

**MAPPING THE ROAD TO INNOVATION :  
THE EFFECTS OF UPPER ECHELON  
HUMAN CAPITAL AND HRM ON INNOVATION IN START-UPS**

Johan Maes

Katholieke Universiteit Leuven – Department of Applied Economics  
Research Centre for Organisation Studies  
Policy Research Centre “Entrepreneurship, Enterprises and Innovation”  
Naamsestraat 69, B-3000 Leuven, Belgium  
Tel. +32 16 32 68 68 Fax +32 16 32 67 32  
[Johan.Maes@econ.kuleuven.be](mailto:Johan.Maes@econ.kuleuven.be)

Luc Sels

Katholieke Universiteit Leuven – Department of Applied Economics  
Research Centre for Organisation Studies  
Policy Research Centre “Entrepreneurship, Enterprises and Innovation”  
Naamsestraat 69, B-3000 Leuven, Belgium  
Tel. +32 16 32 68 72 Fax +32 16 32 67 32  
[Luc.Sels@econ.kuleuven.be](mailto:Luc.Sels@econ.kuleuven.be)



the Autonomous Management School of  
Ghent University and Katholieke Universiteit Leuven



## **ABSTRACT**

This study investigates to which extent start-ups (in their second year of life) can help to safeguard their entrepreneurial flair, thus enhancing their chances of survival and stimulating their growth prospects. More precisely, we explore the role of upper echelon human capital and HRM as determinants of one specific outcome dimension of corporate entrepreneurship in start-ups: innovation. This approach builds on a 'human resource'-based view, stressing the importance of (1) top management and ownership ('upper echelon human capital') and (2) human resource management (management of 'employee human capital') in determining the entrepreneurial functioning of start-ups. Based on a sample of 637 start-ups, the results indicate that both types of human capital do matter in the context of start-up innovation. First of all, the intensity of the management of 'employee human capital' has a strong positive effect on innovation. Second, while we could not trace direct effects of top management human capital and ownership on innovation, indirect effects (via HRM intensity) of for instance management education and foreign ownership are indisputably present. All things considered, the study learns us that valuing human resources in start-ups can contribute to a considerable extent in preserving their innovation performance, thus stimulating their chances of building a viable business model and safeguarding future growth and further development.

Paper presented at the RENT XVIII Conference, Copenhagen (Denmark) 25-26 November  
2004

## 1. Introduction

In the process of economic growth and development entrepreneurship is considered to be a vital component. Entrepreneurship has long been seen as a synonym for establishing new small firms as a suitable vehicle for entrepreneurial endeavor (Rothwell & Zegveld, 1982). Later on, a parallel strand in literature was developed stressing the importance of entrepreneurship for and within existing companies. A widely accepted label for this branch in entrepreneurship theory aiming at bewildering existing firms with an entrepreneurial spirit is corporate or firm-level entrepreneurship. Corporate entrepreneurship is brought into practice as a tool for keeping up the entrepreneurial spirit by means of business development, revenue growth, and pioneering the development of new products, services and processes (Miles & Covin, 2002; Zahra & Covin, 1995; Zahra et al., 1999b).

Newly established firms or start-ups can contribute to the process of economic development in two ways. First, through their entry, start-ups form a major source of competitive restructuring within industries. Additionally, start-ups – as existing companies - can contribute to the industrial transition in a second way, i.e. via the growth that occurs as these firms develop and expand the scope of their activities (Baldwin & Gellatly, 2003). The latter reveals that corporate entrepreneurship is not something that pertains only to larger, mature companies, but that corporate entrepreneurship is equally desirable for start-ups. It thus points to the efforts made by *all* existing companies - large as well as small, mature as well as newly formed - of retaining their entrepreneurial spirit throughout the different stages of their development in view of stimulating business development, innovation and so forth. Thus, small and newly formed firms too can benefit from bringing corporate entrepreneurship into practice (Carrier, 1996). Notwithstanding this recognition on a theoretical level, most empirical research on corporate entrepreneurship seems to have been concentrating on larger corporations.

This article aims at starting to bridge this gap and investigates to which extent start-ups can help to safeguard their entrepreneurial flair, thus enhancing their chances of survival and stimulating their growth prospects. More precisely, we explore the role of upper echelon human capital and human resource management (HRM) as determinants of one specific outcome dimension of corporate entrepreneurship in start-ups: innovation. The analyses are based on a sample of 637 start-ups covering a wide range of economic activities, having 1 to

49 employees and being in their second year of life in 2003. In view of the specific nature of the sample, both other dimensions of corporate entrepreneurship (renewal and venturing) are not investigated here since these particular corporate entrepreneurship activities may be rather premature in the life cycle stage of the firms studied. For the same reason also financial performance measures such as profitability may be ill suited as dependent variable in this particular context. Innovation performance on the other hand (defined here as improving products, services, production processes and/or supporting processes and as developing new products or services) could prove to be solid indicator of the degree in which these newly formed firms are able to develop themselves and display a viable business model, thus increasing their chances of surviving the turbulent first stage of their existence.

As mentioned, our approach builds on a 'human resource'-based view, stressing the importance of (1) top management and ownership ('upper echelon human capital') and (2) human resource management (management of 'employee human capital') in determining the innovation performance of start-ups. In what follows, the terms 'human resources' and 'human capital' will be used interchangeably. The focus on human resources and the way in which these are managed results from the growing awareness that a firm's ability to develop new products, services or processes is inextricably linked to its human resource pool and to the way in which it organizes its human capital (Laursen, 2002). Firms that are endowed with superior human resources and with policies managing these resources in a proficient way should be more able to adapt to environmental contingencies, to find new ways to increase customer benefits and to innovate (Florin et al., 2003; Youndt et al., 1996; Lengnick-Hall, 1992). In spite of the above, the combination of corporate entrepreneurship (including innovation) and HRM has been overlooked up to a considerable degree in past research (Heneman et al., 2000; Katz et al., 2000; Laursen, 2002; Laursen & Foss, 2003; Michie & Sheehan, 1999). This paper is intended as a contribution to the somewhat underdeveloped research stream on the combination of HRM and corporate entrepreneurship (or one of its outcome dimensions: innovation).

The further outline of this article is as follows. First, we briefly explore the construct of corporate entrepreneurship. Following, we develop our research model and formulate the corresponding research hypotheses. Thereafter, we elaborate on the methodology and present the empirical findings. And finally, we discuss the results.

## **2. Corporate entrepreneurship: what's in a name?**

A prerequisite for developing a research model on the link between human capital and the innovation outcome dimension of corporate entrepreneurship is clarifying how corporate entrepreneurship is conceptualized. After all, corporate entrepreneurship is generally considered to be ill defined (Stopford & Baden-Fuller, 1994). There is no consensus on what it means for firms to be entrepreneurial and researchers are often talking about different phenomena, although using the same label (Covin & Miles, 1999; Maes, 2003). This gives rise to a misfit between the labeled phenomenon and its actual operationalization. As such, the knowledge on corporate entrepreneurship remains limited and fragmented (Miles & Covin, 2002). Entrepreneurship and - its hierarchical sub-construct - corporate entrepreneurship can be seen as broad labels under which a hodgepodge of research is housed (Shane & Venkataraman, 2000).

This fragmentation of the research field tends to be self-reinforcing since it brings researchers to speak after one another, rather than to one another. Before developing a research model it is therefore imperative to (1) make clear which main research approach is being taken and (2) explain how corporate entrepreneurship is conceptualized within the approach withheld. In what follows, both topics are dealt with consecutively.

### ***2.1. Entrepreneurship research approaches***

Two research approaches dominate the entrepreneurship field: the trait approach and the behavioral approach. In the trait approach researchers try to identify traits and characteristics of individuals in order to differentiate entrepreneurs from non-entrepreneurs. The entrepreneur's traits are seen as the key to explain the entrepreneurship phenomenon (Gartner, 1989). The primary level of analysis is therefore the individual. Specific entrepreneurial traits often mentioned in literature are the locus of control, the need for achievement, risk taking, the personal value system and age (Begley & Boyd, 1987; Gartner, 1989). Despite the attention this approach has received in research and literature, the trait approach still seems to be unable to capture the entrepreneurship phenomenon to the full extent. The flaws in this approach are well documented by Gartner (1989).

The shortcomings of the trait approach have lead entrepreneurship researchers to a second approach. In this so-called behavioral approach entrepreneurship is seen as the *process* of creating entrepreneurial achievements, such as new organizations (Gartner, 1989) or surplus value (Jones & Butler, 1992). This approach takes the entrepreneurial object being created ('the project') as the primary level of analysis. The objective is not to find out 'who is the entrepreneur', but to gain understanding as to why and how the entrepreneurial achievement has come into existence. The behavioral view stresses the contextual nature of the creating process. The entrepreneurial project is therefore seen as an outcome of a complex process with many influences (Gartner, 1989; Maes, 2003). The role of the individual boils down to a series of actions or behavior undertaken to enable the creation of the project. Personal characteristics are considered ancillary to the behavior.

Although the definitional ambiguity surrounding the entrepreneurship construct has still not been resolved, studying entrepreneurship from a behavioral point of view is likely to increase the chances of researchers speaking to one another. As a result, we will take the behavioral approach. However, the behavioral approach also increases the complexity of the entrepreneurship phenomenon compared to the trait approach. After all, within the behavioral view, entrepreneurship is generally accepted as a *multidimensional* construct, as the nexus of several dimensions or process components that can be distinguished, but not separated from each other.

A condition that must be fulfilled in order to obtain a good definition of entrepreneurship (or of its hierarchical sub-construct corporate entrepreneurship) is that researchers in the field must share this definition so as to promote the accumulation of knowledge (Bruyat & Julien, 2001). Maes (2003) has demonstrated that this condition – even within the behavioral approach – is not fulfilled and that even within the behavioral approach, reaching agreement on a definition of (corporate) entrepreneurship remains problematic. As a result, we are bound to clarify in a next paragraph how we conceptualize corporate entrepreneurship within the behavioral approach before we can develop our specific research model on human capital and innovation.

## ***2.2. The corporate entrepreneurship nexus***

As we recall, within a behavioral framework entrepreneurship is generally accepted as a multidimensional construct, as a nexus of multiple components. The study of entrepreneurship then requires taking into account the various process components. However, there seems to be no agreement as to the number of components involved. In our view (and for reasons on which we can not elaborate in this article), entrepreneurship can be seen as a nexus of three core components: the creator, the creating process and new value creation, as explained by Maes (2003). These three components (that can be distinguished but not separated from each other) form the true nexus or core of entrepreneurship considered from a behavioral point of view. This nexus is the actual object or construct studied in the field of entrepreneurship (Bruyat & Julien, 2001). Since corporate entrepreneurship is a hierarchical sub-construct of entrepreneurship (Sharma & Chrisman, 1999) this three-component nexus is equally applicable to corporate entrepreneurship.

Corporate entrepreneurship aims at *creating new value* for the firm (component 1). New value (the outcome component of the nexus) can be created by developing new products, services or processes (innovation), by setting up new activities and moving into new markets (venturing) and by renewing the business concept (strategic renewal) (Zahra & Covin, 1995). As such, new value creation is seen as the sum of a company's innovation, venturing and renewal efforts (Zahra, 1995). A *creating process* (component 2) precedes this new value creation. The creating process can be defined as the process through which the company pursues entrepreneurial opportunities. It entails several steps, such as the discovery and recognition of business opportunities, information search and the acquisition and accumulation of resources (Shane & Venkataraman, 2000; Ucbasaran et al., 2001). Finally, an organization as such or an individual or a group of individuals (the creator; component 3) drives the creating process. The corporate entrepreneurship nexus forms the basis of our research model that will be developed in the following section.

### **3. Research model and hypotheses**

The research model intended aims at exploring the role of human capital and human resource management (HRM) as determinants of one particular newly created value dimension of corporate entrepreneurship in start-ups: innovation. The research model builds on the corporate entrepreneurship nexus discussed on a general level in the previous paragraph. As such, we will now elaborate on the specific operationalization of the nexus in view of the focus of this article.

#### ***3.1. New value creation***

As we recall, corporate entrepreneurship aims at creating new value for the organization. It is seen as a process that goes on inside an existing firm and that may lead to new business ventures, the development of new products, services or processes and the renewal of strategies and competitive postures. As such, it can be seen as the sum of a company's innovation, venturing and renewal efforts (Zahra, 1995). In this article, we will focus on the innovation dimension of corporate entrepreneurship since our research population consists of newly formed start-ups (in their second year of existence), for whom renewal and venturing activities may be rather premature in that particular stage of their life cycle. For the same reason also financial performance measures such as profitability may be ill suited as dependent variable in this particular context. Innovation performance on the other hand (defined here as improving products, services, production processes and/or supporting processes and as developing new products or services) could prove to be solid indicator of the degree in which these newly formed firms are able to develop themselves and display a viable business model, thus increasing their chances of surviving the turbulent first stage of their existence.

### ***3.2. Creating process***

As discussed earlier, the creating process of corporate entrepreneurship entails several steps, such as the discovery and recognition of opportunities, information search and the acquisition and accumulation of resources (Shane & Venkataraman, 2000; Ucbasaran et al., 2001). Put differently, this description suggests that we have to focus on the discovery, acquisition and accumulation of various kinds of resources if we are to understand the process of new value creation by firms. As such, it is intrinsically linked to the resource-based perspective of the firm. This perspective emphasizes firm-specific assets and capabilities as fundamental determinants of different instances of firm performance and wealth creation (Galunic & Rodan, 1998; Teece et al., 1997). Although originating from strategic management, the resource-based view is also increasingly being used by entrepreneurship scholars to identify and explain persistent performance differences among firms (Ireland et al., 2003). Competitive advantage lies upstream of product markets and relies upon resources (Teece et al., 1997). The more valuable, rare, imperfectly imitable and non-substitutable these resources are compared to those held by competitors, the more important the competitive advantage built on these resources will be (Ireland et al., 2003).

Although researchers have paid attention to resource issues in corporate entrepreneurship in the past, the resource-based perspective has not been adequately applied to corporate entrepreneurship. Most research seems to have concentrated on resource stocks, scarcity/availability or slack resources (e.g. Wiklund, 1999; Zajac et al., 1991). A critical question remains unanswered: how can resources contribute to company performance through corporate entrepreneurial activities (Teng, 2003). Working towards answering this question requires having an eye not only for the resources themselves ('positions'), but also for the management of the resources ('managerial processes') (cfr. *infra*). Implicitly, the resource-based view also invites consideration of managerial strategies and practices for developing new competitive advantage and wealth (Ireland et al., 2003; Teece et al., 1997). A growing contingency of scholars acknowledges that resources by themselves rarely are a source of competitive advantage. They are more likely to be a source of competitive or entrepreneurial advantage if they are used to do something, i.e. if they are exploited through business processes and management practices (Ray et al., 2004). Or put differently, if they are managed strategically, i.e. structuring the resource portfolio, bundling resources to form

capabilities and leveraging these (Ireland et al., 2003). And it is the management of the various resources (rather than the resource stocks or positions) that is at the center of the creating process.

As far as the creating process is concerned in this article, we will focus on the management of one particular type of resources: employee human resources. Of all the managerial processes that can affect the pursuit of corporate entrepreneurial outcomes, the management of human resources is considered as one of the more vital (Morris & Jones, 1993). After all, firms increasingly profess that people are the source of their competitive advantage. The START 2003 survey (cfr. infra) indicates that more than 45% of the entrepreneurs considers HRM one of the top three of management domains to be developed with priority in order for the newly formed venture to prosper. As such, effective management of the human resources can spell success or failure of all firms, but especially of the entrepreneurial ones (Katz et al., 2000). Increasingly, entrepreneurs recognize the importance of human resource management (HRM) for developing their business. As research has been able to demonstrate, organization-level entrepreneurship can be influenced by a large number of HRM-related policies and practices. For instance, poorly designed compensation and performance appraisal systems constrain entrepreneurial behavior in established firms. Moreover, human resource management can help entrepreneurs to build a viable business model and secure their organic development (Chandler & McEvoy, 2000). Therefore, the acquisition and management of the human resources is a very important domain in the discovery and exploitation of entrepreneurial opportunities leading to innovation. As small, newly formed firms usually work in a less planned, less-formalized way and cannot afford to establish separate research and/or development departments, any development, acquisition or transformation of new knowledge in start-ups depends heavily on human resources and the way in which these are managed (Hayton, 2003; Sundbo, 1999). The more intense the management of employee human capital is developed in the firm, the stronger its effect on innovation. Hence the following research hypothesis:

*H1: The intensity of the human resource management has a positive effect on innovation*

### **3.3. Creator**

As explained, the ‘creator’ initiating corporate entrepreneurship refers to an organization as such or to an individual or a group of individuals associated with an existing organization. Compared to elements pertaining to the creating process, the creator dimension has somewhat been understudied in (behavioral) corporate entrepreneurship research. The available literature focusing on creator aspects of corporate entrepreneurship generally mentions entrepreneur or top management team human capital characteristics and ownership structure aspects as being key elements of the creator dimension (Barker & Mueller, 2002; Jones & Butler, 1992; Love et al., 1996; Zahra et al., 2000). Both key elements can be studied from both angles of the resource-based perspective indicated earlier: positions and managerial processes (Teece et al., 1997). First, the management team represents a unique organizational resource or ‘position’ affecting performance (e.g. innovation) directly (Daily et al., 2000). Likewise, ownership structure shaping the relationship between ownership and management can be considered an important resource (Certo et al., 2001). Second, both elements seem to be able to influence the management of resources. Top management human capital for instance is the main source of knowledge needed to effectively build and use the firm’s capabilities (Dutta et al., 2002). As such, the top management team and the ownership structure are also expected to affect the management of resources, in this case the management of employee human resources (cfr. supra). As will be explained, both key elements (top management human capital and ownership) belong to two separate but related categories of variables associated with the creator dimension.

As a first category, the characteristics of the entrepreneur(s) or of the top management team as a resource in se and their influence on resource management originates from “upper echelon” theory. This theory states that an organization and everything that goes on inside as a reflection of its top management (Hambrick & Mason, 1984). This theory links observable characteristics such as top management age, tenure, functional track and other career experiences, formal education and management team heterogeneity to the nature of managerial processes and organizational outcomes. As corporate entrepreneurship can be induced as a top-down strategy, it is imperative to take top management team characteristics into account. In this article, we focus on variables referring to top management human capital (or ‘upper echelon human resources’). We expect that top management human capital is an

important ‘creator’ resource or position leading to organizational outcomes such as innovation and influencing the management of employee human resources (creating process). Hence:

*H2: The level of top management human capital has a positive effect on innovation*

*H3: The level of top management human capital has a positive effect on the intensity of the human resource management*

A second category comprises ownership structure aspects. Ownership can affect managers’ incentives to pursue corporate entrepreneurship and manage resources (including human resources) accordingly, as suggested by agency theory. This theory predicts that ownership structure (e.g. ownership dispersion) and composition (e.g. executive and institutional ownership) influences the degree of freedom and power possessed by executives (“agents”), coloring the development of managerial processes such as human resource management. Left alone, these executives may pursue objectives possibly thwarting the goals of the owners (‘principals’) (Zahra & Pearce, 1989). Ownership concentration has been identified as an important tool to curtail managers’ propensity to pursue inefficient (i.e. endangering shareholder wealth) strategies. The same goes for ownership structure and foreign ownership. Ownership by the firm’s executives or employees and by powerful and vigilant shareholders such as institutional owners are believed to affect manager’s incentives to pursue corporate entrepreneurship (Gamble, 2000; Zahra et al., 2000). Foreign ownership is also believed to affect the likelihood of innovation and corporate entrepreneurship (Love et al., 1996). Hence the following research hypotheses:

*H4: Ownership by powerful shareholders has a positive effect on innovation*

*H5: Foreign ownership has a positive effect on innovation*

*H6: Ownership by powerful shareholders has a positive effect on the intensity of the human resource management*

*H7: Foreign ownership has a positive effect on the intensity of the human resource management*

To summarize, the research model developed in this article is depicted in the figure below (Figure 1). We explore the effects of top management human capital ('upper echelon human resources') and ownership on the management of employee human resources (HRM) and of HRM on innovation. Additionally, we also search for possible effects of top management human capital and ownership on innovation. In this way, a structural model is developed.

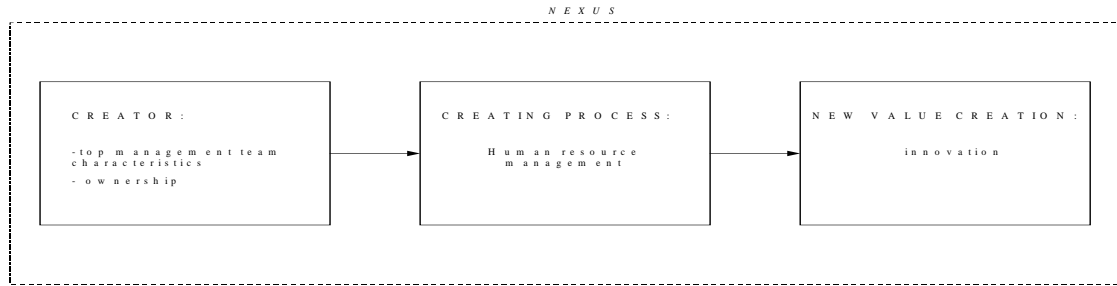


Figure 1. Research model.

## 4. Sample and methodology

### 4.1. Sample

Data has been collected by means of the START 2003 survey, jointly financed by the Policy Research Center “Entrepreneurship, Enterprises and Innovation” and by PASO Flanders (Panel Survey of Organizations). The survey’s targeted respondent is the start-up’s CEO or owner-manager. The population of this survey consists of all Flemish companies (partnerships; for-profit) (full population) as far as they meet two conditions: (1) having at least 1 and maximum 49 employees and (2) being in their second year of life in September 2003. This survey study yielded data for 637 start-ups on various themes, such as the human capital of owner-manager(s), management team heterogeneity, ownership structure, strategy and market orientation and management practices in a wide range of functional areas. Specific strong points of the START 2003 database are: (1) its focus on a cohort of Flemish start-up partnerships (all in their second year of life in 2003) (2) the survey is specifically developed for start-ups and covers the start-up process and all main management themes such as HRM, accountancy and financial management, location management, purchasing, sales, external advice, etc.

### 4.2. Measures

**Innovation.** Innovation was measured by means of an index or scale, composed out of the weighted sum of four dichotomous (0/1) variables (weights mentioned between brackets): innovation w.r.t the supporting processes (e.g. administration) (1), innovation w.r.t. the production process (2), improvement of existing products or services (4) and development of new products or services (8). The scale ranges from 0 to 15, representing ‘non-innovators’ on one end and ‘full innovators’ on the other. The scale reliability coefficient (alpha) is 0.99.

**Human resource management.** HRM intensity was measured by means of an index or scale, composed of eight subscales (range mentioned between brackets): number of HRM activities for which external advice is called upon (0-2), staffing and selection procedures (0-1), training procedures (0-1), appraisal procedures (0-1), use of advanced selection methods, such as simulation exercises, assessment centers etc. (0-1), use of individual variable

compensation (0-1), whether or not a pension plan, health insurance or a company car is offered as a fringe benefit (0-1) and the number of themes for which employees are asked for their advice or can co-decide thereupon (0-2). The scale ranges from 0 to 10. The scale reliability coefficient (alpha) is 0.60. This suggests that the complementarity of the HR activities (stressed by Laursen & Foss, 2003) used to compose the scale is sufficiently high.

**Top management human capital.** Top management human capital is operationalized by means of six variables: (1) the age of the owner-manager (or the average age if there is more than one owner-manager), (2) the level of formal education (1= lower secondary level or lower 2= higher secondary level 3= short-cycle higher education outside university 4= long-cycle higher education outside university 5= university) of the owner-manager (or the average level of education if there is more than one owner-manager), (3) the years of experience of the owner-manager in the industry in which the firm is active (or the average years of experience if there is more than one owner-manager), (4) the years of management experience of the owner-manager (or the average years of management experience if there is more than one owner-manager), (5) whether or not at least one of the owner-managers has a formal degree of a management-oriented education (6) whether or not at least one of the owner-managers has a formal degree of a technical oriented education.

**Ownership.** Three variables represent the ownership construct in our model. Two variables reflect the ownership stake of powerful and vigilant owners: ownership stake (%) by professional capital providers (banks, insurance companies, venture capitalists, pension funds, etc.) and by private companies and members of the general public. Foreign ownership is measured by means of the ownership stake (%) of non-Belgian parties.

**Control variables.** The study also includes several control variables believed to be of importance in the context of the operationalized corporate entrepreneurship nexus: company size (number of employees), industry, an overall index of management professionalism in areas other than HRM and innovation (range 0-57) and company age (number of years since the company was first founded). Industry is modeled by means of eight sector dummies. The agricultural sector is the point of reference. Industry and company size have to be controlled for since there are likely to be sectoral and size differences in HRM, innovation and so forth (Laursen, 2002). Management professionalism (excluding HRM) is important to be included in order to find out if the effect reported is a pure HRM effect, and not a hidden effect of management professionalism in general. Company age (the number of years the business activity is in place in this company or its legal predecessor; not the age of the 'official' partnership which is one year for all companies (see 'sample')) is particularly important to be

taken into account since some newly established partnerships appear to be mere legal transformations of companies that were already active instead of de novo start-ups.

## 5. Findings

Table 1 presents the means, standard deviations and correlations among the study's variables. Structural equation modeling was used to test the research hypotheses formulated earlier. This technique has very rarely been used in entrepreneurship and corporate entrepreneurship research (in only 1% of all cases) (Chandler & Lyon, 2001). Nevertheless, this technique is very appropriate (if not necessary) for testing more complex relationships (direct and indirect effects connected to the nexus concept) and taking into account a series of contingency factors or control variables.

The results of the analysis are depicted in Table 2. All goodness-of-fit measures (chi-square, Goodness of Fit Index (GFI), Bentler's Comparative Fit Index, Bentler & Bonett's Non-normed Index) indicate that the model is supported by the data (Hatcher, 1994). No residuals significantly differing from zero were found, which means that the theoretical model successfully accounts for the actual causal relationships between the variables. Note that paths indicated with "0.00" are paths that were hypothesized and tested, but have proven to be completely redundant and insignificantly different from zero.

As Hypothesis 1 predicts, HRM intensity has a strong and positive effect on innovation. So, even when controlled for the professionalism of management in general (excluding HRM) HRM is to be considered as a very important element of the creating process leading to innovation. As such, it is confirmed that the development, acquisition or transformation of new knowledge (innovation) in start-ups depends on the way in which human resources are managed (Hayton, 2003; Sundbo, 1999).

No support has been found for Hypotheses 2, 4 and 5. As such, there are no direct effects of top management human capital, ownership by powerful shareholders and foreign ownership on innovation. This implies that the direct 'resource position' aspect of the resource-based view (cfr. supra) is not confirmed here. In this respect, Hypotheses 3, 6 and 7 gain importance as to verify whether top management human capital, ownership by powerful shareholders and foreign ownership have an effect on HRM, since the latter affects innovation strongly. Or put differently, it is important to verify if the 'managerial process' side of the top management human capital and ownership resources holds.

Hypothesis 3, assuming a positive effect of top management human capital on HRM intensity, is partially supported. Whether or not at least one of the owner-managers has a

formal degree of a management-oriented education has a positive effect on HRM intensity. Thus, this aspect of top management human capital follows what Hypothesis 3 has put forward. However, the number of years of management experience affects HRM intensity in a negative sense. This runs counter to Hypothesis 3. Taking into account the correlation coefficients among the number of years of management experience, company age and HRM (Table1), the negative sign can be explained in terms of management experience serving as a proxy for company age (which in itself was found to be redundant) that is negatively correlated to HRM intensity. Concluding that HRM intensity is negatively connected to firm age is consistent with previous research (Sels et al., in press).

No support has been found for Hypothesis 6 stating that ownership by powerful shareholders affects HRM intensity in a positive sense. Hypothesis 7 on the other hand is supported. Thus, foreign ownership has a positive effect on HRM intensity in start-ups.

Table 2 also reveals that several control variables have significant associations with innovation and/or HRM. First, company size is positively related to HRM intensity. Second, management professionalism in general (excluding HRM) and HRM are also positively connected, suggesting that the degree of development of HRM goes hand in hand with the development of management in a series of other professional areas (purchasing, marketing, ICT, accounting, finance, etc.). Third, as indicated earlier, our study allows for inter-industry comparisons. Compared to the point of reference (agricultural sector), HRM intensity is significantly less developed in the construction sector, as is innovation. The reverse for HRM holds for the sector of personal and health services.

As we recall, no support has been found for Hypotheses 2, 4 and 5, suggesting that there are no direct effects of top management human capital, ownership by powerful shareholders and foreign ownership on innovation. However, since some of these categories of variables have proven to affect HRM (which in its turn influences innovation), it is worthwhile mapping the indirect effects of these specific top management human capital, ownership by powerful shareholders or foreign ownership variables on innovation (via HRM). Afterwards, this will allow us to calculate the total effects on innovation of these variables. A parallel exercise can be done for the control variables affecting HRM. Table 3 reflects the results.

Table 3 shows us that, while there are no direct effects of top management human capital, and foreign ownership variables on innovation, total (and in most cases purely indirect, i.e. via HRM) effects of such variables can be discerned. More specifically, we notice that owner-

manager management experience has a negative effect on innovation. On the other hand, a formal degree of management education and foreign ownership seem to stimulate innovation in the end. As far as the control variables are concerned, innovation is associated positively with company size, management professionalism and the personal and health services sector. A negative association exists between innovation and the construction sector.

Table 1. Descriptive statistics and correlations (\*).

Variable	mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. innovation	4.83	4.48													
2. HRM	4.04	2.49	0.34												
3. o-m age	49.42	15.11	-0.04	-0.02											
4. o-m education	2.64	1.26	0.14	0.26	0.02										
5. o-m industry experience	13.52	8.11	-0.08	-0.07	0.30	-0.07									
6. o-m management experience	10.93	7.73	-0.05	-0.07	0.38	0.01	0.58								
7. management education	0.58	0.49	0.05	0.16	0.07	0.17	-0.09	-0.01							
8. technical education	0.61	0.49	0.08	0.02	-0.03	-0.27	0.0	-0.06	-0.12						
9. prof. cap. provider ownership	1.95	11.46	0.09	0.14	0.01	0.03	0.01	-0.03	0.04	0.05					
10. private ownership	5.49	20.42	0.08	0.19	0.03	0.17	-0.04	0.04	0.07	-0.04	-0.05				
11. foreign ownership	8.14	25.70	0.10	0.22	0.01	0.16	0.01	0.05	0.03	0.02	0.19	0.17			
12. company size	5.76	9.98	0.08	0.32	-0.01	0.14	0.04	0.09	0.03	-0.03	0.11	0.33	0.22		
13. company age	10.11	14.91	-0.07	-0.11	0.06	-0.08	0.24	0.18	-0.05	0.04	-0.02	-0.05	-0.05	0.03	
14. management professionalism	22.45	9.53	0.25	0.51	-0.03	0.14	0.01	-0.03	0.14	0.02	0.05	0.11	0.14	0.24	-0.14

(\*) Correlations greater than or equal to 0.08 are significant (p < 0.05)

Table 2. Standardized path coefficients (\* p < .10 \*\* p < .05 \*\*\* p < .01 \*\*\*\* p < .001)

	Path from/to	Innovation	HRM
HRM	HRM	0.30 (****)	-
	O-m age	0.0	0.0
	O-m education	0.0	0.0
Top management human capital	O-m industry experience	0.0	0.0
	O-m management experience	0.0	-0.12 (**)
	Management education	0.0	0.10 (*)
	Technical education	0.0	0.0
Ownership	Professional capital. provider ownership	0.0	0.0
	Private ownership	0.0	0.0
	Foreign ownership	0.0	0.13 (**)
	Company size	0.0	0.19 (***)
	Company age	0.0	0.0
	Management professionalism	0.0	0.42 (****)
	Heavy industry	0.0	0.0
Control variables	Construction	-0.14 (**)	-0.10 (*)
	Wholesale and retail	0.0	0.0
	Catering	0.0	0.0
	Transportation and communication	0.0	0.0
	Financial services	0.0	0.0
	Personal and health services	0.0	0.12 (**)

N=637; chi-square (p-value) 0.81; Goodness of Fit Index (GFI) 0.99; Bentler's Comparative Fit Index 1.00; Bentler & Bonett's Non-normed Index 1.15

Table 3. Indirect and total effects on innovation of variables affecting HRM.

	Indirect effect on innovation	Total effect on innovation
O-m management experience	-0.04	-0.04
Management education	0.03	0.03
Foreign ownership	0.04	0.04
Company size	0.06	0.06
Management professionalism	0.13	0.13
Construction	-0.03	-0.17
Personal and health services	0.04	0.04

On the whole, the results of the analyses indicate that HRM is an important managerial process in pursuit of corporate entrepreneurial outcomes such as innovation. Both significant paths leading towards innovation (see Table 2) account for 12% of the total variability in innovation. Furthermore, considering also the results of Table 3, it appears that the type of education (management education) rather than the level of education (not significant) is important in explaining innovation by start-ups. This is consistent with previous research (Romano, 1990). Further, owner-manager management experience, management education, foreign ownership, company size, management professionalism and the two significant industry variables explain 34% of the total variability in HRM.

## 6. Conclusion

This study investigates to which extent start-ups (in their second year of life) can help to safeguard their entrepreneurial flair, thus enhancing their chances of survival and stimulating their growth prospects. More precisely, we explore the role of upper echelon human capital and HRM as determinants of one specific outcome dimension of corporate entrepreneurship in start-ups: innovation. This approach builds on a ‘human resource’-based view, stressing the importance of (1) top management and ownership (‘upper echelon human capital’) and (2) human resource management (management of ‘employee human capital’) in determining the entrepreneurial functioning of start-ups. The results indicate that both types of human resources do matter in the context of start-up innovation. First of all, the intensity of the management of ‘employee human resources’ has a strong positive effect on innovation. Second, while we could not trace direct effects of top management human capital and ownership on innovation, indirect effects (via HRM intensity) of for instance management education and foreign ownership are indisputably present. All things considered, the study learns us that valuing human resources in start-ups can contribute to a considerable extent in preserving their innovation performance, thus stimulating their chances of building a viable business model and safeguarding future growth and further development.

This study contributes to corporate entrepreneurship and innovation research in several respects. First, it departs from a completely new, recently developed theoretical framework (Maes, 2003) that was not tested empirically ever before. After all, the nexus idea of corporate entrepreneurship emerged only very recently in entrepreneurship theory (Shane & Venkataraman, 2000). Second, the study focuses on the importance of human resources and the way in which they are managed. As such, it builds a bridge between the fields of (corporate) entrepreneurship and HRM, a combination largely overlooked in past research (Heneman et al., 2000; Katz et al., 2000; Laursen & Foss, 2003; Michie & Sheehan, 1999). Third, the article aims at a more thorough (albeit focused) application of the resource-based perspective on corporate entrepreneurship (innovation), considering both resource positions and managerial processes. Fourth, this article looks at corporate entrepreneurship (innovation) in Flemish start-ups, building on a cohort of more than 600 firms. As such, it complies with the call for greater diversity in the geographic scope of corporate entrepreneurship research. After all, the vast majority of research on firm-level

entrepreneurship has been conducted in the United States or by researchers working in U.S.-based universities (Zahra et al., 1999a). Moreover, the study is also quite unique in targeting newly established firms. Until now, most empirical research on corporate entrepreneurship seems to have been concentrating on larger, mature corporations. Sixth, compared to previous corporate entrepreneurship research in which 85% of the companies researched were manufacturing companies (Zahra et al., 1999a), this approach brings a greater diversity in industry scope and allows inter-industry comparisons. And last but not least, this article uses structural equation modeling as an analytical technique. This particular technique has very rarely been used in entrepreneurship and corporate entrepreneurship research (in only 1% of all cases) (Chandler & Lyon, 2001). Nevertheless, this technique is very appropriate (if not necessary) for testing more complex relationships (direct and indirect effects connected to the nexus concept) and taking into account a series of contingency factors or control variables.

However, the study presented here also faces a number of limitations. First, while the study allows testing the nexus idea of corporate entrepreneurship in some extent, it does not capture the full complexity of this type of research. After all, by focusing solely on HRM as an element of the creating process (albeit under control of an index of overall management professionalism) it disregards other important aspects of the creating process, such as other types of resources and their management, both tangible (e.g. financial resources) as well as intangible (e.g. social and intellectual capital). Similar remarks can be made with regard to the creator aspects investigated. As such, future research should keep an open view on the filling-in of the research model in order to try to open the black box and answering 'why' questions, thus also considering other and, preferably, multiple types of creating process and creator elements. Additionally, the corporate entrepreneurship nexus should also be studied in its environment. In this article we have focused on the nexus as a stand-alone, suppressing environmental influences that have proven to be of importance (Zahra, 1993) as well as ignoring performance outcomes and contingent factors such as strategy. At this point in time, the study can therefore not comply with the call for additional studies focusing on the complex relationships between organizational antecedents of corporate entrepreneurship, external environment, business strategy and financial and non-financial organizational performance (Ucbasaran et al., 2001; Zahra & Covin, 1995; Zahra et al., 1999a). Third, the study must go even further in adding control variables. While this article did control for important aspects such as company size and age (although the sample applies to start-ups being one year of age and having between one and 49 employees), it should also take into account a control variable for the founding environment. After all, this is likely to affect the

development, intensity or professionalism of many managerial processes. Consider for example the probable differences on that matter between a de novo start-up founded by a single, non-serial entrepreneur and a de novo start-up established as a new venture by a multinational corporation.

All of this however heightens the complexity of the research setting in a field still struggling with its basic constructs. Although this type of research would be very welcome, it might be premature at this point in time since the development of the theoretical frameworks on which it has to be built seems to be lagging behind. Such a framework can only be developed on a step-for-step basis whereby evidence-based theoretical advancements are alternated with empirical tests, by means of which theory can be further adjusted and so forth. By means of this article we hope to have taken a first step.

## References

- Baldwin, J. & Gellatly, G. (2003). *Innovation strategies and performance in small firms*. Edward Elgar: Cheltenham.
- Barker, V.L. III & Mueller, G.C. (2002). CEO characteristics and firm R&D spending. *Management Science*, 48(6): 782-801.
- Begley, T.M. & Boyd, D.P. (1987). Psychological characteristics associated with performance in entrepreneurial firms and smaller businesses. *Journal of Business Venturing*, 2(1): 79-93.
- Bruyat, C. & Julien, P.-A. (2001). Defining the field of research in entrepreneurship. *Journal of Business Venturing*, 16(2): 165-180.
- Carrier, C. (1996). Intrapreneurship in small businesses: an exploratory study. *Entrepreneurship: Theory & Practice*, 21(1): 5-20.
- Certo, S.T., Covin, J.G., Daily, C.M. & Dalton, D.R. (2001). Wealth and the effects of founder management among IPO-stage new ventures. *Strategic Management Journal*, 22(6-7): 641-658.
- Chandler, G.N. & Lyon, D.W. (2001). Issues of research design and construct measurement in entrepreneurship research: the past decade. *Entrepreneurship: Theory & Practice*, 25(4): 101-113.
- Chandler, G.N. & McEvoy, G.M. (2000). Human resource management, TQM and firm performance in small and medium-size enterprises. *Entrepreneurship: Theory & Practice*, 25(1): 43-57.
- Covin, J.G. & Miles, M.P. (1999). Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship: Theory & Practice*, 23(4): 47-63.
- Daily, C.M., Certo, S.T. & Dalton, D.R. (2000). International experience in the executive suite: the path to prosperity. *Strategic Management Journal*, 21(4): 515-523.
- Dutta, S., Bergen, M., Levy, D., Ritson, M. & Zbarack, M. (2002). Pricing as a strategic capability. *MIT Sloan Management Review*, 44(3): 61-66.
- Florin, J., Lubatkin, M. & Schulze, W. (2003). A social capital model of high-growth ventures. *Academy of Management Journal*, 46(3): 374-384.
- Galunic, D.C. & Rodan, S. (1998). Resource recombinations in the firm: knowledge structures and the potential for Schumpeterian innovation. *Strategic Management Journal*, 19(12): 1193-1201.
- Gamble, J.E. (2000). Management commitment to innovation and esop concentration. *Journal of Business Venturing*, 15(5-6): 433-447.
- Gartner, W.B. (1989). "Who is an entrepreneur?" is the wrong question. *Entrepreneurship: Theory & Practice*, 13(4): 47-68.
- Hambrick, D.C. & Mason, P.A. (1984). Upper echelons: the organization as a reflection of its top managers. *Academy of Management Review*, 9(2): 193-206.
- Hatcher, L. (1994) *A step-by-step approach to using the SAS system for factor analysis and structural equation modelling*. SAS Institute: Cary, NC (USA).
- Hayton, J.C. (2003). Strategic human capital management in SMEs: an empirical study of entrepreneurial performance. *Human Resource Management*, 42(4): 375-392.
- Heneman, R.L., Tansky, J.W. & Camp, S.M. (2000). Human resource management practices in small and medium-sized enterprises: unanswered questions and future research perspectives. *Entrepreneurship: Theory & Practice*, 25(1): 11-26.

- Ireland, R.D., Covin, J.G. & Kuratko, D.F. (2003). Antecedents, elements, and consequences of corporate entrepreneurship as a strategy. *Journal of Management*, 29(6): 963-989.
- Jones, G.R. & Butler, J.E. (1992). Managing internal corporate entrepreneurship. An agency theory perspective. *Journal of Management*, 18(4): 733-749.
- Katz, J.A., Aldrich, H.E., Welbourne, T.M. & Williams, P.M. (2000). Special issue on human resource management and the SME: toward a new synthesis. *Entrepreneurship: Theory & Practice*, 25(1): 7-10.
- Laursen, K. (2002). The importance of sectoral differences in the application of complementary HRM practices for innovation performance. *International Journal of the Economics of Business*, 9(1): 139-156.
- Laursen, K. & Foss, N.J. (2003). New human resource management practices, complementarities and the impact on innovation performance. *Cambridge Journal of Economics*, 27(2): 243-263.
- Lengnick-Hall, C.A. (1992). Innovation and competitive advantage: what we know and what we need to learn. *Journal of Management*, 18(2): 399-429.
- Love, J.H., Ashcroft, B. & Dunlop, S. (1996). Corporate structure, ownership and the likelihood of innovation. *Applied Economics*, 28(6): 737-746.
- Maes, J. (2003). The search for corporate entrepreneurship: a clarification of the concept and its measures. *Working paper Policy Research Center "Entrepreneurship, Enterprises and Innovation"* ([www.ondernemerschap.be](http://www.ondernemerschap.be)).
- Michie, J. & Sheehan, M. (1999). HRM practices, R&D expenditures and innovative investment: evidence from the UK's 1990 workplace industrial relations survey (WIRS). *Industrial and Corporate Change*, 8(2): 211-234.
- Miles, M.P. & Covin, J.G. (2002). Exploring the practice of corporate venturing: some common forms and their organizational implications. *Entrepreneurship: Theory & Practice*, 26(3): 21-40.
- Morris, M.H. & Jones, F.F. (1993). Human resources management practices and corporate entrepreneurship: an empirical assessment from the USA. *International Journal of Human Resource Management*, 4(4): 873-896.
- Ray, G., Barney, J.B. & Muhanna, W.A. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal*, 25(1): 23-38.
- Romano, C.A. (1990). Identifying factors that influence innovation: a case study approach. *Journal of Management Studies*, 27(1): 75-95.
- Rothwell, R. & Zegveld, W. (1982). New ventures and large firms. The search for internal entrepreneurship. In: *Innovation and the small and medium sized firm: their role in employment and in economic change*. London: Pinter.
- Sels L., De Winne S., Maes J., Faems D., Delmotte J. & Forrier A. (in press). Linking HRM and small business performance. An examination of the impact of human resource management practices on the productivity and financial performance of small businesses. *Small Business Economics*.
- Shane, S. & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1): 217-226.
- Sharma, P. & Chrisman, J.J. (1999). Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Entrepreneurship: Theory & Practice*, 23(3): 11-27.
- Stopford, J.M. & Baden-Fuller, C.W.F. (1994). Creating corporate entrepreneurship. *Strategic Management Journal*, 15(7): 521-536.
- Sundbo, J. (1999). Empowerment of employees in small and medium-sized service firms. *Employee Relations*, 21(1/2): 105-127.

- Teece, D.J., Pisano, G. & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7): 509-533.
- Teng, B.-S. (2003). Corporate entrepreneurship through strategic alliances: a resource-based framework. *Paper presented at the Academy of Management 2003 Annual Meeting (Seattle, WA)*.
- Ucbasaran, D., Westhead, P. & Wright, M. (2001). The focus of entrepreneurial research: contextual and process issues. *Entrepreneurship: Theory & Practice*, 25(4): 57-80.
- Wiklund, J. (1999). The sustainability of the entrepreneurial orientation - performance relationship. *Entrepreneurship: Theory & Practice*: 24(1): 37-48.
- Youndt, M.A., Snell, S.A., Dean, J.W.J. & Lepak, D.P. (1996). Human resource management, manufacturing strategy, and firm performance. *Academy of Management Journal*, 39(4): 836-866.
- Zahra, S.A. (1993). Environment, corporate entrepreneurship and financial performance: a taxonomic approach. *Journal of Business Venturing*, 8(4): 319-340.
- Zahra, S.A. (1995). Corporate entrepreneurship and financial performance: the case of management leveraged buyouts. *Journal of Business Venturing*, 10(3): 225-247.
- Zahra, S.A. & Covin, J.G. (1995). Contextual influences on the corporate entrepreneurship-performance relationship: a longitudinal analysis. *Journal of Business Venturing*, 10(1): 43-58.
- Zahra, S.A. & Pearce, J.A. II (1989). Boards of directors and corporate financial performance: a review and integrative model. *Journal of Management*, 15(2): 291-334.
- Zahra, S.A., Jennings, D.F. & Kuratko, D.F. (1999a). The antecedents and consequences of firm-level entrepreneurship: the state of the field. *Entrepreneurship: Theory & Practice*, 24(2): 45-65.
- Zahra, S.A., Neubaum, D.O. & Huse, M. (2000). Entrepreneurship in medium-size companies: exploring the effects of ownership and governance systems. *Journal of Management*, 26(5): 947-976.
- Zahra, S.A., Nielsen, A.P. & Bogner, W.C. (1999b). Corporate entrepreneurship, knowledge, and competence development. *Entrepreneurship: Theory & Practice*, 23(3): 169-189.
- Zajac, E.J., Golden, B.R. & Shortell, S.M. (1991). New organizational forms for enhancing innovation. The case of internal corporate ventures. *Management Science*, 37(2): 170-184.