Management factors affecting the performance of technology firms

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ABSTRACT
This paper analyzes high-technology firms within the European Union to determine the factors that influence performance through business productivity. The study examines six different factors that are representative of entrepreneurial activity, firstly from a purely business standpoint, and subsequently from the areas of production and technology, human resources, strategy and marketing and, lastly, the economic-financial area. Results indicate a direct relation between productivity and factors such as private borrowing, dynamism or using price as a strategic factor, while the reverse is true for concepts such as family resources, level of investment in R&D or training programs.

1. Introduction

This article contributes to existing theory on entrepreneurship by relating contributions from several standpoints that have had a profound effect on the development of the study of this phenomenon. It also presents a model of entrepreneurial performance, using and contrasting the most relevant, recent research on entrepreneurship. Entrepreneurship, in its entirety, covers a broad spectrum of ideas and disciplines, as shown by existing international publications dedicated to the field, as well as studies that stem from other dimensions of entrepreneurial activity, such as entrepreneurial processes, entrepreneurial orientation, corporate entrepreneurship and entrepreneurial management. These can all have an influence on entrepreneurial behavior. The methodology for this study comes from an examination of the existing literature on the influence of the entrepreneur and the relation between entrepreneurial activity and its consequences.

A common view, according to Cuervo et al. (2007), is that the central role of entrepreneurial leaders is business creation, which calls for a dual level analysis: individually – analyzing psychological aspects and social factors or non-psychological ones – and at an environmental level – both generally and specifically. The study of entrepreneurs as individuals analyzes the factors that explain their appearance, such as the personal characteristics of their psychological profile (the need for achievement, the capacity to control, power and independence, tolerance of ambiguity, a tendency to take risks) and social or non-psychological factors (education and training, experience, networks, family, etc.). The study of business leadership at the environmental level analyzes factors from the general environment, which can be economic (the dimension of markets), financial (capital cost and availability) and fiscal (taxation for firms and subsidies available for the creation of new ventures). They can also be from the legal framework (administrative overheads for licenses, time and cost of creating new firms), training models, the national science and technology system, and socio-cultural and institutional approaches (culture and shared values in society, the role of exclusion and social change as motivators of the business function in minority and marginalized groups). Specific environmental studies analyze the pertinent factors for each sector, the configuration of productive processes and technological changes that occur, as well as the spatial environment (clusters and agglomeration economies). There is, therefore, a broad basis for explaining the appearance of business activity although, as Eckhardt and Shane (2003) point out, these approaches are not exclusive.

This article consists of five sections, in addition to the introduction. Section two presents the theoretical background for entrepreneurial business activity by analyzing six different kinds of factors: the idea of business and its dominant psychological concepts, and the influence of certain areas within the firm -production and technology, human resources, strategy, marketing and the economic-financial area. Section three analyzes the methodological approximation for developing the empirical study. Here, we underline the use of a quantitative approximation. This section also contains a comprehensive description of the methodology for its development (design, methods for obtaining information and methods of analysis). In the fourth section, we go on to describe the most striking results obtained, whilst the most relevant conclusions and contributions of the study appear in the final section.

2. Entrepreneurial activity

Entrepreneurship is a phenomenon of utmost importance in these initial years of the 21st century. Entrepreneurship favors economic growth, employment and technological and innovative activities of many countries. Entrepreneurship is a topic of enormous interest to academics, businesspeople and governments around the world. Since the signing of the Maastricht agreement and the creation of the
European Union in 1992, the reality of this zone of free commerce has created a market of 500 million consumers around the world. In addition, the democratization of Eastern block countries has led to Europe becoming a business opportunity for international, and particularly American, Japanese and Arab capital.

Assuming that entrepreneurship plays an important role in economic development, the creation of small firms is a determining factor for establishing a solid economic base (Altinay, 2005; Cuervo, 2005; Goedhuys and Sleuwaegen, 2000; Romero-Martínez and Montoro-Sánchez, 2008; Veciana and Urbano, 2008). The importance of entrepreneurship for the economy has become apparent in its visible growth as a topic both from a scientific and a business viewpoint.

2.1. The business idea

An entrepreneur does not have to adopt rational behavior (Zafirovski, 1999). Entrepreneurs are normally prompted by motives and impulses that have little to do with rationally following up opportunities and profits, such as the power to create" (Zafirovski, 1999, p. 363). However, entrepreneurs do need certain qualities that are both psychological (Begley and Boyd, 1987; Naffziger et al., 1994; Shaver and Scott, 1991) and sociological/personal (Brockhaus and Horwitz, 1986; Gartner, 1989; Guzmán and Santos, 1999; McClelland, 1961; Shaver and Scott, 1991; Wailer et al., 1993). These include creativity (Bhidé, 1999b,c; Smallbone and Welter, 2001), proactiveness (Utsch et al., 1998) or a marked ability to anticipate opportunities and actions, lay down objectives and search for solutions, however challenging they may seem (Bateman and Grant, 1993; Becherer and Maurer, 1999; Lumpkin and Dess, 1996). The need for achievement is also salient (McClelland, 1961; Utsch et al., 1999), as is individualist behavior and the strength of will needed to take risks (Lumpkin and Dess, 1996; Stearns and Hills, 1996; Thomas and Mueller, 2000), internal control (Bhidé, 1999a), the independence needed to give a sense of freedom, autonomy and the ability to work for oneself (Guzmán and Santos, 2001; Lumpkin and Dess, 1996; Utsch et al., 1999). Other relevant characteristics include adaptability (Smallbone and Welter, 2001), audacity Bhidé (1999c), leadership (Bhidé, 1999c; Stearns and Hills, 1996), the role of the entrepreneur as intermediary (Casson, 1999), and the capacity to learn (Guzmán and Santos, 2001). Other qualities include organization and teamwork (Smallbone and Welter, 2001; Stearns and Hills, 1996), competitive aggressiveness or improving their position in relation to others (Lumpkin and Dess, 1996; Utsch et al., 1999), an awareness of what is necessary to avoid a return to the ranks of the unemployed (Guzmán and Santos, 1999; Smallbone, 1990), and a capacity for delegating functions without shirking responsibilities (Bhidé, 1999a). However, other research focuses on questioning or criticizing the idea that personality is an important quality in improving the business performance (Cressy, 1999).

Training, experience, and the family are important social factors that can influence performance improvements and entrepreneurial success (Guzmán and Santos, 1999). Robinson and Sexton (1994), Storey (1994) and Yusuf (1995) state that the level of training and education has a positive influence on performance, while Lee and Tsang (2001), and Stuart and Abetti (1990) suggest that the consequences might be entirely the opposite. Dyke et al. (1992) and Jo and Lee (1999) claim that the outcome is dependent on the factors that measure improvement in business performance. Education has a positive influence on performance (Deakins et al., 2005), due to the fact that imagination, inventiveness, flexibility, the capacity to adapt and a minimal accumulation of knowledge of the environment can be developed through training and education, though this may all depend on the size of the firm (Lee and Tsang, 2001). As Ramachandran and Kedia Shah (1999) and Veciana et al. (2005) all point out, a university education plays a key role in the creation and growth of the firm by entrepreneurs; a fact that suggests the need to develop new schools of thought on university education in entrepreneurship (Laukkanen, 2000).

Certain authors ponder the importance of experience (Lehti, 1990), the specialization of the entrepreneur (Bhidé and Stevenson, 1999), and the size of previous firms in which they may have worked (Kangasharju, 2000). Gasse (1982) and Lee and Tsang (2001) state that the experience of having created other firms in the past has a positive effect, and that the knowledge and tools acquired by the entrepreneur will be important for firm performance in the future. Most new firm founders will have been, at some time in the past, members of a managerial team (Rosa and Scott, 1999). Ducheneau and Gartner (1990), Dyke et al. (1992), Lee and Tsang (2001) and Stuart and Abetti (1990) see experience as having a positive impact. Jo and Lee (1999), however, believe that its consequences may well be negative. Ducheneau and Gartner (1990), Dyke et al. (1992) and Jo and Lee (1999) claim that previous knowledge of the targeted sector can have a positive effect on performance.

The family also has a relevant effect on entrepreneurial activity (Bloodgood et al., 1995; Carroll and Gannon, 1997; Covin and Slevin, 1989; Luthans et al., 2000). Therefore, cultural, political and economic environments are factors that act as a suitable starting point for any analysis of entrepreneurship (Bloodgood et al., 1995; Covin and Slevin, 1989; Luthans et al., 2000), though this environment is also influenced, according to schools of management that focus on the concept of social corporate responsibility (Nieto and Fernández, 2004).

2.2. Area of production and technology

The need to innovate members of the firm is intensifying because of the acceleration experienced through technological change (Veciana, 1996) and globalization. These factors have gone hand in hand with the need to generate new ideas and find original solutions to problems (Lumpkin and Dess, 1996; Utsch et al., 1999). Hamel (2000) argues that innovation is the most important component in a firm's strategy. Certain authors, however, suggest that innovation in processes reduces the number of entrepreneurial failures but product innovations do not (Cosh, Hughes, and Wood, 1999, Littunen, 2000).

2.3. Area of human resources

Some research conceives entrepreneurship as a learning process that either takes place through the assimilation and processing of professional experience and learning or through formal education (Goedhuys and Sleuwaegen, 2000). There is thus a correlation between investment in human capital and obtaining and maintaining business performance (Cressy, 1999).

2.4. Area of strategy and marketing

Entrepreneurial behavior implies a notable knowledge of suitable business strategies (Barringer and Bluedorn, 1999; Choe and Anderson, 2006); creative imitation combined with the intention of seeing through strategies to a successful conclusion (Fu-Lai Yu, 2000; Sciascia et al., 2006). Emphasis is placed on entrepreneurship based on strategic management (Krueger, 1993), best applied when formally written down on paper (Reid, 1999; Reid and Smith, 2000), and the pursuit of a better future for the organization (Bhidé, 1999c; Utsch et al., 1999). The ability to generate change in strategic management (Littunen, 2000) by perceiving market opportunities (Woo et al., 1999), adapting to the environment (Entrialgo et al., 2001; Mas-Verdú, 2007), and possessing certain managerial factors (Furrer and Solbergier, 2007; Goedhuys and Sleuwaegen, 2000; Lyon et al., 2000) are all vital factors for bringing about improvement in business performance. These managerial factors can also apply when analyzing whether they are on the right road to achieving a suitable strategy for the firm (Bhidé, 1999a). Firms that hope to achieve opportunities on
an international, national and local scale need to promote entrepreneurship through their activities and operations (Zahra et al., 2001).

2.5. Economic-financial area

Bloodgood et al. (1995), Covin and Slevin (1989) and Luthans et al. (2000) underline the importance of financial resources for businesses. The financial sector can represent an important obstacle for entrepreneurial activity (Goedhuys and Sleuwaegen, 2000; Van Auken, 2005). Butler (1991) and Ogbor (2000) suggest that inaccessibility to financial support in the form of loans etc. is an impediment for the entrepreneur. However, a factor that should be considered in any analysis of new firm start-ups is the role played by the state in enabling the creation of firms by providing funding at preferential interest rates, via tax incentives or with subsidies (Audretsch, 1999; Duckett, 2001; Etemad and Salmasi, 2001; González, 2001; Holtz-Eakin, 2000; Klofsten and Jones-Evans, 2000). Some authors, on the other hand, claim that the market should be left entirely free of state influence or aid to nascent firms and that the best way of ensuring the firm’s consequent survival is for the entrepreneur to start up on their own (Chell and Baines, 2000).

2.6. Contingency factors

Consider the following list of factors that appear in the literature for each of the major dimensions that form the subject of this study.

- **Dimension: the business idea**
  - Factor: financing (bank backing, private loan, own capital and family loans).
  - Factor: business background/antecedents
  - Factor: family backing
  - Factor: previous work situation (owner, employee and unemployed).
  - Factor: worker with responsibility
  - Factor: assessment of the attributes that characterize an entrepreneur (self-confidence, creativity, dynamism and energy, leadership, flexibility, ability to calculate risks, ability to get on well with people, independence, initiative, need to achieve, optimism, directed towards profit, perseverance and determination, receptivity to suggestions and criticism).
  - Factor: qualifications (basic or elementary training, vocational training and university education).
  - Factor: aims (independence, fulfillment of an idea and professional fulfillment).
  - Factor: age of the partners at the outset

- **Dimension: area of production and technology**
  - Factor: technological level of the company
  - Factor: strategy followed (leader strategy and specialist strategy).
  - Factor: area of human resources
  - Factor: the existence of a specific department
  - Factor: the existence of a regular training scheme

- **Dimension: area of strategy and marketing**
  - Factor: search for company growth (internal and external).
  - Factor: interest in exporting as a better way of growing
  - Factor: promotional activities (personal sales, advertising, public relations and sales promotion).
  - Factor: price as a strategic variable
  - Factor: distribution channels (a long distribution channel and a distribution channel the businessman has control over).
  - Factor: most profitable investments (investment in technology and investment in R&D).
  - Factor: financial debts.
  - Factor: presence of European subsidies.

3. Research methodology

This study is a guide so that small and medium-sized firms (SMEs) can identify and analyze the possible relationships between the nature of the business and the performance of the firm. The objective of this study is to determine the factors that have an influence on business productivity. The research focuses on SMEs due to the fact that the great majority of businesses in the European Union and the US fall within this category (Marrero, 1998; Ribeiro, 2005). The contribution that SMEs make towards generating employment, the distribution of wealth and the growth of the economy frequently act a reference for establishing suitable policies and provide the basis for economic debate. The majority of literature generally regards SMEs as being more innovative than large firms (Dobón and Soriano, 2008; Lim et al., 2008; Maroto and Rubalcaba, 2008; Uttsch et al., 1999).

No universal unit of analysis exists for describing or measuring performance, competitiveness and success in firms (Chandler and Jansen, 1992; Das and Teng, 2000; Elche and Gonzalez, 2008; Galán and Vecino, 1997; Lane et al., 2001; Phillips, 2000; Reid and Smith, 2000; Steensma et al., 2005). Measurements of performance in firms are unique and exclusive for each business (Kay, 1993). Researchers should also consider a variety of measurements before evaluating the results, performance and success of businesses, rather than limiting methodology to a single approach (Helms et al., 1997; Phillips, 1996; Romanelli, 1989; Stearns et al., 1995) in order to apply the most appropriate form of measurement in each study. Moreover, a widely shared, erroneous attitude to gauging this aspect is the exclusive association between performance and objectives of a financial nature such as profit (McDougall et al., 1992), sales (Van de Ven et al., 1984), growth in sales (Eisenhardt and Schoonover, 1990; McDougall et al., 1994), market share (Tsai et al., 1991) or growth in market share (McDougall et al., 1992).

Having analyzed three indicators, such as economic profit, financing and growth, analyzing a global indicator that is the pondered average of these factors is possible. Some experts go as far as to establish business success or failure according to whether the firm survives or not (Cooper et al., 1994). Stuart and Abetti (1987) review performance measures in newly created hi-tech firms, distinguishing between performance and objective success as opposed to subjective success, and performance and financial success in comparison with non-financial achievements. However, other authors such as Dess and Robinson (1984) clearly state the existence of a correlation between the objective profitability of the firm and a subjective assessment of this profitability.

This study moves away from the measurement of the improvement of performance or success or failure of the firm through the exclusive analysis of business results, as in the study by Murphy et al. (1996). Reid and Smith (2000, p. 169) state that “there are many potential indicators that can be used to carry out this study, but the problem we are faced with is not a lack of information, but the separation between what is fundamental and what is necessary”. On this aspect, Bigné et al. (2005, p. 143) state that “from the point of view of strategic management, the multi-dimensional nature of business performance demands the use of both financial and operative indicators” requiring an analysis of the relations between them (Ketchen and Palmer, 1999). Consequently, the improvement in performance and success of the business is a qualitative magnitude that is difficult to measure. The objective here is to find a measurement scale that any researcher can apply that is also related to the traditional concept of productivity. Such a magnitude has to comply with three characteristics: it has to be objective, offer an efficient simply applicable measurement, and be believable for the different fields of business and management. As mentioned before, entrepreneurship has links with both fields. Productivity has been the object of analysis in numerous studies (Craig and Harris, 1973; Dexeus and Selles, 2006; Jacobides and Croson, 2001; Mahmood, 2008; Meyer, 2000; OECD, 2001; Singh et al., 2000; Steensma et al., 2005; Zenger and Marshall, 2000).
This research suggests that an alternative measure be used for these analyses, namely the average gross margin per employee, calculated as sales minus variable costs divided by the number of employees (Kaplan and Norton, 1997), thereby achieving an approximation of apparent productivity of labor (Ribeiro, 2003a,b). As Maroto and Cuadrado (2006, p. 66) point out, the concepts of the pursuit of competitiveness and productivity are closely related, “Both are related to the capacity for growth, although productivity is a conditioning factor of the competitive capacity of any economy... although measuring productivity can be much more precise than the concept and the measurement of competitiveness”. These authors end by saying that “productivity can refer to the whole economy, to a particular sector or branch of activity, or to a particular firm” (p. 42), “improving competitive position, endowing greater usefulness and social welfare, enabling greater business investment and creating more employment” (p. 37).

3.1. Sample and data collection

A questionnaire was addressed to the CEO-owners of high-technology firms, on the condition that this person also held this position at the time the firm was created. The objective in this case was to discover the motivation and ideas behind the entrepreneur’s actions when starting up the business (the first section of the questionnaire) and the influence of the different areas: production and technology, human resources, management, and finance (second section of the questionnaire) on the evolution of the relevant business activity and firm performance. Four small business development centers in the European Union provided a list of 6310 small to medium-sized, privately owned firms. The sample firms conformed to Milkovich’s definition of high-technology firms as those “that emphasize invention and innovation in their business strategy, deploy a significant percentage of their financial resources to R&D, employ a relatively high percentage of scientists and engineers in their workforce, and compete in worldwide, short-life-cycle product markets” (1987, p. 80).

CEO-owners of each firm were sent the questionnaire with an accompanying cover letter indicating that the President of the Chamber of Commerce of their city supported the project, assuring respondent anonymity and information confidentiality. The cover letter pointed out that the survey was within the framework of an ongoing research project on entrepreneurship involving researchers at several leading journals and CEO-owners from firms, and highlighted that this was the first research of many others that could henceforth be carried out. The Directorate-General for Enterprise and Industry (European Union Commission for SMEs) provided official endorsement for the study. Non-respondents received two further rounds of questionnaires (email survey and fax, respectively).

Bureau van Dijk (BvD) and Dun & Bradstreet reports provided two of the main sources of data on firm performance. Biographical data on CEO-owners came from multiple sources that commonly appear in prior research on corporate elites, including Dun & Bradstreet’s Reference Book on Corporate Management, Marquis’ Who’s Who, annual company reports, and a large management consulting firm (Westphal and Stern, 2007).

The research was carried out during the second term of 2006, for September to December. The data obtained refers to that particular moment in time for the firm, given the fact that we were not attempting to analyze the time it was founded, as (logically) changes occur in management.

Of the 6310 technology firms contacted, 2729 agreed to participate in the study. CEO-owners who (1) had founded their businesses or purchased going concerns less than two years or more than eight years prior to the 2006 survey, (2) had no or fewer than 10 employees (micro-firms), (3) were not active CEO-owners, or (4) supplied incomplete data were disqualified. Because of missing data on some measures for 16 firms, the final sample size was 2713 companies, representing a 43% participation rate, which is considerably better than “the 10–12% rate typical for mailed surveys to top executives” (Hambrick et al., 1993, p. 407). The individual reply ratio was consistent with those found for previous studies on entrepreneurial firms (Alpar and Spitzer, 1989; Steensma et al., 2000). The study by Westphal and Stern (2007) shows similar results. The average CEO-owner respondent had a 12.74% ROA in 2003, 12.81% ROA in 2005, and had an average age of 43 in 2005. To test

| Factors | Mean | S.D. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---------|------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Productivity | 8.9 | 0.65*** | 1.00 |
| Self-confidence | 8.4 | 0.47*** | 0.66*** | 1.00 |
| Creativity | 8.9 | 0.71*** | 0.31*** | 0.07 | 1.00 |
| Dynamism and leadership | 7.3 | 0.59*** | 0.06 | 0.01 | 0.16*** | 1.00 |
| Energy and diligence | 7.6 | 0.40*** | 0.53*** | 0.02 | 0.68*** | 0.67*** | 1.00 |
| Experience | 7.9 | 0.62*** | 0.22*** | 0.56*** | 0.60*** | 0.46*** | 0.01 | 1.00 |
| Ability to take risks | 8.7 | 0.63*** | 0.07 | 0.27*** | 0.59*** | 0.00 | 0.31*** | 0.44*** | 1.00 |
| Ability to get on with others | 7.1 | 0.49*** | 0.46*** | 0.24*** | 0.42*** | 0.33*** | 0.32*** | 0.66*** | 0.36*** | 1.00 |
| Independence (own boss) | 9.2 | 0.60*** | 0.53*** | 0.50*** | 0.17*** | 0.15*** | 0.19*** | 0.59*** | 0.04 | 0.11*** | 1.00 |
| Initiative | 8.2 | 0.36*** | 0.48*** | 0.64*** | 0.39*** | 0.62*** | 0.64*** | 0.65*** | 0.49*** | 0.14*** | 0.59*** | 1.00 |
| Need for achievement | 7.8 | 0.69*** | 0.51*** | 0.39*** | 0.04 | 0.45*** | 0.41*** | 0.65*** | 0.53*** | 0.42*** | 0.24*** | 0.26*** | 1.00 |
| Optimism | 7.2 | 0.40*** | 0.03 | 0.06 | 0.08 | 0.19*** | 0.63*** | 0.43*** | 0.53*** | 0.45*** | 0.53*** | 0.67*** | 0.11*** | 1.00 |
| Orientation toward profit | 7.9 | 0.50*** | 0.27*** | 0.19*** | 0.62*** | 0.56*** | 0.57*** | 0.62*** | 0.31*** | 0.36*** | 0.43*** | 0.39*** | 0.67*** | 0.21*** | 1.00 |
| Perception | 8.7 | 0.65*** | 0.02 | 0.62*** | 0.62*** | 0.58*** | 0.19*** | 0.13*** | 0.42*** | 0.66*** | 0.37*** | 0.39*** | 0.21*** | 0.03 | 0.58*** | 1.00 |
| Perseverance | 8.2 | 0.51*** | 0.64*** | 0.06 | 0.22*** | 0.40*** | 0.24*** | 0.65*** | 0.35*** | 0.61*** | 0.30*** | 0.08*** | 0.45*** | 0.60*** | 0.58*** | 0.55*** | 1.00 |
| Receptiveness to suggestions and criticisms | 8.3 | 0.55*** | 0.54*** | 0.35*** | 0.65*** | 0.02 | 0.18*** | 0.54*** | 0.41*** | 0.36*** | 0.20*** | 0.56*** | 0.17*** | 0.12*** | 0.69*** | 0.36*** | 0.51*** |

a n = 364.

b p<0.05; **p<0.01; ***p<0.001.
whether the 2,713 respondents were representative of the population, we compared the mean ROA and the mean age of the CEO-owner of the respondents with the population. Differences were not significant (ROA, $Z = 1.23, p < .11$; age of the CEO-owner, $Z = 0.98, p < .14$).

The Kolmogorov–Smirnov test and Heckman selection models were used to assess sample representativeness. The test determines whether the distribution of a single factor is different for respondents and non-respondents. Results showed that respondents were not significantly different from non-respondents on any of the continuous factor measures with archival data, including measures of ROA, age of the CEO-owner (see description of control variables), total sales and assets. Heckman selection models were used to conduct a multivariate test of sample selection bias (Heckman and Borjas, 1980). The selection equation in these models estimated the likelihood of responding to the survey and included all the independent variables measured with archival data as well as variables that described survey characteristics, such as when the questionnaire was distributed and returned. The results were not significantly different from those presented in the tables, and the selection parameters were not statistically significant, further suggesting that non-response bias did not affect our results.

Although the relatively large sample of firms obtained provided considerable statistical power, several remedial approaches reduced informant bias and random error associated with the key informant data collection technique. For a reliability check, CEO-owners were randomly re-surveyed in a 10% sampling of the initial 6310 firms. This procedure resulted in 128 responses (a response rate of almost 20%) and yielded a usable sample of 76 firms that returned both completed surveys. These 76 firms were comparable in average ROA and age to all the other firms in our 10% sample. The Kolmogorov–Smirnov test helped assess whether significant differences existed in the response distributions of both replies (Siegel and Castellan, 1988). Reliability was verified by comparing responses at scale (mean differences and correlations) levels, following the suggestions of Jones et al. (1983). As expected, the analysis confirmed a reasonable level of agreement between both responses, with correlations ranging from .54 to .71 ($p < .001$), indicating no systematic bias in the direction or magnitude of the CEO–owner responses.

Twenty randomly selected CEO-owners participated in a pilot study, though the data collected was not included in the subsequent analyses. Feedback from the pilot study improved the content and appearance of the survey instrument.

### 3.2. Statistics

Multiple correlation indices were used to analyze the continual variables (Brown et al., 2001) (see Table 1). These correlations went from 0.36 up to 0.71. This result indicates that all the elements were closely related to their respective constructions (Nunnally and Bernstein, 1994).

A bivariate analysis statistically verified which factors individually define significant differences in firm performance, including the Kruskal–Wallis test (see Table 2) for more than two independent samples (Utsch et al., 1999). This allows for the identification of an imbalance in the distribution of firm performance at different levels for each factor. Business performance was measured through sales

### Table 2

<table>
<thead>
<tr>
<th>Factor</th>
<th>p-value</th>
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<tbody>
<tr>
<td><strong>Area of economy–finance</strong></td>
<td></td>
</tr>
<tr>
<td>Financial debts</td>
<td></td>
</tr>
<tr>
<td>51–75</td>
<td>0.001***</td>
</tr>
<tr>
<td>&gt;76%</td>
<td>0.039*</td>
</tr>
<tr>
<td>European funding</td>
<td>0.001***</td>
</tr>
<tr>
<td>Sector</td>
<td>0.030*</td>
</tr>
<tr>
<td>Country</td>
<td>0.001***</td>
</tr>
<tr>
<td><strong>Profitable investment</strong></td>
<td></td>
</tr>
<tr>
<td>Investment in technology</td>
<td>0.001***</td>
</tr>
<tr>
<td>Investment in manpower</td>
<td>0.001***</td>
</tr>
<tr>
<td>Investment in publicity</td>
<td>0.001***</td>
</tr>
<tr>
<td>Investment in R&amp;D</td>
<td>0.001***</td>
</tr>
<tr>
<td>Financial debts</td>
<td></td>
</tr>
<tr>
<td>&lt;25%</td>
<td>0.038*</td>
</tr>
<tr>
<td>25–50</td>
<td>0.837</td>
</tr>
</tbody>
</table>

(continued on next page)
minus variable costs divided by the number of employees or apparent productivity of labor. Results reported were robust enough to counter the effects of heterocedasticity and multiple observations for all numbers of independent variables (Williams, 2000; Wooldridge, 2002) produced similar results.

Tables 1 and 2 show probability figures for each contrast, defined by the influence of each of the factors considered on firm performance for continuous and discrete variables.

A multivariate analysis, in this case a multiple linear regression, identifies the factors that, together, explain productivity. The regression technique allows the differentiation between the factors that explain the effects of heterocedasticity and multiple observations for all numbers of independent variables (Williams, 2000; Wooldridge, 2002) produced similar results.

4. Findings

The model explaining apparent productivity of labor can be seen in Table 3.

Having established the factors that influence entrepreneurial performance and the coefficients of the model, it is possible to determine productivity, thereby showing the performance of these firms. The interpretation from the model is that, the greater the quotient of sales minus variable costs per worker (‘apparent’ productivity associated with labor), the better the performance of the firm. The coefficient of each factor shows the direction of its repercussions for the dependent variable. Thus, for the model of “apparent” productivity, the factor “pursuit of growth” (external response) has a positive value (2.076). It is therefore possible to determine the effect of each factor on the variable for the model.

5. Conclusion

The difficulties in modeling strategic management from an entrepreneurial perspective are sizeable, but this study has attempted to represent a tool for determining the factors that enable a characterization of entrepreneurial SMEs.

Among the most notable conclusions from our study is the establishment of factors available to the firm that positively influence business performance: ‘private loans’ as a means of financing; the importance of entrepreneurial traits such as dynamism, the need for achievement and optimism; for entrepreneurs to have a university education; that carrying out an idea should be amongst their goals; that among the firm’s goals should be the pursuit of external growth of the firm; that ‘personal sales’ should be a priority as promotion tools; that firms should consider ‘price as a strategic factor’, and finally that firms should look to European funding.

Among the factors that negatively influence business performance is that of the firm using family resources as a source of financing; that the CEO/firm owner had previously been the owner of a firm; that among the characteristics of the entrepreneur are those of leadership, the ability to calculate risks and initiative; that among the goals pursued appears professional fulfilment; the importance of the technological level of the firm and of yearly training programs; for the priority to be sales promotion as promotion tools; the importance of investment in R&D as being more profitable, and finally that firms use financial debts for their development and daily functioning.

The magnitude of business performance analyzed is the major limitation of the study. The aim is not to provoke debate on whether the terminology used is suitable or not, as the objective of this study is of an entirely different nature. Obviously many different variables and forms of measurement can determine and define business performance. Moreover, aggregated factors associated with the performance of SMEs may be proposed. Another relevant aspect was the time established for considering a firm that has experience improvement in performance. Roure and Keeley (1950) look at a sizeable period of ten years. However, Cooper et al. (1994) reduce this period to three years. This research adopts a medium-sized period of a five-year business survival cut-off. Lastly, although this study solely focuses on SMEs, “firms are created small and grow with time” (Audretsch, 1999; 91). The strength of this study lies in a methodology that links the concepts of entrepreneurship, management and strategy, and business performance.

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