek, 1945). Such uneven distribution can largely be attributed to two factors: first, people have different stocks of knowledge because of their idiosyncratic life experiences (Shane, 2000); second, people are unique and display distinct sets of characteristics from one another, thereby leading them to absorb information and deploy resources in different ways. While much has been written about the influence of human capital on born globals' international expansion, particularly in terms of founder characteristics, little is known about the impact that it may have on the internationalisation pattern of academic ventures. Furthermore, to the best of our knowledge, no studies have explored the influence of human capital in parallel to social capital. In particular, this study will attempt to investigate the human capital possessed and accumulated by the entrepreneurial team before and throughout the firm's pre-foundation period, in an effort to capture its impact on the firm's willingness to internationalise early.

Social capital is the second theoretical lens, where social capital can be defined as "the sum of the actual and potential resources embedded within, available through, and derived from the networks of relationships possessed by an individual or a social unit." (Nahapiet and Ghoshal, 1998: 243). Much has been written about networks in the born global literature, and they have largely been regarded as a critical asset in the inception and subsequent development of BGs (Andersson and Wictor, 2003; Arenius, 2002). However, little investigation has focused on the role of networks throughout the formation process of the firm. As Coviello (2006) argues, if the role of networks is in fact pivotal to BG development, the influence and mobilisation of networks must be observed and understood from the very beginning of the organisation's life-cycle, rather than from the moment in which it first ventures abroad. Coviello's (2006) study of BG networks seems to be the most comprehensive in its consideration of the pre-foundation period, as she stretches her scope of analysis to the moment of conception, i.e. the idea generation for the venture. While Coviello's (2006) study presents some issues associated with the generalisability of her findings, her research demonstrates that pre-foundation networks play a central role in the subsequent international development of firms and can provide great insight into the early processes of born global formation. Given her findings, and the numerous arguments in the literature that state that "the conduct and performance of firms can be more fully understood by examining the networks of relationships in which they are embedded" (Gulati et al., 2000: 203), it is surprising that very few researchers have dedicated their attention to exploring networks as promoters of rapid international development. Furthermore, present studies provide very little insight on the causal relationship between firm-level human capital and social capital, whereby, for example, the characteristics of human capital determine how networks are mobilised to achieve rapid internationalisation.

Born Global Spin-Out Companies

An additional contribution of this study is the consideration of firm-specific characteristics by focusing on a particular type of firm: the University Spin-Out company. USOs represent a complex phenomenon within the field of entrepreneurship, and they have become increasingly popular as a means of commercialising academic research. USOs can be defined as a technology transfer mechanism for the commercialisation of a technology (or idea) developed at a university (Clarysse and Moray, 2004).

There are a variety of reasons behind the choice of USOs as the unit of analysis for this study. First, they represent a specific type of firm in a unique environment, i.e. the university, thereby enabling this study to contribute to our knowledge about the influence that the context-specific factors may have on the firm's willingness and ability to internationalise early. Second, as the purpose of this study is to investigate the pre-foundation period of the firm, the literature on USOs offers a number of conceptualisations of the formation process of the firm, thereby creating a strong foundation upon which to build this study. Third, USOs typically possess advanced technologies that are attractive in global niche markets, and are therefore deemed to be natural born global candidates (Kiederich and Kraus, 2009); furthermore, an increasing number of USOs becomes internationally active very shortly after their official founding (Teixeira and Coimbra, 2014). These characteristics provide a great opportunity for this study to further investigate the born global phenomenon in a context where the formation process in more transparently observable, thereby enabling us to trace the influence of the pre-foundation period on subsequent internationalisation behaviour.

By exploring USOs, this study will contribute to the International Entrepreneurship literature by exploring the born global phenomenon in a novel context. Indeed, while displaying some peculiarities, USOs are small, technology-based firms that are embedded in networks of relationships and who are led by an entrepreneurial team, thereby allowing this study to contribute to the limited understanding of the influence of pre-foundation human capital and social capital on the international expansion of high-tech new ventures.

Born Global USOs: Conceptual Development

USOs represent a rather complex technology transfer mechanism, and a considerable amount of attention has been dedicated to the analysis of the key players involved in the process, the networks in which the firm is embedded, and the formation and evolution of the firm over time. Indeed, academic entrepreneurs, frequently the founders of USOs, are often highly dependent on other players in their environment to supply the competencies and resources required to launch the organisation, particularly given the traditionally non-commercial environment in which they operate (Rasmussen et al., 2014). In the formation of USOs, distinct sets of competencies are required to identify opportunities and to develop, champion and acquire resources, and developing these competencies represents a significant challenge for nascent entrepreneurs. For this reason, USOs often search for the required competencies and resources beyond their own organisational boundaries, both internally and externally to the university environment (Rasmussen and Borch, 2010; Rasmussen et al., 2014).

This study will focus on exploring the determinants of two key drivers of the internationalisation process: the USO's *willingness* of internationalising early, which is reflected in the founders' recognition of international business opportunities and a clear intention to exploit them; and the USO's *ability* to internationalise early, which is grounded in the resource-base view of the firm and the ability to exploit international opportunities.

In the following sections, the theoretical propositions of the paper will be presented, along with the conceptual framework. First, the development process of born global USOs will be outlined, in an effort to conceptualise the pre-foundation period of the internationalising firm. Second, the characteristics of the entrepreneurial team, representing the human capital in the firm, will be discussed as determinants of the USO's willingness to internationalise early. Third, the networks in which the USO is embedded will be discussed as determinants of the firm's ability to internationalise early. And finally, the relationship between human capital and social capital will be discussed.

The Formation Process of USOs

The evolution of USOs is an extremely complex phenomenon (Clarysse et al., 2005). Drawing on existing research into the life-cycle and stages of business development, a number of authors (e.g. Vohora et al., 2004; Ndonzuau et al., 2002; Clarysse and Moray, 2004; Clarysse et al., 2005) have observed the formation period of university spin-out firms in an attempt to identify the key stages of their development, and the major challenges they face. Although there is no generally accepted stage model, all of them emphasise that the nature of the business changes as it grows (Miller and Friesen, 1984; Clarysse et al., 2005).

Due to its more comprehensive nature, this study draws on the Vohora et al. (2004) model of USO development. Based on empirical research, the authors propose that USOs develop in a non-linear fashion over five distinct phases. The gaps between the phases present *critical junctures* that must be overcome in order to progress through the process. Furthermore, the authors find that, by examining the USO both before and after each transition, the firm is qualitatively different with regards to its resources, capabilities and social capital (Vohora et al., 2004).

In an effort to conceptualise the development process of early and rapidly internationalising USOs, this study has adapted the Vohora et al. (2004) model of USO formation and framed it within an international dimension.

The first stage represents the *Research Phase*, where the main focus for academic entrepreneurs is on their academic research in a particular scientific field (Vohora et al., 2004). The second stage is the *Opportunity Recognition* phase, which involves identifying the match between an unfulfilled market need and a solution that satisfies that need (Bhave, 1994; Vohora et al., 2004). This phase involves the development of breakthrough ideas that may subsequently trigger international commercialisation efforts. The third phase is represented by *Entrepreneurial Commitment*, which involves the transition from entrepreneurial intentions to entrepreneurial action in international markets. While entrepreneurial intentions define a state of mind and play a critical role in the initial phases of new venture development (Gersick, 1991), they are no substitute for entrepreneurial commitment, defined as sustained persistence and committed actions in order to add value to an emerging business venture (Vohora et al., 2004). A key challenge here is the lack of professional and/or market experience on behalf of academics and universities, who face great difficulty in knowing what concrete actions to take, both in terms of setting up the business and securing financing. Vohora et al. (2004) point out that most academics have contacts within the academic environment, emphasising that the nature of their social capital is largely restricted to the university environment, and does not extend to the spheres of business and/or finance. The fourth stage is the *Credibility* phase, where the key hurdle is to create the perception of quality, professionalism and reliability, both in the eyes of clients and financiers, in order to gain access to and acquire an initial stock of resources. Credibility is largely obtained through the social capital, resource stocks and capabilities accumulated in the previous stages of development, which in turn enable the firm to gain access to the right resources, information and knowledge to secure additional assets or profitable contracts from new international clients (Vohora et al., 2004). The fifth and final stage of development is the *International Growth* phase, which represents the moment in which the firm ventures in international markets for the first time. Reaching this stage can be interpreted as a sign that the entrepreneurial team succeeded in developing and obtaining the appropriate resources, capabilities and social capital.

In the model, the development process of born global USOs has also been conceptualised in terms of the time required to move through the phases of USO formation, starting from the research phase up to the international growth phase.

Based on the above discussion, we can predict that early internationalisation activities, particularly exports, are initiated during the pre-foundation period of the firm.

Proposition 1: Early USO exporting activities are initiated during the development process of the firm, and hence prior to its official founding.

The Entrepreneurial Team and the Willingness to Internationalise

Clarysse et al. (2011) note that the academic entrepreneurship literature makes very limited reference to the impact of individual attributes on the overall development of the USO, and largely focuses on the influence of contextual and social factors, such as the efficiency of Tech-Transfer Offices and incubators. This is surprising, as the wider entrepreneurship literature has stressed the role of individual characteristics and experience as a key determinant of entrepreneurial activity and success (Clarysse et al., 2011). Nicolau et al. (2008), for example, demonstrate that individual differences account for close to 60% of entrepreneurial activity variations, even after controlling for environmental effects such as income, education, marital status and race. Moreover, findings on habitual or serial entrepreneurs claim that entrepreneurial experience is a strong predictor of future start-up activity (Hsu, 2007). In line with this view, studies on entrepreneurial intent consider entrepreneurial self-efficacy and self-belief as a key determinant of future activity (e.g. Fini et al., 2011).

In this study, we identify three core factors that have an impact on the USO's willingness to internationalise early: *Entrepreneurial Capacity* (Shane, 2010; Clarysse et al., 2011), *Experience* (Clarysse et al., 2011), and *Personal Attributes.* We also predict that the entrepreneurial experience and personal attributes will have a direct impact on entrepreneurial capacity.

Entrepreneurial Capacity

Entrepreneurial capacity is defined as the skill that enables individuals to spot, recognise and absorb opportunities, and it has been emphasised in the literature as an essential individual characteristic to become an entrepreneur (Nicolau et al., 2008; Clarysse et al., 2011). Indeed, entrepreneurially oriented individuals are, on the one hand, able to identify new opportunities for new venture creation, and on the other hand, they display greater interest and commitment to pursue such opportunities (Clarysse et al., 2011). In this context, the concept of entrepreneurial capacity can be viewed as converging with the notion of International Entrepreneurial Orientation (IEO), whereby an entrepreneur who displays high levels of *proactiveness* in the search for international business opportunities and their exploitation, *innovativeness* in the development of products and business processes, and *risk-taking* in the investment and commitment of resources into projects with uncertain outcomes (Glavas and Mathews, 2014), is more likely to get involved in international ventures.

While no studies have explored the effects of entrepreneurial capacity in the context of born global USOs, we can predict that entrepreneurial capacity positively influences the entrepreneur's ability to recognise international opportunities and willingness to exploit them, thereby increasing the USO's willingness to internationalise early.

Proposition 2: Entrepreneurial capacity positively influences the USO's willingness to internationalise early.

Prior Experience

In turn, entrepreneurial capacity is influenced by prior experience and personal attributes. In the entrepreneurship literature, experience is associated with individuals that have been involved in start-ups before, and who are thus labelled habitual or serial entrepreneurs (Westhead and Wright, 1998). Habitual entrepreneurs are considered to have greater belief in their own entrepreneurial potential, regardless of whether these past experiences have been positive or negative (McGrath and MacMillan, 2000). Indeed, McGrath and MacMillan (2000) argue that both positive and negative experiences contribute to the formation of an *entrepreneurial mindset* that prompts individuals to continuously search for new opportunities. Accordingly, an individual that has previously been involved in a start-up activity displays a much greater likelihood of subsequent entrepreneurial involvement, despite of the outcome of previous activity (Clarysse et al., 2011). Indeed, research results show that academics who have past experience of new venture activity are 30% more likely to become involved in further entrepreneurial initiatives (Clarysse et al., 2011), largely due to the fact that they know what to expect and can better evaluate their own skills.

In this study, experience goes beyond mere entrepreneurial experience and includes general business/industry experience, education, previous international research collaborations, etc., which are all likely to influence the individual's entrepreneurial capacity. From a human capital perspective, experience can lead to increased learning and to the accumulation of three different types of human capital: prior knowledge of markets, prior knowledge of ways to serve markets, and prior knowledge of customer problems (Shane, 2000). The differences between the stocks of knowledge possessed by individuals, in turn, has been shown to influence the ability to identify opportunities (Venkataraman, 1997) and, therefore, entrepreneurial capacity.

In the context of born globals, given the vast amount of research demonstrating that experience and experiential learning reduce the perceived levels of risk in foreign markets (e.g. Johanson and Vahlne, 1977), we can predict that the founder's experience, international experience in particular, positively influences entrepreneurial capacity, thus increasing the USO's willingness to internationalise early.

Proposition 3: Experience, particularly international entrepreneurial experience, positively influences Entrepreneurial Capacity, thereby increasing the USO's willingness to internationalise early.

Personal Attributes

Personal attributes represent a second factor that has an impact on entrepreneurial capacity. Personal attributes can be divided into two sub-categories: personality and demographic factors, and cognitive processes.

With regards to the first sub-category, Nicolau et al. (2008) demonstrate that 60% of the differences in the entrepreneurial capacities of individuals can be attributed to genetic differences. Indeed, the authors show that particular innate characteristics, such as personality, are responsible for explaining an individual's ability to spot, recognise and absorb opportunities among individuals. To complement such findings, Shane (2010) goes beyond mere genetics and shows that demographic differences, such as gender and age, have a significant impact on the individual's characteristics of proactiveness, innovativeness and risk-taking behaviour. For example, the author finds that while male entrepreneurs can compensate for personality shortcomings through direct experience, female entrepreneurs cannot.

Cognitive processes represent the second sub-category. "The cognitive perspective emphasises the fact that everything we think, say, or do is influenced by mental processes – the cognitive mechanisms through which we acquire, store, transform, and use information" (Baron, 2004: 221). Accordingly, an individual's cognitive ability determines their capacity to acquire knowledge and processes it, thereby directly influencing entrepreneurial capacity (Ucbasaran et al., 2009). Gaglio and Katz (2001) argue that entrepreneurs may possess a particular mental framework, termed entrepreneurial alertness, that determines their ability, or lack thereof, to recognise opportunities. Such framework enables individuals to process information in various domains of knowledge relating to identifying opportunities (Tang et al., 2012), and it implies that individuals who have a greater ability to recognise opportunities possess a more developed entrepreneurial alertness.

With regards to born global USOs, and based on the above discussion, we can predict that personal attributes, including personality and demographic factors, as well as cognitive processes, will have a direct impact on entrepreneurial capacity, thereby increasing (or decreasing) the USO's willingness to internationalise early.

Proposition 4: The personal attributes of the entrepreneur will have a significant impact on entrepreneurial capacity, thereby increasing (or decreasing) the USO's willingness to internationalise early.

<u>Team Composition</u>

An additional, yet understudied, stream of literature on the characteristics of academic entrepreneurs focuses on the founding team and its composition. Academic entrepreneurship studies often make reference to the academic entrepreneur as a single individual generating and commercialising the technology. There is general consensus, however, that high-tech start-ups are more commonly created by a team of entrepreneurs, rather than one lone individual (Clarysse and Moray, 2004). Spin-outs, in particular, are often founded by team members that know each other through university work, and the lead entrepreneur is often found to be the technical project manager of the research prior to start-up (Clarysse and Moray, 2004).

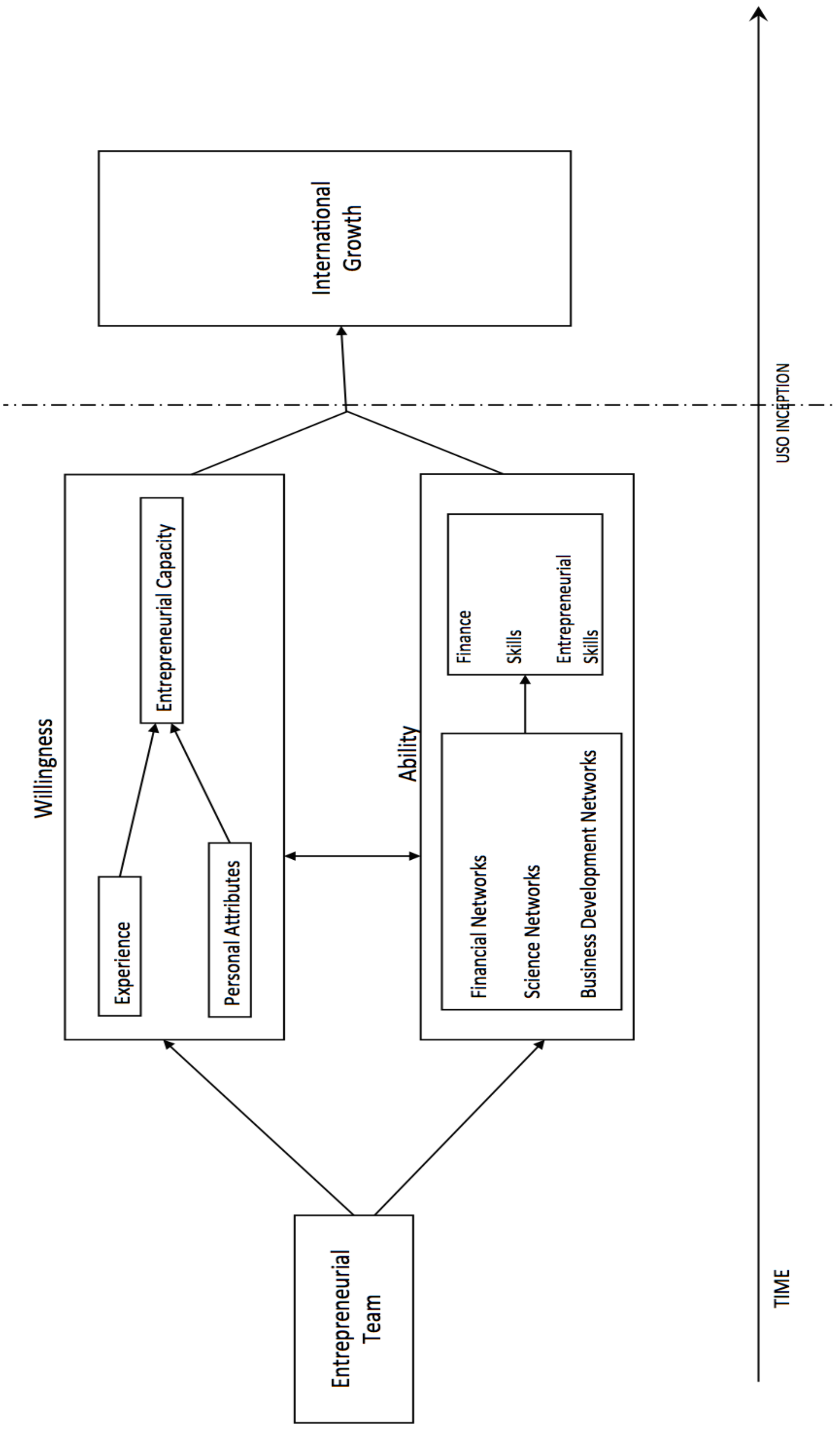
It is evident that the success of start-ups in high-tech industries is largely dependent on the full exploitation of technology as the firm's core source of competitive advantage (Hamel and Prahalad, 1994). This requires the effective integration of technical factors with business strategy (Visitin and Pittino, 2014). Compared to single founders, entrepreneurial teams have a greater chance to possess the skills required to achieve such integration (Colombo and Grilli, 2010), as well as displaying more stability within the highly volatile and uncertain technology-based industry (Visitin and Pittino, 2014). It is therefore unsurprising that a growing number of studies on the performance of high-tech firms focus on the characteristics of top management teams.

Current issues on founder teams revolve around team composition and their effect on new firm performance. Team composition has been researched in terms founder affiliation, education history, and business experience (Rothaermel et al., 2007). For example, most USO founding teams are composed solely of academic entrepreneurs, thus providing a rather homogenous set of experiences and skillsets; in contrast, some teams are composed of both academics and surrogate entrepreneurs, who are not academics and have wide industry experience, thereby providing a heterogeneous pool of experiences and skillsets. This research stream has emphasised the importance of team heterogeneity (Ensley and Hmieleski, 2005), while at the same time calling for further investigation into the most effective founding team composition for USO success. Rasmussen et al. (2014) identify three key competencies deemed as vital to the development and growth of academic spin-outs: first, the ability to recognise opportunities (Shane, 2000); second, the role of human agency in entrepreneurship (Shane et al., 2003); third, the ability to assemble and re-organise resources to exploit the opportunity (Brush et al., 2001). The key objective while forming an entrepreneurial team would be to gather a wide enough variety of skillsets and experiences to meet these needs.

While conflict may arise within heterogeneous founding teams, research suggests that the presence of individuals with previous entrepreneurial or commercial experience could significantly enhance the likelihood of USO success. In the context of born globals we predict that higher levels of team heterogeneity, in terms of entrepreneurial experiences and skillsets, positively influence the team's entrepreneurial capacity, thus increasing the firm's willingness to internationalise early.

Proposition 5: High levels of founding team heterogeneity, understood in terms of entrepreneurial experience, personal attributes, and therefore entrepreneurial capacity, positively influence the USO's willingness to internationalise early.

Figure 1. Conceptual Framework of a Born Global USO.



<u>Role of Networks and the Ability to Internationalise</u>

While the above sections addressed the knowledge gap pertaining to the impact of human capital on the USO's *willingness* to internationalise, the following section will explore the role of pre-foundation networks and social capital as moderators of the *ability* of USOs to internationalise early. The discussion will be grounded in a resource-based view of the firm.

Networks have been widely recognised as influential in the internationalisation process of the firm. Indeed, network relationships generate social capital, which can be defined as "the sum of the actual and potential resources embedded within, available through, and derived from the networks of relationships possessed by an individual or a social unit." (Nahapiet and Ghoshal, 1998: 243). As Coleman (1988) notes, resources such as information and tangible assets are fundamental in providing a basis for action, but can be extremely costly to gather. The fundamental proposition underpinning the concept of social capital is that social relationships, often established for different purposes, can become effective channels for the diffusion of resources, thereby reducing the amount of time and investment required to gain access to them. This is particularly relevant for internationalising SMEs, as social capital, by providing the new venture with greater access to resources and international opportunities, can enable firms to overcome the liabilities of newness and foreignness (Arenius, 2002) associated with international markets. In this sense, USO networks and social capital have a direct impact on the firm's material *ability* to exploit the opportunities, and thus internationalise early.

USOs, like many other types of firms, are widely recognised as being embedded in networks of social, professional and exchange relationships with other actors (Granovetter, 1985). As such, USOs are no longer considered as individual self-fulfilling units that prefer transactional arrangements; instead, they develop networks and relational capital, through which they learn from partners, they develop trust, respect, and friendships, and they gain access to additional, often complementary resources (Kale et al., 2000).

The influence of networks on the growth of USOs has long been recognised in the academic entrepreneurship literature (Meyer, 2003). Mustar (1998), for instance, suggests that the rate of growth of the start-ups is highly dependent on the extent to which these new firms and their entrepreneurs possess the ability to establish multiple partnerships in a wide range of fields, including financial partnerships, academic partnerships, and even international relationships (Mustar, 1998; Meyer, 2003). Indeed, social networks in the academic context may compensate for the shortcomings of a group that is usually not regarded as being entrepreneurial (Fernandez-Perez et al., 2013).

In this study, we will attempt to capture the role of networks and social capital as drivers of the ability of USOs to internationalise by focusing on three key types of networks: Financial Networks, Science Networks, and Business Development Networks. We have chosen to focus on these particular categories as they emerge in the USO literature as the core sources of financial resources, knowledge assets and business-related skills, which are vital to business growth and sustainability.

Financial Networks

Financial networks, mainly composed of the providers of finance and investment, are the first set of relationships that are deemed to influence the USO's ability to internationalise early.

Most USOs need to engage in both technological and business development before they can commercialise their inventions. Consequently, they require financing in order to develop their firms. While it may be possible for entrepreneurs to self-finance their ventures, developing a USO can be extremely costly, making this task very difficult for most academic entrepreneurs. As a result, many entrepreneurs acquire capital from sources external to the university, including government agencies, business angels, and venture capitalists (Shane, 2004).

With regards to financing USOs, Shane (2004) identifies two key risk factors: uncertainty and information asymmetry. Uncertainty about the technology refers to the fact that no one is certain whether a market demand exists for the technologies being commercialised. Information asymmetry, on the other hand, refers to the fact that academic inventors possess more technical information and, potentially, market understanding about the technology than any other party, rendering it difficult for financiers to assess the invention. Uncertainty and information asymmetry tend to diminish in the later stages of USO formation, as the business idea becomes more concrete and investors have more information on the venture project.

The literature sheds light on three key sources of financing of academic spin-out firms: government agency funding, venture capitalists (VCs) and business angels (De Coster and Butler, 2005).

The initial capital obtained by USOs in most industries, generally, does not come from private investors, thus generating a funding gap in the development of USOs (Shane, 2004). For this reason, many USOs avail of public sector funding programmes to finance their own development. Indeed, private investors would rarely invest in spin-outs when they are first founded, let alone before they are formed, as most investors want to assess a thoroughly developed technology and business plan, thereby leading firms to rely on public funding during the very early stages of development (Shane, 2004).

The second type of funding is venture capital (VC), which is allocated to academic spin-outs when they are of a capital-intensive nature and have long timeframes to profitability (Powers and McDougall, 2005). Venture capitalists use a thorough assessment process to achieve a holistic appraisal of the new venture; therefore, USOs must provide a well developed project idea or prototype in order to secure such funding. USOs benefit from venture capital in two ways: first, from the financial capital provided; second, from the management or advisory expertise provided by the venture capitalists (McMillan et al., 1987). Shane and Stuart (2002) suggest that having relationships with venture capitalists and angel investors increases the likelihood of USO success.

The third set of investors are business angels that come from diverse professional backgrounds, ranging from former entrepreneurs to finance specialists (Prowse, 1998). Business angels display a tendency to target less risky proposals compared to VCs (Mason and Harrison, 2002), and they assess business projects in a more informal manner than VCs, largely basing their judgement on the entrepreneurs leading the ventures rather than market risk (De Coster and Butler, 2005). Angel investors are viewed to be very popular among the founders of USOs.

With regards to the impact that financial relationships have on the firm, we can firstly predict that access to financial resources has a strong and positive impact on the USO's ability to internationalise early. Secondly, we can predict that the type of the investment, which also includes its timing, and the strategic expectations of the investor will also influence the firm. For example, as VC investments tend to occur later in the pre-foundation period of the firm, e.g. during the credibility stage, and after a thorough screening process of the business idea, the financing will likely support strategic development rather than product development, thereby having a greater impact on the international growth of the firm (Lockett and Wright, 2005). Additionally, Clarysse et al. (2005) predict that VCs often expect USOs to have explosive growth and to adopt a global orientation, which is likely to direct the firm's strategic development towards early internationalisation. In contrast, as public funding tends to take place during the very early stages of USO development, the financing will likely support idea and product development, thereby rendering the impact of funding on subsequent internationalisation less evident.

Proposition 6: Financial networks enable the firm to gain access to financial resources, thereby having a positive impact on the USO's ability to internationalise early.

Proposition 7: The source and timing of financial support will influence the strategic objectives of the USO, including internationalisation, and the firm's ability to attain them.

Science Networks: The University Department

The USO's Science Networks represent the second category of networks, largely represented by the relationships developed at the university. Indeed, universities can act as enablers of USO development by offering a "culture of entrepreneurship". This is even more evident at the departmental level, and for this reason this study will focus on the relationships developed at this level. A number of studies have asserted that the level of entrepreneurial activity varies widely between departments within the same university (Bercovits and Feldman, 2008), and that the local environment can strongly influence faculty involvement in academic entrepreneurship (Rasmussen et al., 2014). According to Perkmann et al. (2013) the most salient organisational-level determinant of academic entrepreneurial activities is represented by the quality of the researchers' university department.

Research has highlighted that the impact of the wider institutional context upon the development of USOs is particularly evident during the early stages of USO formation (e.g. Clarysse and Moray, 2004), although this largely depends on university policies and tech-transfer structures and infrastructures (Clarysse et al., 2005). Indeed, while there may be university policies in place to support the development of USOs, the organisational structure of the university may generate a divergence between such policies and what actually occurs "on the ground" (Rasmussen et al., 2014). Efforts to induce changes are, in fact, unlikely to succeed unless accepted and practiced at the local, departmental level (Louis et al., 1989).

Rasmussen et al. (2014) identify two key ways in which the departmental context shapes the academic entrepreneurship process: first, the local context is viewed to moderate the impact of university policies and practices on the USO development process; second, the university department is shown to influence how the new venture develops entrepreneurial competencies, which are vital to firm formation and development.

The strong influence of the university department on the impact of university policies is supported by Bercovitz and Feldman's (2008) study of invention disclosure at the departmental-level; according to the authors, department leadership and peers play important roles in evaluating performance, allocating slack resources such as time, setting the social cues with regards to the likelihood of invention disclosure, and generating conflict and/or compliance between individual behaviours and departmental norms. As USO formation is likely to be more challenging and time-consuming to the work of academics and departments than mere invention disclosure, Rasmussen et al. (2014) suggest that these factors may play even more prominent roles during the early stages of the formation process.

Rasmussen et al. (2014) also find that the department influences how new ventures develop entrepreneurial competencies, which are vital to firm formation and development. For example, the social capital required to gain access to specific industry expertise needed for commercialisation may be more likely to reside at the departmental level, rather than at the university level. Moreover, while USOs may eventually need to look beyond university boundaries to develop key business competencies, such as the development and acquisition of resources, the departmental context may be more influential in the development of such skills during the very early stages of firm development (Bercovitz and Feldman, 2008).

In the context of this study, we propose that the university department influences, not just USO formation, but also internationalisation. In particular, we predict that, by increasing the levels of entrepreneurial culture and access to external competencies, the department provides academic entrepreneurs with the support and capabilities required to pursue early internationalisation.

Proposition 8: The university department, by increasing the levels of entrepreneurial culture and the competencies of its academics, positively influences the ability of USOs to internationalise early.

Business Development Networks: Incubators and TTOs

The third and final category of USO networks is represented by Business Development Networks. The changing role of universities from "knowledge production" to "capitalisation of knowledge", with the ultimate purpose of improving regional or national economic performance, as well as increasing the university's financial advantage, has led to increasing commercialisation activities among academic institutions in the last two decades (Djokovic and Soutaris, 2008). To support such activities, many universities have introduced a range of business development facilities, including incubators and Technology Transfer Offices (TTOs), which play an active role in assisting USO in the identification, protection, and commercialisation of the university's intellectual property (Djokovic and Soutaris, 2008).

The University Incubator

To enable spin-out firms to progress through the stages of their formation process, support from the parent organisation may be required. For this reason, universities often act as an incubator (Clarysse et al., 2005), providing business support in the form of office space, equipment, mentoring assistance and, sometimes, even capital to new firms. Incubators are widely regarded as playing a critical role in science-based innovation, as they can affect the nature of the new business started and, to some degree, its subsequent pattern of success (Meyer, 2003).

Etzkowits et al. (2000) devised a list of the core elements that should characterise an “ideal” incubator, including the provision of mere facilities, networking support, mentoring services, long-term assistance, human capital support and a solid financial base. However, not all incubators are the same and universities vary widely with regards to the types of support they offer academic entrepreneurs in the gestation period of USOs[1]. Furthermore, while many universities offer incubating facilities, not all academic spin-outs use them during their development process.

With regards to rapidly internationalising USOs, we propose that firms that utilise the support of incubators are more likely to gain the resources and skillsets required for internationalisation, thereby positively influencing the USO’s ability to internationalise early.

Proposition 9: The use of an incubator during the USO’s formation process positively influences the USO’s ability to internationalise early.

Technology Transfer Offices

Another actor in the USO’s business development network is the TTO, a facility that acts as an intermediary between university researchers and external experts and financiers, and which provides assistance in the commercialisation process of university technologies (Fryges and Wright, 2014). With the support of public funds, TTOs have stimulated a range of entrepreneurial activities by academics, ranging from invention disclosures to patent application, the generation of licensing income, and the involvement of academics in the founding of USOs (Clarysse et al., 2011). Some universities are more effective at transferring technologies to the market than others (Siegel et al., 2008), and this is partly dependent on the abilities of the university’s TTO to facilitate the exploitation of academic inventions in commercial applications (Lockett and Wright, 2005; Weckowska, 2015).

[1] For a detailed review of Incubator Models, please see Clarysse et al. (2005).

A wide range of studies have shed light on the abilities of TTOs to have a positive impact on the university's tech-transfer performance, including the ability to evaluate technological inventions, to secure Intellectual Property Rights (IPRs), to identify viable commercial partners, and to establish new ventures for the commercialisation of university technology (Weckowska, 2015). While TTOs have widely been found to be catalysts of USO development, some studies have found them to constitute barriers to technology transfer, due to aggressive IPRs or lengthy bureaucracy, thereby becoming "bottlenecks", rather than facilitators, of innovation dissemination (Litan et al., 2008).

The role of TTOs has yet to be explored in the context of internationalising USOs. Based on the above arguments, we can predict that the support offered by TTOs can assist USOs in recognising the commercial potential of the product in foreign markets, identifying international opportunities, and securing financial resources. Such assistance can ultimately have a positive effect on the USO's ability to internationalise early.

Proposition 10: Utilising the support facilities offered by the TTO has a positive impact on the USO's ability to internationalise early.

The Interaction between Human Capital and Social Capital

In the context of internationalising USOs, human capital theory emphasises the role of entrepreneurial team characteristics, entrepreneurial capacity in particular, as increasing the firm's willingness to internationalise. In contrast, social capital theory emphasises the impact of business relationships upon the ability of the firm to grow and internationalise by enabling the USO to gain access to external resources and knowledge.

While we have explored each of these factors separately, and both are necessary conditions for early internationalisation, they must not be considered as independent of one another. Indeed, they are of an interdependent nature, as USOs will not be able to internationalise if the team is willing but unable to do so; similarly, they will not venture into foreign markets if the ability is present, but the willingness to pursue the international opportunity is not.

Furthermore, human capital and social capital influence each other. For example, while opportunity recognition was considered here in the context of entrepreneurial capacity, research has found that relationships can also affect the ability of firms to recognise opportunities, by providing access to external information, expertise and skillsets. Another way in which networks may influence human capital is by affecting entrepreneurs' cognitions. De Carolis and Saparito (2006), in fact, argue that networks and social capital influence entrepreneurial cognition by obscuring perceptions of risk that are frequently associated with international ventures, ultimately increasing the levels of entrepreneurial capacity and, therefore, the willingness to internationalise.

Conversely, human capital influences the development of social capital and the ability of the team to exploit relationships. Firstly, some USO networks may have been developed by the entrepreneurial team during previous industry or research experience; for example, science-related relationships are often a result of academic entrepreneurs' previous activity, and are therefore likely to differ depending on the academic entrepreneurs. Secondly, the mobilisation of network resources is dependent on the entrepreneurial team's selection of the right relationships and their ability to exploit them, emphasising the fact that the potential value of social capital is only realised through human capital.

Proposition 11: Human Capital and Social Capital are necessary but insufficient conditions when considered individually. Indeed, early internationalisation requires USOs to be both willingness *and* able to do so.

Conclusion

The conceptual framework outlined in this paper makes several contributions by addressing some significant gaps in the literature.

Firstly, it contributes to the International Entrepreneurship literature by addressing the lack of process-based studies on born global firms. Indeed, this study extends the scope of the research to include the pre-foundation period of the firm, beginning from the moment in which the business idea is first conceived, in an effort to shed further light on how the entrepreneurial process evolves in the early stages of born global formation.

Secondly, this research focuses on a particular type of firm: University Spin-Out firms. By focusing on USOs, often considered ideal born global candidates, this study contributes to the lack of research exploring the internationalisation behaviour of this type of firm. Additionally, observing a specific type of organisation enables the research to take into account the context-specific factors that may influence firm behaviour. Finally, the academic entrepreneurship literature offers several conceptualisations of the development process of USOs, thereby providing a strong foundation upon which to build this study.

In our conceptual framework, we predict that, during the pre-foundation period, two particular variables have a strong influence on subsequent internationalisation: willingness, affected by the entrepreneurial team's human capital, and ability, affected by the USO's social capital. The key proposition of human capital theory is that knowledge is a heterogeneous resource that is distributed unevenly throughout society (Hayek, 1945). In line with this view, the research investigates the human capital possessed and accumulated by the entrepreneurial team of the USO before and throughout the firm's pre-foundation period, in an effort to capture its impact on the firm's willingness to internationalise early. Future research might empirically test the relationship between human capital and the USO's willingness to internationalise early.

Additionally, this research adopts a social capital approach to BG research. Indeed, this research adopts a resource-based view of networks and explores the impact of the pre-foundation social capital, mobilised through the firm's financial networks, science networks and business development networks, on the USO's ability to internationalise early. Future research might empirically test the relationship between pre-foundation social capital and the firm's ability to internationalise early.

Finally, the framework sheds light on the inter-relationship between human capital and social capital as determinants of firm willingness and ability to internationalise early. The implication of such relationship is that, although we have portrayed human capital as the key determinant of willingness and social capital as that of ability, the boundaries may at times be blurred. As such, relationships may sometimes influence USO the willingness, and human capital may have affect the ability to internationalise early. Future research might further explore such relationship in an empirical manner; rich, qualitative data is deemed to be most appropriate to capture this dynamic relationship.

It is hoped that the conceptual framework of born global USOs, as well as the avenues for future research that have been identified, provide fruitful grounds for the development of our understanding of the pre-foundation processes of born global firms, particularly in the context of university spin-out companies.

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