

Information and Communication Technology Spanish Gazelles: A Competitiveness Analysis

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Due to the difficult economic situation, which has led to dramatic job losses in Spain, the companies with high growth potential are seen as a promising alternative to resume economic growth. A sample of companies in the information and communications technology sector sets up the basis of this comparative analysis of the characteristics of gazelles versus the standard firms. Also this study shows, by means of a cluster analysis, the determinants of gazelles along the different stages of their development. This will lead to a better understanding of gazelle businesses, from which to develop incentives to increase the number of them.

Key words: *Gazelles, ICT, high-growth firms*

Introduction

The current financial situation in the majority of countries, especially in the main economies of Europe and America, is affected by low or even negative economic growth rates and excessively high levels of unemployment. As a result, it is essential to identify new ways to contribute to both economic growth and job creation. The Spanish case is a clear example of this economic situation. The growth rates of the Spanish GDP have dropped from levels of around 4% in 2004-2007 to a negative minimum of 5% in 2009. Although these figures have improved during 2010, the Spanish economy is still almost zero growth and is essential to find alternatives to ensure sustainable levels of growth over time.

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The delicate economic context affects all markets. Since 2009, Information and Communication Technology (ICT) companies' turnovers have dropped by 8.1 percent. Equally, the number of jobs decreased by 5.8 percent (AETIC; MITYC 2010). However, ICT companies are found to be a key sector in strategies which aim to modernise business network and make it more competitive by means of, mainly, their decisive role in R&D and innovation (Feindt, Jeffcoate, and Chappel 2002; Toivonen, Paasio, and Sinervo 2009)

Small and medium enterprises (SMEs) are one of the main mitigation alternatives to find the growth path. It is estimated that the creation of new SMEs contributes to a 30 percent productivity increase (Foster, Haltiwanger, and Krizan 2008). Moreover, it has been fully demonstrated that small and medium businesses engender relatively much employment creation, growth and innovation, producing important spillovers in regional rates (Halabisky, Dreessen, and Parsley 2006; Acs, and Mueller 2008; Van Praag, and Versloot 2008). Between SMEs, the more important ones are those with increasing over average figures for turnover and number of employees. These fast growing companies are called gazelles (Birch, and Haggerty 1997).

As an example of the importance of the small and medium enterprises in the European economy, it is worthy to point out that 99 percent of the companies are small to medium sized, 90 percent of which has a maximum of ten employees (Commission of the European Communities 2008). In the Spanish case, 75.1 percent of the companies created in 2009 did not have any employee, whereas 23.7 percent had less than 10 employees (INE 2010a). As a result of the financial situation, the number of newly created companies has decreased by 1.9 percent in 2010, (INE 2010b) and unemployment figures have moved to levels close to 20 percent.

Nevertheless, despite the importance of SMEs companies, mainly high-growth companies, there are only a few studies which deal with the main characteristics of gazelle companies. This is principally motivated by the difficulty to have complete data series of firms' items (Henrekson, and Johansson 2010).

For the aforementioned reasons, carrying out a study of gazelle companies in the Spanish ICT market seems an excellent opportunity to identify growth and job-creation patterns that might also be applicable to other markets and countries.

Literature review

The concept of gazelle Company was first introduced by Birch (1997) to refer to those businesses with high levels of growth. The basis of his study was the capacity of these companies to generate net jobs in the economy. Since then, new definitions and terms have been coined to refer to the same concept. The difference between those definitions is essentially the parameter used to measure growth levels (turnover, employment rate, profits, etc), the minimum levels of growth, the length of time during which the companies have to maintain the same growth levels, the company size in terms of number of employees, and a few other factors (Henrekson, and Johansson 2010).

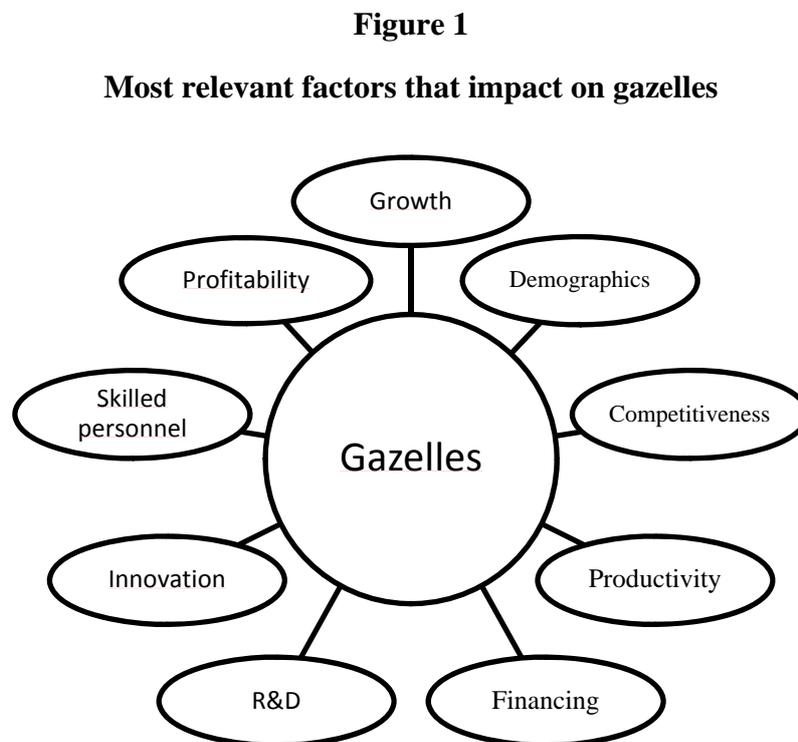
In order to systematize the studies from which these definitions have been originated, Delmar (2003) distinguishes four work streams based on their approach. Three of them are related to the definition of gazelle concept, whereas the fourth one focuses on their characteristics:

- Growth parameter: Although the most common parameters are turnover and employee numbers, some studies have analysed profits, market share or sales figures.

- Growth measures: depending on the whether the measurements are taken with absolute or relative parameters.
- Sustained growth: monitoring fluctuation of growth parameters in time.
- Company's characteristics: such as size, longevity, type of industry, etc.

As a result of that work, Delmar (2003) indicates that the study of high-growth firms is necessarily multidimensional given the heterogeneity of the high-growth phenomenon. Accordingly, the study of such companies has to rely on other determining factors beyond the traditional growth parameters. This multidimensional approach has been adopted by other researchers in subsequent studies which consider additional types of parameters (Autio 2007; Hölzl, and Friesenbichler 2008; Janczak, and Bares 2010; Mitusch, and Schimke 2011).

The figure below shows the most relevant factors that impact on high growth companies based on related studies:



Growth: The contribution of gazelles to economic growth has been explored in much detail, especially the correlation with employment growth rates. As a result of the study carried out by Henrenkson y Johansson (2010), in which they examine the twenty most relevant jobs in the study of gazelles as job generators, it is concluded that all those studies prove that gazelles have the potential to generate jobs, regardless of the size, sector or location. Notwithstanding the above, some of the latter factors make the results differ from each other. Equally, other subsequent studies not included in Henrenkson y Johansson (2010) find similar results such as (Janczak, and Bares 2010; Hölzl, and Friesenbichler 2008).

Demographics: The demographic factors are also decisive. One of these factors is the firm size. Empirical studies show that employment growth is particularly significant in small companies. (Henrekson, and Johansson 2010; Mitusch, and Schimke 2011). Companies' longevity is also considered as a demographic parameter. It has been noticed a correlation between job generation capacity and the company's lifecycle. Experience shows that the fastest employment growth rate is achieved in the initial years of operations (Halabisky, Dreessen, and Parsley 2006; Acs, and Mueller 2008). Another important demographic factor is the sector the company belong to. It is generally acknowledged that gazelles exist in every sector whether they are high or low technology type (Hölzl, and Friesenbichler 2008; Henrekson, and Johansson 2010). However, the sector influences the number of gazelles (Autio 2007) or their characteristics (Delmar, Davidsson, and Gartner 2003). Nationality is also a very much influential demographic variable (Autio 2007). In fact, some studies point to the regional characteristics as the driver for the gazelles' development (Acs, and Mueller 2008). It is also worth noting the spillover effect caused in a region by the influence of gazelle (Autio 2009).

Competitiveness: One approach is to study the way high growth companies compete in the market. This type of companies seems to be better prepared to seize opportunities and adapt their strategy to the changing market conditions. (Rigby, Bleda, Morrisson, and Kim 2006; Hölzl and Friesenbichler, 2008). Gazelles are generally more client and goals objective oriented (Janczak, and Bares 2010; Parker, Storey, and Van Witteloostuijn 2010).

Financing: In order to be able to grow, companies need to have appropriate financial support. The sources of the financing are very diverse, going from close bonds such as family or friends to external investors such as Business Angels or private equity. It has been proven that difficulty in access to sources of financing limits the growth of companies (Hölzl, and Friesenbichler 2008).

Research and Development: One of the fundamental factors for companies in order to be able to innovate is to commit to research. Yet for gazelles, research is more critical than for other type of companies (Hölzl, and Friesenbichler 2008). For the achievement of innovation and subsequent growth through R&D, it is essential that companies be part of the National Innovation System and the Regional Innovation System (Autio 2009). It would guaranty a sustainable growth of employment levels. Although there is no direct correlation between active participation of SMEs in the various networks with short term growth, it does show positive results in long term growth (Havnes, and Senneseth 2001).

Innovation: It is widely accepted that innovation is a source of growth and competitiveness. Gazelles, while not necessarily in the technological sector, have a significant innovative profile and they tend to develop innovative activities through organizational or product innovations (Schreyer 2000; Tatum 2007).

Productivity: gazelles seem to have achieved better results as a consequence of implementing innovative solutions to both the technical and the managerial parts (Bares, Boiteux, Clerc-Girard, and Janczak 2006). As a result, they have managed to increase efficiency levels and to foster an increase in productivity in the market (Autio 2009).

Skilled personnel: It has been evidenced that the entrepreneurs of sustainable growing companies have better qualifications (Autio 2007). The more prepared and educated entrepreneurs in the company seem to provide it with a more developed capacity to adapt to the market environment as well as the use of new technologies (Krueger, and Kumar, 2004). Equally, training, motivation and principles and policy development are proved to be beneficial for the company's growth (Janczak, and Bares 2010).

Profitability: Despite the multiple studies linking company's growth with increase in profitability, total agreement has not yet been reached. While some studies report a positive correlation (Markman, and Gartner 2002; Coad 2007), others do not (Sexton, Pricer, and Nenide 2000; Sims, and O'Reagn 2006).

Although the factors described above help to characterise gazelles, the multiple combinations of those factors give rise to different types of companies with a high degree of heterogeneity (Delmar, Davidsson, and Gartner 2003). However, by limiting those factors we can achieve similarities that allow classifying the companies in groups.

Method

The development of this work has been carried out through the survey and subsequent analysis of a group of Spanish Information and Communication Technology (ICT) companies. The paper is composed of the following phases:

Sample Selection: The first criterion used to select the companies was that these belonged to the ICT sector. For this purpose, some activities extracted from the Spanish National Classification for Economic Activities (CNAE-93) have been chosen. The second criterion was that the companies were considered small or medium enterprises (SMEs: less than 250 employees). The following definition of gazelle was selected: A company will be classified as gazelle when their annual growth in terms of employment numbers and/or sales is greater than 20% over a three consecutive years and have been established for more than five years. In addition, for Micro SME companies (MSMEs), they have to employ at least four people at the end of the analysis period (2004-2007).

On that basis, a research of companies was carried out through the data platform eInforma, first company in Europe providing with online corporate commercial and financial information. A total of 15,147 ICT companies were identified, 420 of which matched the criteria for the sample selection, which represents 2,77 percent of the total. 75 percent of the gazelles identified were related to economic activities: consultation of IT applications and supply of IT programs (CNAE-7220) other IT related activities (CNAE-7260).

In order to be able to compare, after selecting 420 qualified gazelle, a set of another 420 non-gazelle companies (named standard) was selected.

Data collection: In order to characterise the companies with both profiles, a questionnaire was designed based on the factors impacting on high growth firms described before. The questionnaire consisted on 18 groups of questions divided into the 9 factors above. The companies had a three month period to complete the questionnaire and a website was set up for that purpose. During this period, several reminders (via

phone, email and facsimile) were sent to the companies that had not taken the time to answer.

A total of 87 answers were recorded. 40 of them coming from gazelles and 47 coming from non-gazelle firms. Answer rate recorded was 10,35%.

The table below shows the sample's most relevant data:

Table 1
Sample main information

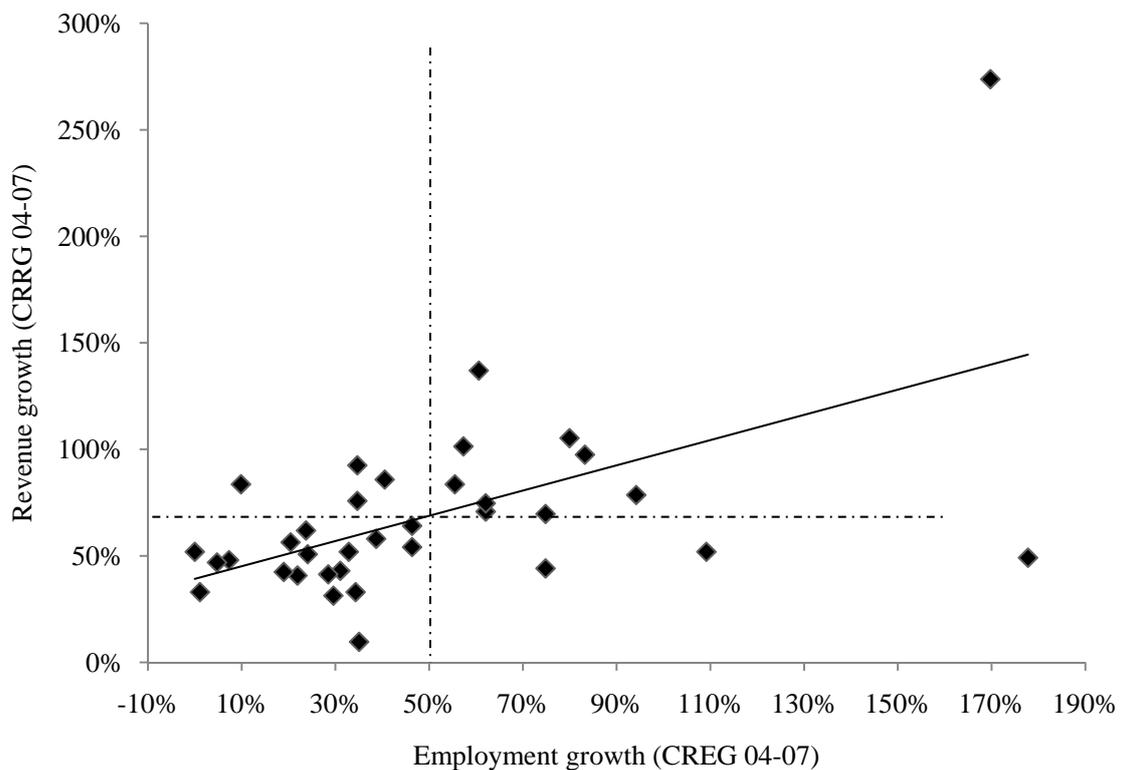
Number of ICT companies found in eInforma	15,147
Number of gazelles in the data base and success percentages	420 (2.77%)
Numbers of questionnaires sent to gazelles and success percentage	420 (50%)
Numbers of questionnaires sent to standard companies and success percentage	420 (50%)
Number of answers from gazelles and success percentages	40 (9.52%)
Number of answers from standard companies and success percentages	47 (11.19%)

Analysis: The methodology established for the analysis of these companies is composed of two major parts. First of all, comparative analysis between gazelle and non gazelle companies has been carried out. This analysis identifies how Gazelles differ from the standard business

Secondly, we performed a cluster analysis in which data is taken only from gazelles. As already indicated, there is heterogeneity in the growth profiles of Gazelles (Delmar, Davidsson and Gartner 2003). However, the intent is to identify groups with similar characteristics in companies that sharing a similar context despite being located in the same place and operating the same sector.

To perform the cluster analysis two variables are used: the compound rate of employment annual growth in the period stretching from 2004-2007 (CREG 04-07) and the compound rate of revenue annual growth rate in the same period (CRRG 04-07). These rates match the average annual cumulative growth of each variable between 2004 and 2007. These variables have been chosen given their importance to differentiate gazelles from standard companies. Five out of the 40 gazelle companies have been ruled out in first instance due to their extreme parameter values they showed. Below is the distribution of the values used in the analysis:

Figure 2.
Sample distributions of revenue and employment cumulative growth rates



The type of analysis is based on a k-means algorithm that assigns each point to the cluster whose centre is nearest. To perform this analysis two initial criteria have been established: the performance of 10 maximum iterations and the choice of the number of clusters. After scrutiny of the data panel, it is worth noting companies with values in the vicinity of the average ones, as well as companies that fall outside of the average values

(higher and lower than average). The initial intention to characterize gazelles from these three growth profiles makes us perform the study with three clusters.

Results

First of all, we present the results of the survey, comparing those obtained by the gazelles and the standard companies.

Results of the survey. As expected, the gazelles' growth is much higher than the standard companies'. In particular, during the period that analysis was undertaken (2004-2007), gazelles get a 138 percent growth figure in number of employees, compared with the 40 percent of the standard business. This result makes gazelles, most of which began as small companies with an average of 19.9 employees, get closer to medium size companies at the end of the period. On the other hand, the difference in income between the two groups is even greater, with an estimated average growth of 292 percent for gazelles over three years, compared to the 55 percent of the standard business.

Regarding demographic factors, both groups have similarly been running for a period of around 10 years. The only group that differs from the others is the gazelles with less than 10 employees, which have only been running for a 6.7 years on average. The breakdown of these companies by activities within the ICT sector is very similar, most of the companies providing software services.

From a competitiveness point of view, gazelles are leaders or following a niche strategy. Standard businesses tend to be in average positions. Gazelles are more likely to use strategic planning tools, (used by 73.7 percent of them) compared to 62.8 percent of the standard companies.

Nevertheless, there are no significant differences in the sources of financing both types of companies utilize. In both cases, around 80 percent of the companies initially tend to draw on their own resources or bank loans. As a second source of funding, both types of companies choose mostly by the same means, although more gazelles try to find

The high-growth firms tend to be more active in R&D. Although in both cases there is a high participation in projects of this type (70 percent of gazelles and 67.4 percent of standard companies), gazelles are normally involved on three times more projects in average. In particular, larger companies are more involved in international projects. The number of gazelle that participate in R&D programs with public funding is twice the number of traditional companies. The gap is even wider when it comes to international projects where gazelles are involved on average in 3.6 whereas standard companies in only 0.5. Collaboration with other agencies for R&D is also much higher in the case of high-growth firms in average. 37.5 percent of gazelles have partnerships with universities, compared to the 17.4 percent figure of standard companies.

From the point of view of innovation, most firms in both groups consider it as a factor of high importance for their main lines of business (66.7 percent gazelles and 57.8 percent standard business.) However, only a 52.5 percent of the high-growth firms deem that the profits obtained from R&D are higher than the costs, compared with 66.7 percent for standard companies. Nevertheless, in terms of productivity gazelles show better results than standard companies. Measuring productivity in terms of revenues per employee, Gazelles get in average 12 percent more than the others. However, measuring productivity in terms of profits per employee, the difference amounts to 115 percent.

In terms of staff training, both have more than 50% of highly qualified employees. However, gazelles have on average 70 percent of employees with university degree, compared with the 57 percent of the standard businesses.

To finalize the profile description of both groups of companies, the results are analyzed in terms of their profitability in the period of analysis (2004 – 2007). Interestingly, in 2004, gazelles reported average losses of €27.211, as opposed to the average profits reported by standard companies amounting to €12.902. However, during the next three years, gazelles outperformed by far standard business in terms of profitability. The maximum difference between the profits of both groups was reached in 2007 when the average profits of gazelles were 502 percent higher than average profits for the standard business. Differences in average profits between the two groups of companies keep increasing every year.

Results of cluster analysis: After the completion of cluster analysis it becomes evident that no sample has been excluded, so they are all classified. The analysis classified the samples with the following distribution.

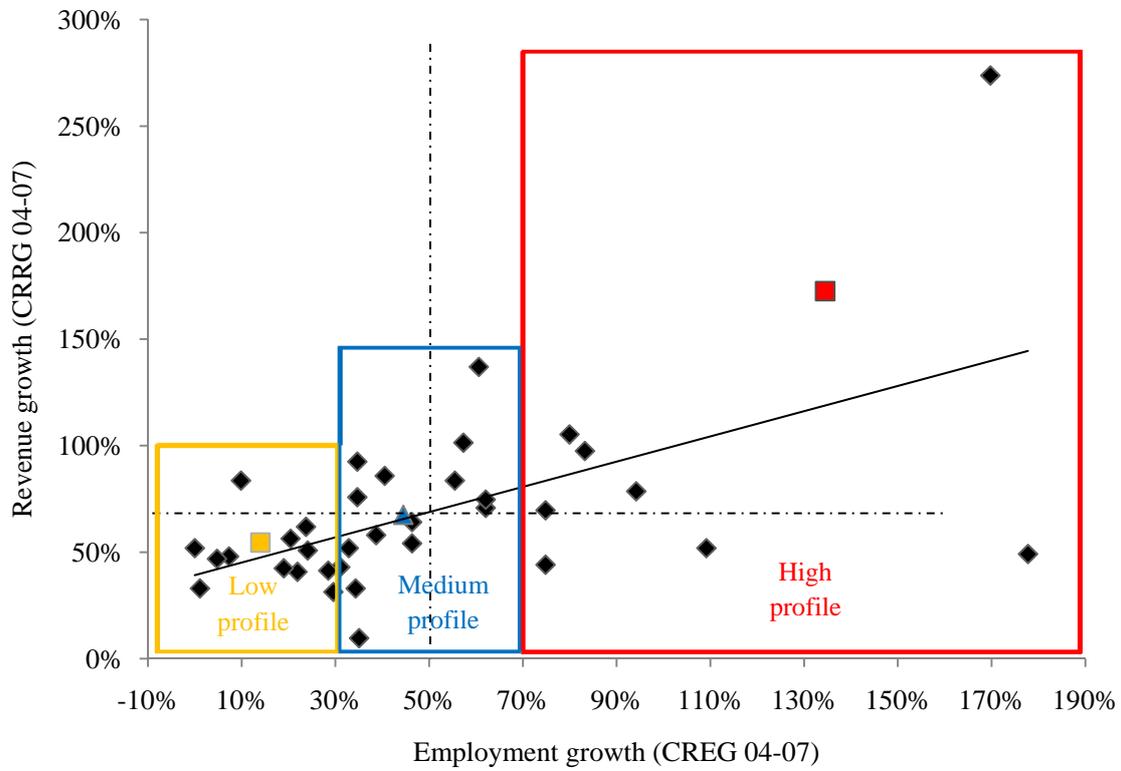
Table 2
Final cluster centres and number of cases in each cluster

Final cluster centers				Number of cases in each cluster		
	Cluster			Clusters		
	1	2	3			
Employment	14%	45%	135%	1		12,000
Turnover	55%	68%	173%	2		15,000
				3		8,000
				Valid		35,000
				Missing		0,000

Taking into account the results above, the following figure shows the final stage of the distribution of samples associated with their respective clusters and the specific characteristics of the firms belonging to each of them.

Figure 3.

Sample distributions of revenue and employment cumulative growth rates and cluster analysis results



Low profile: made of companies that have the lowest compound annual growth rates in both sales and employment. Data show that firms belonging to this group are at the end of its expansive phase. Gazelles of this cluster have a higher average age (11.3 years) since they were formed and average number of employees is higher (59.5). They show the highest levels of income, with a value close to three times as much as the companies in the intermediate cluster, although their profits are virtually identical to the companies of that cluster. This fact makes that their turnover per employee is much higher than for other companies in other clusters. However, their profits per employee do not keep up in the same proportion, which evidences a loss of efficiency in the business. They have a more international and research oriented profile than other firms: the average number of international projects undertaken is 10.5, compared to only one for companies in medium cluster. Also R&D turnover is three times higher than that of other two

clusters. However, they are the companies with least partnerships and collaboration formed. This shows that these companies have reached a stage of maturity that has slowed down their growth rates.

Medium profile: the average growth figures of this gazelles' profile amount to around 50 percent average annual growth in employment and 67 percent in turnover. Although they have a large number of employees (53.2 average), they are the youngest companies with an average age of 7.5 years. Gazelles of this cluster show a high level of competitiveness and efficiency as it is evidenced when comparing the ratios income/profits with low profile cluster companies. While they are mainly engaged in national and regional R&D projects, they also report one international project per company. They consider that R&D is a factor of paramount importance for the development of their business, however, they report low income levels attributed to R&D (14.3 percent). This result and the fact that they give more importance to R&D when working in collaboration with other institutions, demonstrates they are still in an early stage of their development and the results obtained through R&D progress at a slow pace. In general, this cluster is composed of expanding gazelles with still high growth rates but not far from reaching maturity.

High profile: Gazelles in this cluster report higher levels of employment and revenue growth of all companies analysed, although they constitute the smallest group. In terms of number of employees they are the smallest (25.5 employees), although their average age reported is 9.5 years. Despite their high levels of growth, firms in this cluster have the lowest levels of income and profits, both in absolute terms and per employee. They, however, seem to allocate more resources for commercial and business development purposes than other gazelles studied, so they need to increase their productivity figures, which is expected from its growth values. They operate mainly in the national market

(with 87.5 percent of companies operating in this area) and in their R&D programs, participating in national and regional project, but not international. As medium profile companies they are involved in R&D projects collaboration with other institutions, but their turnover due to R&D activities are still low (15.6 percent). In a nutshell, gazelles of this cluster are in the early stage of their development, reaching the highest rates of growth, but they need to increase in capabilities in order to be able to deal with new developments within the organizations.

The following table summarizes the most important facts that characterize the three clusters:

Table 3
Main indicators of each cluster

	Low profile	Medium profile	High profile
Cumulative Employment Growth Rate	16.8%	45.5%	109.8%
Cumulative Turnover Growth Rate	44.4 %	63.2 %	91.6 %
Employment growth (annual mean)	17.8 %	54.0 %	167.6%
Turnover growth (annual mean)	45.7%	67.3%	111.4%
Number of employees	59.5	53.2	25.5
Longevity (years)	11.3	7.5	9.5
International I+D Projects	10.5	1.0	0.0
Average income 2007	10,296,054 €	3,844,476 €	1,500,183 €
Average revenue 2007	552,533 €	534,746 €	43,976 €

Conclusions and discussion of results

The result of this research provides a comprehensive analysis of all factors in the characterization of high-growth companies. In light of the differences between gazelles and the standard companies we can observe how they satisfy all the assumptions drawn

from previous research papers, where they had studied independently. It thus reinforces the selection of these indicators as decisive factors in the behaviour of Gazelles.

The cluster analysis performed helps to determine three clear profiles of Gazelles from their growth parameters. This classification which can be associated with three stages in the companies' cycle, contributes to the study of the characterization of growth proposing a model that can be applied to companies in other contexts.

As for the practical contribution of the research results, we find out that they may be useful for both gazelles as well as other companies given the complete and detailed analysis of the factors that affect gazelle companies.

Gazelles can apply these methods of analysis to their strategic processes to monitor their development and remain in the path of growth. Regarding the latter, the results of the study provide guidelines for action to standard companies to determine the kind of activities that can be developed and imitate the performance of the high-growth companies. Although in both cases the results can be extended to other sectors, achieving higher levels of growth in the ICT sector may generate additional benefits over the rest of the economy. Given that the main activities of these companies consist in providing services for other companies, the growth of the companies in this sector may cause a spillover effect beneficial for the companies they interact with.

Having obtained the specific characteristics of the three phases of development of the Gazelles, the results of the study make possible to identify specific measures that can be undertaken by appropriate officers to promote the emergence of Gazelles and their development.

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