THE PERFORMANCE OF UNIVERSITY SPIN-OFFS: THE IMPACT OF ENTREPRENEURIAL CAPABILITIES AND SOCIAL NETWORKS OF FOUNDING TEAMS DURING START-UPS

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Objectives: *University spin-offs have received increasing attention from academia, governments, and policymakers because not only do they generate new innovations, productivity, and jobs for regional economies, they also make a significant contribution to university productivity and creativity (Hayter, 2013, Urbano and Guerrero, 2013). However, our understanding of the process by which university spin-offs are created, developed, and sustained is limited. This paper is based upon data collected from university spin-offs in Spain and investigates the contribution made by a founding team to a spin-off's performance. By employing resource-based view theory and a social networks approach, this paper addresses the gap by exploring university spin-offs in Spain.*

Prior work: *University spin-off studies have concentrated on analysing entrepreneurial business models (Ndonzuau et al., 2002, Vohora et al., 2004b, Bower, 2003, Mets, 2010) to understand how the commercialization of research is undertaken to create a university spin-off. This kind of company has also been analysed from the perspective of a university's capabilities (Powers and McDougall, 2005), or the capabilities and social networks of an established spin-off instead of the founding teams (Walter et al., 2006). Moreover, Vohora et al. (2004a) and Shane (2004) have suggested founders need to build capable teams, which must have entrepreneurial abilities and qualitative social networks, to create effective university spin-offs. Both entrepreneurial capability and social network theory have been studied in prior entrepreneurship research, but have received less attention within the context of the university spin-offs (Gonzalez-Pernia et al., 2013).*

Approach: *By utilising an internet-based survey, this paper explores the entrepreneurial capabilities and social networks of founding teams in Spanish university spin-offs, using quantitative data analysis. Based upon the resource-based view theory of Barney (1991) the research studies the entrepreneurial capabilities of founding teams; it employs entrepreneurial technology, strategy, human capital, organizational viability, and commercial resources (see Vohora et al., 2004a). To study the social networks of a founding team, we employ the conceptual model of Hoang and Antoncic (2003) that divides networks into three components: structure, governance, and content.*

Results and implications: *The results from an examination of the sample of 181 Spanish university spin-offs empirically demonstrate that by exploiting social networks a founding team can improve its entrepreneurial capabilities which, in turn, enhance its spin-off's performance. By employing the work of Vohora et al. (2004a) and Shane (2004), this paper constructs a model in which entrepreneurial capabilities play a mediating role between social networks and a spin-off's performance. Thus, the paper has implications for universities in training and policy development to support spin-off's activities.*

Value: *This study addresses some fundamental questions to contribute to the theory-based understanding of university spin-offs: How do the entrepreneurial capabilities of founding teams*

influence the performance of university spin-offs? How do the social networks of founding teams contribute to the process of the university spin-offs?

Keywords

University spin-offs, entrepreneurial teams, resource-based view, social networks

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 and Guerrero, 2013). According to Smilor et al. (1990), a university spin-off refers to a new venture founded by current students or faculty members of a university to develop and exploit their inventions based on an entrepreneurial process. Vohora et al. (2004a) suggested that a university entrepreneurial process comprises a creation and a growth phase. To support creation universities need to utilize internal or external financial awards to pursue their research activities leading to new and novel ideas. These ideas can then become opportunities to commercialize, where the universities recognize business potential, and develop into beta versions of products or services enabling some tests for market approval. The development phase involves the creation of a business around, the subsequent entry and positioning of the spin-off within a market. Once into the development phase a key aspect of the spin-off process is the quality of the founder/founding team, this determines the initial resources of a new venture (Vohora et al., 2004b, Aspelund et al., 2005).

Zacharakis and Meyer (1998) indicated that the venture capitalists solely invest in a new venture if it has growth potential, and consistently analyse founding team quality as an important criterion in their funding decision-makings. Other scholars, for example Vohora et al. (2004a) and Shane (2004), indicated that the creation of effective spin-offs is dependent upon the ability of the founders to build capable teams with entrepreneurial capabilities and qualitative social networks. Thus, this paper analyses the role of the founding team in the entrepreneurial process, with a founding team defined as "the groups of people involved into the creation and management of new ventures" (Forbes et al., 2006).

To study the entrepreneurial capabilities of founding teams, we will employ resource-based view theory (Barney, 1991), which emphasized the internal idiosyncratic capabilities of a firm and explained how a firm utilizes the available capabilities to be successful. The entrepreneurial capabilities of a founding team known as internal capabilities comprise entrepreneurial technology, strategy, human capital, organizational viability, and commercial resources (Vohora et al., 2004a). Besides these internal capabilities, the quality of a team's social networks, external resources, in the entrepreneurial process are also important (Vohora et al., 2004a, Shane, 2004). A social network includes single nodes (actors) and linkages between these nodes (dyads), and is "a sum of actual and potential resources embedded within, available through, and derived from the networks of relationships possessed by individual social units" (Nahapiet and Ghoshal, 1998). The entrepreneurial capability and social network have been studied in prior

entrepreneurship research, but have received less attention in the context of the university spin-offs (Gonzalez-Pernia et al., 2013).

In prior university spin-off studies, the entrepreneurial activities of universities were studied under the impacts of their business environment (Fini et al., 2009), or their contributions to the regional economies (Smith and Bagchi-Sen, 2012) or to university productivity (Urbano and Guerrero, 2013). Moreover, university spin-off studies have concentrated on analysing the entrepreneurial business models (Ndonzuau et al., 2002, Vohora et al., 2004b, Bower, 2003, Mets, 2010) to understand how the commercialization of research is undertaken to create a university spin-off. Where capability has been investigated in the context of spin-offs, the focus has been upon the capability that exists within the university (Powers and McDougall, 2005), or received the influence of capabilities and social networks (after establishment) (Walter et al., 2006). This paper analyses the contribution of capabilities and networks of the founding teams at the start of the new venture and its effects on future performance. In general, the current university spin-off studies have omitted the influences of the founding team's entrepreneurial capabilities and social networks on the spin-off's performance, previous literature (Murphy et al., 1996) has defined these characteristics as important in the growth and financial performance of university spin-offs.

Since university spin-off is a relatively recent subject that has come under investigation this paper will examine empirically some fundamental questions to contribute to the theory-based understanding of the spin-off process: How do the capabilities of founding teams influence the performance of university spin-offs? How do the social networks of founding teams contribute to the process of university spin-offs? To address these questions and strengthen the theoretical and empirical foundation of university spin-off studies, we will analyse the performance of university spin-offs in the growth phase under the impact of the entrepreneurial capabilities and social networks of founding teams in the creation phase. To do this the paper adopts resource-based view theory to measure the capabilities of founding teams using the measures of entrepreneurial technology, strategy, human capital, organizational viability, and commercial resources, and social capital theory to analyse the networks of founding teams through three dimensions: structure, governance and content. These characteristics will be analysed against the financial, operational, and market performance of responding university spin-offs. This analysis will be employed to develop and test a theoretical framework linking the performance of a university spin-off to both social networks and capabilities of the founding teams. 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 the members of the teams. The findings indicate that the capabilities of founding teams affect the spin-offs' performance. Additionally, the social networks of founding teams indirectly influence the spin-offs' performance through their impact on the capabilities of the founding teams.

DEFINITIONS, CONCEPTS, AND HYPOTHESES

According to Smilor et al. (1990), a university spin-off refers to a new venture founded by current students or faculty members of a university to develop and exploit their inventions based on an entrepreneurial process. Vohora et al. (2004a) demonstrated that a university spin-off process has a creation and growth phase. The creation phase requires a university to utilize internal or external financial awards to pursue research activities leading to new and novel ideas. These ideas can become opportunities to commercialize where business potential is recognised leading to the development of beta versions of products or services ready for market testing. The movement into the development phase involves the entry and positioning of a spin-off and its product or services within a defined market sector. It is argued (Vohora et al., 2004a, Shane, 2004) that success in this element of the spin-off process depends on the founders quality which is often encompassed in a team (Kisfalvi, 2002).

The importance of the founding teams has been previously highlighted in the literature; for example Zacharakis and Meyer (1998) indicate that venture capitalists consistently analyse the quality of a founding team as an important criterion in their funding decisions, while Vohora et al. (2004a) and Shane (2004) note that effective university spin-offs must build a capable team that has entrepreneurial capabilities and qualitative social networks. To study the roles of founders in the entrepreneurial process, we will consider founding teams defined as "the groups of people involved into the creation and management of new ventures" (Forbes et al., 2006) as research units and analyse the contribution made by using identified capabilities and networks.

The Entrepreneurial Capabilities of Founding Teams

To study the entrepreneurial capabilities of a founding team, we will employ resource-based view theory, which emphasizes the internal idiosyncratic capabilities of a firm and explains how a firm utilizes the available capabilities to be successful (Barney, 1991). The entrepreneurial capabilities of a founding team comprise entrepreneurial technology, organizational viability, human capital, strategy, and commercial resources (Shane, 2004, Vohora et al., 2004a). For the purposes of this paper, entrepreneurial technology is defined as seed technology with the potential to commercialize that is an outcome of research. To understand the entrepreneurial technology capability of a founding team, we will employ the study of Barney (1991), which emphasized the imitability and ability of technologies. Imitability refers to the direct duplication and substitution of technologies (Gallini and Wright, 1990); while ability refers to the scope, application, value, and continuity of technology (Tushman and Anderson, 1986, McGrath, 1997).

The notion of organizational viability refers to institutional routines as an entire system (Nelson and Winter, 1982) and comprise of internal communication, formal control mechanisms, and organizational supports (Leonard-Barton, 1992). Internal communication mechanisms are methods of sharing information; dialogues undertaken to exchange both messages and deeply interconnected meanings (Krueger Jr, 2000); formal controls are identified as the desirable patterns of behaviours in organizations, institutionalized as rules, missions, routines, and regulations (Covin and Slevin, 1991); and organizational supports include the inherent policies of training and rewarding employees, and work discretion are critically important for the entrepreneurship process (Zahra, 1993, Hornsby et al., 1993).

In entrepreneurship studies, human capital refers to the experience and education of founding teams (Alvarez and Busenitz, 2001, McKelvie and Davidsson, 2009). Experience reflects the amount of an individual's working time, and is divided into the depth and breadth of different activities (Gimeno et al., 1997); in addition there is industry-specific experience, special tacit knowledge, derived from the working time of individuals in an industry and from specific training (Reuber and Fischer, 1999).

Entrepreneurial strategy-making is a distinct process characterized by proactiveness, innovativeness, risk-taking and competitive aggressiveness (Lumpkin and Dess, 1996, Dess et al., 1997). Proactiveness refers to first-mover advantage seeking to be the first to introduce new products or services potentially leading to high economic rent from the spin-offs (Lyon et al., 2000). Innovativeness is the tendency of entrepreneurs to engage in and support new ideas, experimentation, and creative processes that lead to new products or services (Lumpkin and Dess, 1996). Risk-taking refers to the propensity of an entrepreneur to engage in high risk/reward opportunities and how aggressively they take actions to exploit and achieve opportunities (Covin and Slevin, 1989). Competitive aggressiveness is the intensity of a firm's efforts to challenge its competitors for entry and position improvement in the marketplace (Lumpkin and Dess, 1996).

A firm's commercial resources are represented by the long-term relationships with customers based on personalization that enhance understanding and ultimately fulfilment, technology training, and business process design (Powell and DentMicallef, 1997, Nadherny, 1998). The trustful and valuable relationships require complex coordination and communication skills to create and maintain (Hall, 1993). According to Cross et al. (1997), modern business requires a high level of collaboration between technical and business staffs, which improve the mutual confidence, harmony of purpose, and communications, to avoid the mistakes in daily business activities. Thus, other staffs have to take the new technology training to cooperate successfully with the technical staffs and generate smooth operations (Feeny and Willcocks, 1998). The founding teams must also focus on the business process design, which evaluate their existing business process to adapt to market demands and to add more values to their customers (Benjamin and Levinson, 1993).

Besides entrepreneurial capabilities, Shane (2004) and Vohora et al. (2004a) also suggested that founding teams need to exploit resources achieved from their social networks to advance the entrepreneurship process. Thus, to understand this external capability of a founding team, we will analyse its social networks during the creation period.

The Social Networks of Founding Teams

This paper analyses the importance of networks available to the founding team at inception and the importance of these networks to the development of the business. The extant literature suggests that founding teams can improve their capabilities by seeking available resources within social networks to exploit new opportunities, enter to new markets, or sell new products or services on existing markets (Tolstoy and Agndal, 2010). The analysis divides the network into

three components structure, governance, and content as suggested by Amit and Zott (2001) and Hoang and Antoncic (2003).

The principal components of networks are nodes or actors that are individuals or integrations of individuals, and connections defined as social ties or bonds and network theory has developed from the strength of the weak tie model of Granovetter (1973) to the structural equivalence model of Burt (1987). Consequently, the concept of network structure varies along the evolution of social network studies and more recently, network structure has referred to the properties of connections and personal configurations of relationships among actors. The absence and presence of network ties, network configurations, and network morphology are the most important facets of the structural dimension (Tichy et al., 1979) and these facets describe the pattern of relationships as density, connectivity, and hierarchy (Amit and Zott, 2001).

Network governance is defined as mechanisms that govern the relationships among actors, the legal forms of actors, and the incentives for participations within networks. These mechanisms based upon power, influence, reputation, relationship reciprocity, and trust support the network sustainability more than legal enforcement (Amit and Zott, 2001). By associating with well-regarded individuals and organizations, entrepreneurs are able to increase their reputation determined by the information about their past performance to attract and convince more investors of their business projects (Podolny, 1994). Reciprocity refers to the mutual connection between two actors within a directed network (Larson, 1992). Network reciprocity based upon trust, the belief that the results of other actor's intended actions will be appropriate from an actor's point of view, is an important element of social networks (Tsai and Ghoshal, 1998). Moreover, trust between actors, a critical element of network exchange (Lorenzoni and Lipparini, 1999), is also associated with the willingness of others within networks to engage in cooperative interactions (Ring and van de Ven, 1992).

Content within a network refers to exchanging resources (Amit and Zott, 2001); such resources can be ideas, information, and advice (Smeltzer et al., 1991) or more esoteric, emotional support for entrepreneurs willing to take risks increasing their persistence to remain in business (Gimeno et al., 1997, Bruderl and Preisendorfer, 1998). However, participants need to consider how they protect internal know-how and the quality of knowledge that should be shared with networking partners (Das and Teng, 1998). Thus, when joining a network, entrepreneurs need to understand the resource potential being offered by other actors and the appropriateness of such resources (Smeltzer et al., 1991).

Therefore social network can be useful as explicit or tacit knowledge to enhance the strategic management skills, and knowledge to support the entrepreneurial process (Floyd and Wooldridge, 1999, Deakins, 1996, Yli-Renko et al., 2001). By exploiting information and advice related to human resources, founding teams encompass their human resource and improve the managerial skills (Davidsson and Honig, 2003, Rothaermel and Deeds, 2006, Tolstoy and Agndal, 2010). For the above reasons, this paper investigates the impact that the social networks of founders have on the entrepreneurial capabilities of the new venture.

H1: The social networks of a founding team improve its entrepreneurial capabilities

University spin-off's performance

In management research, organizational effectiveness theory has been developed and employed to study the firm's competence and performance (Ostroff and Schmitt, 1993) while some (Wiklund, 1999, Wiklund and Shepherd, 2005) indicate that such a measure should be multi-dimensional others (Murphy et al., 1996) emphasise financial measures. Financial measurement refers to a firm's growth and profitability (Chandler and Jansen, 1992, Kathuria, 2000); growth normally represented by an increase in sales or number of employees (Chandler and Hanks, 1993), while profitability refers to net profit, net worth, return on sales, and return on assets (Garg et al., 2003). However, Ittner and Larcker (2003) and Campbell (2008) have indicated that it is difficult to access financial information in the early stage of a new venture, and thus introduced non-financial performance as a complementary factor to evaluate the firm's overall performance. The non-financial performance refers to operational and market performance of a firm that ultimately enhance financial performance (Higashide and Birley, 2002). This paper employs measures used in previous entrepreneurship studies (Cooper, 1993, Cooper and Artz, 1995, Chandler and Hanks, 1993) to understand organizational effectiveness and spin-off performance; in particular, that body of work that have developed multidimensional measurements to understand financial and non-financial performance (Murphy et al., 1996, Stam and Elfring, 2008, Westerberg and Wincent, 2008).

It is argued that for a technology-based spin-off to successfully exploit its innovation certain capabilities are required; human and technological capital (Andries and Debackere, 2006, Gimeno et al., 1997, Yunhee and Heshmati, 2010), commercial resources (Chen, 2009), strategy, and organization structure (Lee, 2007, Wang and Bee Lian, 2004). While it is understood that the entrepreneurial capabilities of founding teams significantly predict its future performance (Aspelund et al., 2005), social networks can support firms in developing and sustaining competitive advantage by gathering unique resources and skills (i.e. knowledge about customers, competitors and industry trends) which creates distinctiveness (Bharadwaj et al., 1993). In addition, in the views of venture capitalists, an entrepreneurial team with a combination of entrepreneurial skills, motivation, and strategy is more successful than others (Agarwal and Chatterjee, 2007) because the initial resources of a spin-off determined by the entrepreneurial capabilities of founding teams promote the product's market entries (Kakati, 2003). These initial resources transferred from parent organizations or enhanced during the creation period include the technology, organizational viability, human capital, strategy, and commercial resource of founding teams (Vohora et al., 2004a, 2004b, Shane, 2004). However, other entrepreneurship researchers demonstrated that the initial resources quickly dissipate after a new venture created (Bruderl and Schussler, 1990, Fichman and Levinthal, 1991). In this study, we thus hypothesize that the entrepreneurial capabilities of a founding team influence its spin-off's performance.

H2: The entrepreneurial capabilities of a founding team predict its spin-off's performance.

University spin-offs are more successful if they transform the resources of founding teams from their social networks into a firm's capabilities to improve their spin-off performance (Shane, 2004, Vohora et al., 2004a). it is argued that social networks provide access to valuable, rare, inimitable, and non-substitutable resources, which, potentially, can improve a new venture performance in terms of profitability, growth, and value creation (Witt, 2004) leading to competitive advantage (Barney, 1991). In addition, Yli-Renko et al. (2001) assert that knowledge acquisitions and knowledge exploitation, together, enhance new-product developments, technological distinctiveness, and cost efficiency which also support improvements in competitive advantage. However, according to the literate the abilities of an entrepreneur to obtain resources from their social networks is dependent upon a number of factors including relative power position (Gnyawali and Madhavan, 2001), strength of network ties (Lipparini and Sobrero, 1994, Echols and Tsai, 2005), degree of centrality (Stam and Elfring, 2008), reputation (Glückler and Armbrüster, 2003), and trust within networks (Lee, 2007).

H3: The s*ocial networks of a founding team predict its spin-off's performance*

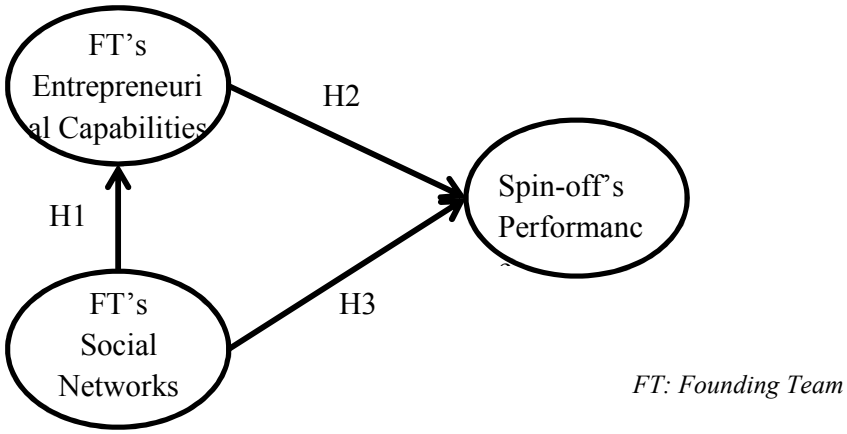

Figure 1. Conceptual Framework

METHODS

Sample

We draw the sample from 69 Spanish universities, each has an office for the transfer of research results (OTRI), located in 17 autonomous communities. The OTRIs were created by the public or private universities within the first Spanish National Plan of R&D 1988-1999 to enhance the relationships between the scientific world and productive sectors. OTRI's engage in a wide range of R&D activities but only 35 are involved in the creation and development of spin-offs. While university spin-offs can be created by individuals or teams those spin-offs participating in this research were created by teams that included at least one academic member from a university.

With the help of the OTRIs, a database of 862 spin-offs was conducted from which 181 responses were received (21 per cent of research population) from a web-based survey. All

respondents were members of the founding teams and have a position on the executive board of the spin-off. The spin-offs are in various sectors: 33.8% in information, computing and telecommunications, 16.1% in engineering and consultancy, 15.3% in medicine and health, 15% in agriculture and biotechnology, 8.9% energy and environment, 4.3% in aeronautics and automotive, 3.4% in electronic, and 3.2% in other industries. The majority of spin-offs, 98%, were created inside university incubators after 2003; the actual breakdown is: 20% in 2009, 16% in 2010, 14% in 2006, 13% in 2008 and 2007, 7% in 2005, 5% in 2011 and 2004, and 7% in 2003 or earlier.

Construct Measurements

To ensure the content validity of measurements, this study uses questions that employ seven-point Likert scales from existing entrepreneurship and management studies (Antoncic and Hisrich, 2001, Tsai and Ghoshal, 1998), and require respondent to self-report on a variety of issues that relate to a founding team's capabilities and social networks during the creation period against current spin-off's performance.

Entrepreneurial capabilities

The capability construct is derived from previous research (McGrath, 1997, Antoncic and Hisrich, 2001, Lumpkin and Dess, 2001) and employs measures for entrepreneurial technology, organizational viability, human capital, strategy, and the commercial resource of founding teams. More specifically, in terms of technology, respondents must answer six questions about the ease of imitation, scope, continuity, and the market signals of their entrepreneurial technology (McGrath, 1997). To measure the organizational viability, we adapt the measurements from studies of Leonard-Barton (1992), Zahra (1993) and Antoncic and Hisrich (2001) to construct five questions that relate to the internal communication mechanisms, formal control mechanisms and organizational support within founding teams during the creation period. To measure human capital, four-item measurement evaluating the industrial, managerial and entrepreneurial experience adapted from the studies of Alvarez and Busenitz (2001) and McKelvie and Davidsson (2009) is used. Questions investigation the notions of innovation, proactiveness, risk-taking, and competitive aggressiveness (Lumpkin and Dess, 2001, Covin and Slevin, 1989) were employed to constitute the entrepreneurial strategy-making measurement. Finally, four questions based on the customer relationship, staff's technology training, and process design were used to measure the commercial resource founding teams (Powell and DentMicallef, 1997, Nadherny, 1998).

Social networks

By adapting prior management research, eight social network measurements are constructed in the areas of: ties, density, centrality, reputation, reciprocity, trust, information quality, and diversity. The strength of a founding-team's ties are measured by constructs that look at the willingness to engage in discussions that relate to social, political, and family matters (Marsden and Campbell, 1984, Parks and Floyd, 1996). The density of a network is measured by three-item scales evaluating interactions within networks (Marsden, 1993). Centrality is based on the

measurements of Rowley (1997) that evaluate the location of actors within information flows using four question about how directly respondents communicate with others within networks. To measure the quality of information within social networks, five questions developed by O'Reilly III (1982) are employed which evaluate the accuracy, relevance, reliability, specificity, and timeliness of information. The degree of availability of business relevant information will be used to measure the diversity of information within networks: market data, product designs, process designs, marketing know-how, and packaging design or technology (Gupta and Govindarajan, 2000). Furthermore, we measure trust by four questions, which require respondents to self-report on how trustworthy they are perceived in by other members within networks (Tsai and Ghoshal, 1998). By adapting the studies of Uzzi (1996) and Shane and Stuart (2002), a four-item measurement to evaluate the founder's reputation is constructed to obtain the views of other participants within networks. Reciprocity is measured by four questions regarding to the level of support, accumulation of favours, and the fairness contained in the relationships among members (Miller and Kean, 1997).

Spin-off's performance

To understand the performance of a university spin-off, this study will employ financial, operational (Westerberg and Wincent, 2008), and market performance measures (Murphy et al., 1996, Ittner and Larcker, 2003). Financial performance measures will use a firm's growth in terms of sales, revenue, number of employees, and net profit margin. The measures of firm's product/service innovation, process of innovation, and adaptation to new technology constitute the operational performance measurement and market performance is measured through product/service quality, product/service variety, and customer factors.

Control Variables

To ensure that one person from the founding team worked or was a student at a university, a binary code was used one for at least one founder in the team, at the creation time, and zero for no member. To manipulate for the potential negative effect on the performance of a spin-off created outside the university's incubator, this study will include a dummy variable coded one if spin-offs created inside the parent incubators and zero otherwise. Moreover, we consider the age of a spin-off as a control variable that can influence its performance.

Validity and reliability

To reduce common method bias, previously validated measurements were employed (Spector, 1987) and a pilot test on five spin-offs from the university of Granada was undertaken which resulted in the survey being to avoid potential question confusion by respondents. There is a potential error generated by the use of self-reporting from respondents especially as many of the measures are complex in nature and require post-hoc assessment. To reduce this issue, Harman's one-factor test was employed on all variables and the results suggest that the relationships among social network, entrepreneurial capability, and spin-off's performance factors are unlikely to be caused by this common method bias in this study. Furthermore, to avoid measurement errors, the study conducted proper survey measures and used a construct validation test (the empirical

indicators actually measure the construct) for validity (convergent and discriminant) and reliability. The results prove that research's measurements are both valid and reliable (see Appendix 2).

RESULTS

Model estimation and fit

First, exploratory factor analysis (EFA) is used to construct the research indicators. The results from the EFA of network structure model revealed that item loadings were mostly significant (over 0.5) and the four items that had loadings under 0.5, trust, information quality and diversity, and strategy factors that loadings were removed. The EFA is not considered as an sufficient method to evaluate the dimensions because it cannot test the models with higher-order factors (Rubio et al., 2001). Therefore, in this study, we will utilize first-order confirmatory factor analysis (CFA) to construct the lower-order factors, and the second-order CFA to construct the higher-order factors by applying the AMOS program. The research employs CFA based on the maximum likelihood method to test the hypotheses as the normality test revealed that all of the observed variables have significant kurtosis and skewness p-values, and the relative multivariate kurtosis is within an acceptable range (1.036). Moreover, the sample size, 181, is more than the minimum requirement for the CFA (The models with latent variables require at least 150 observations for normal distribution with no missing data) (Muthen and Muthen, 2002).

However, in a CFA model with fewer than 200 observations, a goodness-of-fit (GFI) test must be used (Barrett, 2007), for this purpose a combination of the ratio chi-square/degrees of freedom (CMIN/DF<3), RMSEA (<0.08), GFI (>0.9), NFI (0.9), and CFI (0.9) is employed to test the model (Ping Jr, 2004).

Before constructing our structural model, the average scores of eight first-order factors of social networks are estimated by using all items identified from the first-order CFA of structure, governance, and content models. The first-order CFA results from the social network model revealed an acceptable fit and all factor loadings (Density, centrality, tie, reputation, reciprocity, trust, and quality and diversity of information) are significant at 0.01 levels (Table 1). The results also demonstrate that these structure, governance, and content factors are valid and reliable (CR>0.7 and AVE>0.5>SIC) to indicate the social network variable. Thus, these factors can be used as observed variables that construct the social network endogenous latent variable.

Table 1: First-order CFA of Social Network Model

Paths	Loadings	CR	AVE
Network Structure →		0.7678	0.5249
Density	0.756**		
Centrality	0.739**		
Ties	0.676**		
Network Governance →		0.7776	0.5416
Reputation	0.621**		
Reciprocity	0.829**		
Trust	0.743**		

Network Content →		0.7219	0.5650
Information quality	0.736**		
Information diversity	0.767**		
Model fit (CMIN/DF=1.416, RMSEA=0.048, NFI=0.946, CFI=0.980, GFI=0.961)			
** Loading significant at the 0.01 level			

Second, we compute the average scores of the other eight first-order factors: Technology, organizational viability, human capital, strategy, commercial resource, and financial, operational, and market performance from first-order CFA of entrepreneurial capability and spin-off's performance. in combining these with three social network variables it is possible to construct a measurement model.

The first-order CFA of the measurement model revealed an excellent fit (the ratio chi-square/degrees of freedom is smaller than two; RMSEA is smaller than 0.8; and all fit indexes are greater than 0.9) (Table 2). Moreover, the factor loadings are greater than 0.5 and significant at 0.01 levels, and CR>0.7 and AVE>0.5>SIC leading to a conclusion that the construct passes the validity and reliability tests. Thus, all constructs are adequate for use to test the research hypotheses.

Table 2: First-order CFA of Measurement Model

Paths	Loadings	CR	AVE
Social Network →		0.9391	0.8384
Structure	0.958**		
Governance	0.792**		
Content	0.985**		
Entrepreneurial Capability →		0.8827	0.6102
Technology	0.671**		
Organizational Viability	0.928**		
Human Capital	0.513**		
Strategy	0.893**		
Commercial Resource	0.824**		
Spin-off's Performance →		0.8435	0.6489
Financial	0.665**		
Operational	0.979**		
Market	0.739**		
Model fit (CMIN/DF=1.537, RMSEA=0.055, NFI=0.962, CFI=0.986, GFI=0.951)			
** Loading significant at the 0.01 level			

The goodness-of-fit statistics and the chi-square difference test (Table 3) indicate that the fit of the saturated (measurement) model is better than the null model leading to the rejection of the hypothesis that no relationships are posited. Because both saturated and hypothesized models include the direct and indirect effects of social network and entrepreneurial capability constructs on spin-off's performance, they provide similar results of good fit (Table 3). In summary, we can use these measurements to test hypotheses 1, 2, and 3 because the results indicate that the hypothesized model is appropriate for use with research data (CMIN/DF=1.537, RMSEA=0.055, NFI=0.962, CFI=0.986, and GFI=0.951).

Table 3: Model Test

Models	Chi^2	d.f.	*P*	RMSA	NFI	CFI	GFI
1. Null Model	171.875	44	0.000	0.127	0.874	0.903	0.864
2. Saturated (measurement model)	52.248	34	0.024	0.055	0.962	0.986	0.951
3. Hypothesized Model	52.248	34	0.024	0.055	0.962	0.986	0.951

Comparison	Chi^2 diff	d.f. diff	*P*
Null Model vs. Hypothesized	119.627	10	<0.0001

Hypothesis tests

Hypothesis 1 states that founding teams exploit their social networks to improve their capabilities. The results indicate that the direct path between social networks and entrepreneurial capabilities is positive and significant (Table 4) inferring that hypothesis 1 is supported. Hypothesis 2, that the entrepreneurial capabilities of a founding team positively influence its spin-off's performance, is also supported. However, the results reveal that the relationship between the social networks of a founding team and its spin-off's performance is not significant leading to a rejection of hypothesis 3. Moreover, to understand how a founding team can exploit its social networks to improve its entrepreneurial capabilities and enhance its spin-off's performance, we analyse the indirect paths of research model (Table 4).

Table 4: Path analysis results: Direct and indirect effects

Paths	Standardised Direct Effects	Standardised Indirect Effects
Social Network → Entrepreneurial Capability	0.292**	
Social Network → Spin-off's Performance	-0.013	
Entrepreneurial Capability → Spin-off's Performance	0.383**	
Social Network → Spin-off's Performance		0.112**
Entrepreneurial Capability → Financial Performance		0.203**
Entrepreneurial Capability → Operational Performance		0.315**
Entrepreneurial Capability → Market Performance		0.331**
Social Network → Entrepreneurial Technology		0.174**
Social Network → Organizational Viability		0.246**
Social Network → Human Capital		0.091**
Social Network → Strategy		0.287**
Social Network → Commercial Resource		0.216**
Control		
Spin-off's age → Spin-off's Performance	-0.064	
Within incubator → Spin-off's Performance	0.275	

** denotes *p<0.01;Two Tailed significance*

Social networks, consistent with hypothesis 1 appear to influence positively and significantly entrepreneurial capabilities with respect to technology (0.174, $p < 0.01$), organizational viability (0.246, $p < 0.01$), human capital (0.091, $p < 0.01$), strategy (0.187, $p < 0.01$), and commercial

resource (0.216, $p < 0.01$). In fact, the structure, governance, and content of networks significantly affect all aspects of entrepreneurial capabilities within a team (Appendix 1). The results also suggest that social networks are likely to exert stronger influences on organizational viability and the strategy of founding teams, but a much more limited effect on spin-off's performance despite the influence of network content on financial performance (Appendix 1). However, social networks have a significant positive indirect effect on a spin-off's performance (0.112, $p < 0.01$) (Table 4). In other words, social networks positively influence a spin-off's performance through a mediate factor (entrepreneurial capability).

Entrepreneurial capability appears to have a significant positive direct effect on the financial, operational, and market performance of spin-offs (0.383, $p < 0.01$) (see table 4). In particular, the technology, organizational viability, strategy, and commercial resource show significant positive influences on all three dimensions of spin-off's performance (Appendix 1).

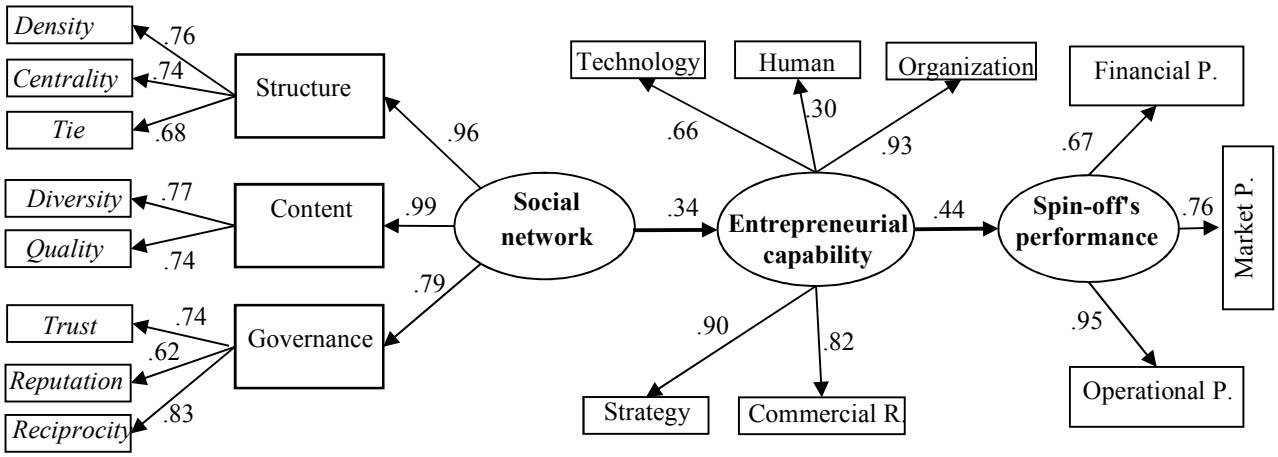

Figure 2. Result model (All estimates are significant at the 0.05 level, all error terms omitted

From the above results, we construct a mediation model that considers the mediate role of a team's entrepreneurial capabilities between its social networks and spin-off's performance. In other words, founding teams exploit their social networks to improve their entrepreneurial capabilities during start-up and subsequently enhance their spin-offs' performance. We also test mediation model by employing bootstrapping technique in the AMOS program. The result reveals that standardized direct effect with mediation is insignificant (-0.047, $p > 0.01$) and standardized indirect effect with mediation is significant (0.122, $p < 0.01$) leading to a conclusion that this new model is a full mediation type (Figure 2). Therefore, a team's social networks during start-up influence its entrepreneurial capabilities which, in turn, enhance spin-off's performance.

Control Variables

All spin-offs in this study were created by academic teams and received support from their universities. Moreover, a spin-off's age and location (within universities' incubators) do not significantly influence its performance (Table 4). Thus, these control variables do not affect the

analysis of relationships among founding team's social network and entrepreneurial capability, and spin-off's performance factors.

DISCUSSIONS

This paper investigates the impact on the performance of Spanish University spin-offs as a consequence of the entrepreneurial capabilities and social network exhibited by teams associated with their start-up and development. The research is distinctive in its focus upon university spin-offs and the use of teams as the unit of analysis; previous literatures have focused upon new ventures in general (Zahra et al., 2006) and on the impact of the capabilities and social network associated with the new venture not the start-up team (Walter et al., 2006). This research posited that the entrepreneurial capabilities and social networks of a founding team would be positively related to improvements in three measures of performance, financial, operational and market, this hypothesis was tested on survey data from 181 spin-offs in 35 universities in Spain. The results indicate that a founding team is likely to improve its entrepreneurial capabilities by exploiting its own social networks and that these improved capabilities can help a spin-off enhance all three measures of performance. However, we could not find a significant direct relationship between the social networks of a founding team and its spin-off performance. Further, we found support for a mediating role of entrepreneurial capabilities between social networks and spin-off's performance.

The empirical tests show that a university spin-off's performance can be improved by exploiting the capabilities of the founding team; this is achieved because such capabilities are utilised to create the initial resources of a spin-off which, in turn, improves the financial, operational, and market performance. These aspects of a spin-off's performance are positively associated with the organisational viability, strategy, commercial resource, and technology, but not significantly linked to the human capital of a founding team; this result is supported by previous findings of Kakati (2003) and Aspelund et al. (2005). However, our findings partially contradict the findings of Bruderl and Schussler (1990) and Shane and Stuart (2002) which suggest that the initial resources of a university start-up quickly dissipate and are irrelevant to its performance. Therefore, academic entrepreneurs are recommended to identify their existing abilities, and determine which capabilities they need to improve to form capable teams, which possess technology, management, and industry knowledge by learning from or employing external resources. Moreover, universities and authorities are suggested to be involved in activities which support the founding teams of university spin-offs to enhance their entrepreneurial capabilities. Universities can encourage staff and students to improve entrepreneurial and managerial skills through relevant seminars, conferences, and additional courses. Universities and authorities should also support spin-off activities by establishing 'incubators', institutions, and mentoring boards to provide low cost facilities, services (i.e. R&D, products' development, marketing, recruitment, accounting, and legality), and executive advice.

The ability to improve a founding team's entrepreneurial capabilities through the deployment of their own social networks to support the development of university spin-offs is supported by research undertaken on new ventures per se (Chen, 2003, Tsai-Lung, 2005). Both authors

suggest that a new venture's relationship with various actors (i.e. consultants, universities, and other companies) support the acquisition of technological knowledge. Deakins (1996) identified that information and knowledge, received and learned from social networks, also improve managerial capability which, in turn, helps to enhance organisational viability. In addition, Yli-Renko et al. (2001) indicated that, by exploiting business experience and market knowledge achieved from social networks, founders can build their commercial resources to allow them to commercialise their products or services. Therefore, this paper indicates that, like other new ventures, entrepreneurial team involved in university spin-offs can exploit social networks to improve their entrepreneurial capabilities. Acknowledging this evidence, universities should support networking activities with industries through events, practical courses, and research projects involving both academia and businessmen. These activities will stimulate the exchange of information and create relationships that benefit the spin-off activities of universities in the future.

This study therefore agrees with previous literature (Shane, 2004, Vohora et al., 2004a, Mustar et al., 2006), in recommending that university spin-offs, like generic new ventures, create founding teams that are in receipt of the necessary entrepreneurial capabilities or are able to call upon their wider social networks to enhance existing capabilities. To support these requirements, it is recommended that universities and policymakers develop and facilitate entrepreneurial communities that integrate academia, entrepreneurs, experts from industries, the public sector, and investors. It is suggested that these communities are established to share knowledge and experience, and discuss, identify and exploit solutions for potential challenges in entrepreneurship.

The findings showed no direct relationship between a founding team's social networks and a spin-off's performance; however, as noted, activities did take place to exploit the social networks of founding teams to enhance entrepreneurial capabilities that are likely to contribute indirectly to improvements in spin-off performance. This is supported by the findings of Vivarelli (2004) and Jenssen and Koenig (2002) that new ventures based on a rich information set acquired from networks are more likely to exhibit better post-entry performance. Overall, these findings indicate that the entrepreneurial capabilities and social networks of founding teams have direct and indirect links that contribute to improve spin-off performance. To depict these relationships, this study constructed an alternative model in which entrepreneurial capabilities of a founding team play a mediate role between social networks and a spin-off's performance.

Contributions

The existing network-based entrepreneurship literature have mostly employed ego network analysis which takes as its focus network structure; this study takes a more holistic view and analyses three dimensions of social networks: structure, governance, and content. The results of the quantitative analysis demonstrated that measurements are valid and reliable to determine the roles of social networks in an entrepreneurship process. Thus, this paper consolidates the validity of the network approach method not only in entrepreneurship studies but also in networks-based management research. Moreover, results from the empirical analysis add value to the study of

university entrepreneurship in broadening the measurements used to measure a spin-off's performance. To study the performance of a university spin-off, we employed three-factor measurements: financial, operational, and market performance. The results of CFA demonstrated that these measures are statistically valid and reliable. Thus, we suggest using three-factor performance measurements to analyse the overall firm's performance instead of using only financial reports, which are difficult to obtain from early stage new ventures.

By embedding resource-based view and social network theory into university entrepreneurship studies this paper broadens the contexts in which this relevant theory can be applied. The current resource-based entrepreneurship studies have mostly focused on the capabilities of spin-offs, but this paper has delighted the important role of a founding team's capabilities. The entrepreneurial capabilities of a founding team comprising technology, human capital, organizational viability, strategy, and commercial resource make an important contribution to the performance of new ventures. In part, this is achieved by exploiting the benefits of social networks which, over time, make a significant contribution to the entrepreneurial capabilities of the founding team. It is this enhancement of existing entrepreneurial capabilities through the exploitation of social networks which supports improved spin-off performance. Thus, this paper enriches university entrepreneurship theory by identifying factors and processes that underpin the successful creation and development of university spin-offs.

Limitations

While the findings from the study are robust, it is acknowledged that there are areas within the research process that could impinge upon the validity and reliability of the work. In comparing to the requirement of SEM, this study's sample size was restricted because of the limitation on the number of spin-offs from Spanish universities; nevertheless, this sample reflects 21% of all spin-offs in Spain between 2003 and 2010. The survey is also based upon a non-random sample as respondents were selected on the basis of their potential to provide the level of detail which could enhance our understanding of the phenomena based upon the judgement of OTRI officers in Spain. Data was collected using an internet survey which has the potential to be misinterpreted but these issues were carefully explored during the pilot phase of the empirical work. It is also possible that respondents to the survey may exhibit certain cognitive bias based on post-hoc rationalisation; they were asked to comment on the constructs of entrepreneurial capabilities and social networks of founding teams at start-up, but were making these evaluations some time later in the spin-off's development. To address this, the research tested Harman's one-factor on all variables and the result showed that this issue does not affect the overall finding of the study.

Future research

It is possible that the Internet-based survey employed could be replicated to explore university spin-offs within a European context that would generate reliability and opportunity to compare and contrast the importance of factors between different economic, political and cultural environments. Within the context of university spin-offs, further research is required to clarify how a founding team's relationships transform and develop into spin-off's connections, how the

resources of networks can be exploited to improve a firm's dynamic capability, and how social networks play their roles in absorptive capacity study.

This study examines the performance of university spin-offs from the resource-based view and social networks of founding teams during start-ups. It explores the roles of antecedent factors in the financial, operational, and market performance of a new spin-off. Based on the data of 181 university spin-offs in Spain, the paper empirically demonstrates that the performance of spin-offs is positively influenced by entrepreneurial capabilities and indirectly affected by the social networks of founding teams. From these findings, the research provides suggestions to entrepreneurs, universities, and policymakers in supporting university entrepreneurship by stimulating the networking activities and capability improvements of founding teams.

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APPENDIX 1: Means, standard deviation, ranges, and correlations for variables in the measurement model

	Variables										
	1	2	3	4	5	6	7	8	9	10	11
(1) Network Structure											
(2) Network Governance	.762**										
(3) Network Content	.944**	.778**									
(4) Technology	.173*	.203**	.196**								
(5) Organizational Viability	.314**	.302**	.358**	.388**							
(6) Human Capital	.160*	.199**	.156*	.190**	.393**						
(7) Strategy	.242**	.239**	.278**	.589**	.835**	.289**					
(8) Commercial Resource	.183*	.160*	.215**	.553**	.558**	.333**	.729**				
(9) Financial Performance	.129	.139	.186*	.163*	.308**	.130	.320**	.329**			
(10) Operational Performance	-.040	-.004	-.001	.419**	.307**	.101	.384**	.446**	.368**		
(11) Market Performance	.064	.044	.102	.233**	.256**	.033	.262**	.368**	.494**	.722**	
Mean	4.31	3.72	4.51	5.58	5.76	5.10	5.15	5.63	3.34	3.78	4.63
S.D.	0.77	0.48	0.76	1.134	0.97	1.50	0.90	1.25	0.87	0.64	7.34
Min.	1.543	1.911	1.892	1.775	2.428	1.660	1.669	1.626	0.907	1.450	5.965
Max.	5.667	4.429	5.797	7.316	7.532	8.252	6.810	8.055	5.568	4.831	1.719

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 2: Validity and Reliability

Convergent validity

We construct the CFA of sixteen first-order factors: density, centrality, tie, reputation, reciprocity, trust, information quality, information diversity, technology, organizational viability, human capital, strategy, commercial resource, and financial, operational and market performance. These factors indicate five second-order variables: structure, governance and content of networks, entrepreneurial capability, and spin-off's performance. The results revealed that both first- and second-order CFA of measurement models are acceptable fit, and each item loads on a single factor and is significant at 0.01 levels (Table 1).

To assess convergent validity, the extent to which the indicators of measurement converge to a high proportion of variances in common, we examine construct loadings and average variance extracted. The results from the first-order CFA of social network, entrepreneurial capability, and spin-off's performance models reveal that all standardized loadings estimates are higher than 0.5 (Table 1). Moreover, all indexes of average variance extracted (AVE), the amount of construct variance relative to measurement error, are greater than 0.5 (Table 2) suggesting adequate convergent validity.

Discriminant validity

Discriminant validity (i.e., unidimensionality) is to test whether a construct is truly distinct from other constructs. The results revealed that all AVE estimates are larger than the corresponding squared interconstruct correlation estimates (SIC) (Table 2) inferring discriminant validity of the hypothesized structure are supported by our data.

Reliability

We compute the composite reliability, analogous to Cronbach's alpha, of all first-order factors by the formula of Fornell and Larcker (1981). Most factors revealed sufficient composite reliabilities (above 0.70) except the reputation factor (0.632) (Table 2). However, according to Hatcher (1994), the cut-off level of 0.6 is acceptable for a new conceptual variable. Thus, the measurements of this research are reliable.

Table 1: Factor Loading of CFA

SOCIAL NETWORK

Reliving this spin-off's creation period, evaluating these statements about relationships between your team and individuals, who you received advices or information related to process of your firm's establishment, and among them (1: Not true…7: Very true).

Measures	First order loadings	Second order

			loadings
Structure			
Density			0.769**
	Knowing each other by name	0.688**	
	Talking to each other about business	0.941**	
	Seeing each other regularly in business situations	0.933**	
Centrality			0.797**
	We talked directly about business issues	0.67**	
	We received directly helpful business information	0.712**	
	We could call for advice about running our business	0.697**	
	We were the first to receive new things in the group	0.781**	
Ties			0.681*
	We would share personal matters with them	0.663**	
	We might discuss family matters with them	0.917**	
	We might ask them for advice about private matter	0.832**	
Governance			
Reputation			0.627**
	We generated a lot of enthusiasm	0.711**	
	We had a forgiving nature	0.604**	
	We persevered until the task is finished	0.742**	
	We liked to play with ideas	0.775**	
Reciprocity			0.755**
	People were generally pair in dealings with us	0.759**	
	People were willing to do us a favour if asked	0.598**	
	We did favours for each other from time to time	0.762**	
	People patronized my business	0.87**	
Trust			0.826**
	We were dependable by these people	0.888**	
	People would say that we are sincere	0.917**	
	They would say that we are trustworthy	0.604**	
Content			
Infor. Quality	Their information was usually accurate	0.878**	
	Their information was relevant	0.916**	
	Their information was specific	0.859**	
	I quickly received their information	0.777**	
Diversity Infor. (*information used to be exchanged*)	Market data	0.782**	
	Product design	0.913**	
	Process design	0.854**	
	Marketing know-how	0.75**	
	Packaging design/technology	0.744**	

- Structure model (CMIN/DF=1.269, RMSEA=0.039, NFI=0.961, CFI=0.991, GFI=0.964);
- Governance model (CMIN/DF=1.149, RMSEA=0.029, NFI=0.950, CFI=0.993, GFI=0.963);
- Content model (CMIN/DF=1.288, RMSEA=0.040, NFI=0.973, CFI=0.994, GFI=0.965);

* Loading significant at the 0.05 level; ** Loading significant at the 0.01 level

ENTREPRENEURIAL CAPABILITIES

Reliving spin-off's creation period, evaluating these statements about what the founding team possessed (1: Not true…7: Very true).

Measures	First order loadings	Second order loadings

Technology			0.685**
	Hard to make a substitute for the technology	0.686**	
	Our products might replace numerous existing one	0.78**	
	Might replace other technologies in the industry	0.729**	
	Potential to generate large economic returns	0.778**	
	A platform for variety of commercial applications	0.598**	
	Developed products with considerable demand in market	0.752**	
Organizational viability	Team's members were encouraged to improve working method	0.772**	0.743**
	Team's members had power to make decisions	0.770**	
	Rewards and reinforcement were used	0.690**	
	Individuals had time to incubate innovative ideas	0.600**	
	Training in working techniques and attitudes was major emphasis	0.729**	
Human Capital			
	Good working experience	0.605**	0.531**
	Good business management knowledge	0.767**	
	Good industrial experience	0.712**	
	Good entrepreneurial experience	0.856**	
Strategy-making			
	Strong emphasis on R&D, technological leadership, and innovation	0.711**	0.923**
	The first to introduce new products and services, administrative technologies, etc...	0.793**	
	Strong tendency to be ahead of other competitors in introducing novel ideals and products	0.751**	
	Strong tendency for high-risk projects with chances of very high returns	0.616**	
Commercial resource			
	Building long-term customer relationships	0.605**	0.685**
	Good plan to redesign management process	0.767**	
	Good plan to redesign marketing and sales process	0.712**	
	Focusing on customer satisfaction	0.895**	

Model fit (CMIN/DF=1.078, RMSEA=0.021, NFI=0.945, CFI=0.990, GFI=0.915)
* Loading significant at the 0.05 level; ** Loading significant at the 0.01 level

SPIN-OFF'S PERFORMANCE

Describing the current performance of spin-off compared to its major competitors (1: Much lower…7: Much higer).

Measures		First order loadings	Second order loadings
Financial performance			0.564**
	Sales growth	0.854**	
	Revenue growth	0.936**	
	Growth of number of employees	0.578**	
	Net profit margin	0.693**	
Operational performance			0.666**
	Product/ service innovation	0.753**	
	Process of innovation	0.730**	
	Adaptation of new technology	0.721**	

Mark performance			0.915**
	Product/service quality	0.722**	
	Product/service variety	0.697**	
	Customer satisfaction	0.735**	

Model fit (CMIN/DF=1.416, RMSEA=0.048, NFI=0.946, CFI=0.980, GFI=0.961)
* Loading significant at the 0.05 level; ** Loading significant at the 0.01 level

Table 2: Reliability and validity tests

	Construct Reliability (CR)	Composite Reliability [a]	Average Variance Extracted (AVE)	Squared Interconstruct Correlation (SIC)
Social Network				
Structure	0.7940		0.5634	
Density	0.8949	0.888	0.7431	0.0751; 0.2025
Centrality	0.8076	0.736	0.5129	0.1475; 0.2052
Ties	0.8499	0.840	0.6576	0.0751; 0.1475
Governance	0.7825		0.5485	
Reputation	0.8020	0.632	0.5054	0.1043; 0.1246
Reciprocity	0.8379	0.850	0.5678	0.1043; 0.3894
Trust	0.8523	0.879	0.6647	0.1246; 0.3894
Content	0.7220		0.5650	
Infor. Quality	0.9182	0.926	0.7379	0.2767
Diversity Infor.	0.9053	0.922	0.6580	0.2767
Entrepreneurial Capability	0.8427		0.5249	
Technology	0.8668	0.839	0.5221	0.3204; 0.2927
Organizational Viability	0.8384	0.794	0.5113	0.1069; 0.5083
Human Capital	0.8279	0.808	0.5498	0.0320; 0.1069
Strategy	0.8109	0.702	0.5195	0.0600; 0.5083
Commercial Resource	0.8135	0.708	0.5226	0.0841; 0.3881
Spin-off's Performance	0.7666		0.5326	
Financial Performance	0.8557	0.842	0.6049	0.0955; 0.1806
Operational Performance	0.7787	0.709	0.5399	0.0955; 0.3709
Market Performance	0.7616	0.712	0.5158	0.1806; 0.3709

[a] analogous to Cronbach's Alpha