Industry, Management Capabilities and Firms' Competitiveness: An Empirical Contribution

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The aim of this paper is to contribute to the knowledge of strategic factors that explain the competitive position reached by firms in their activity sector.

We have used a survey carried out in 1999 on 287 executives that belong to the service sector in the province of Santa Cruz de Tenerife. We have analysed the differential factors that distinguish the strategic performance of competitive *vis-à-vis* non-competitive firms, by jointly assessing the variables representative of the sector (five competitive forces defined by Porter) and variables of an internal feature. Finally, we have moved the level of analysis from the industry to the firm; specifically, we have focused on managerial capabilities due to the significant role played by managers in the strategic decision-making process.

The use of cluster analysis to classify firms depending on their degree of competitiveness and the application of the *See5* induction algorithm of rules and decision trees to determine the differential factors that distinguish competitive from non-competitive firms, provide a methodological framework for the most significant contributions of this work. Copyright © 2004 John Wiley & Sons, Ltd.

INTRODUCTION

Throughout the 1980s, developments in the field of strategic management were almost exclusively based on the relationship between strategy and environment, and Porter's (1980) contributions were highly significant. Based on the structure–conduct–performance paradigm of industrial organization (Mason, 1949; Bain, 1959), this approach affirms that the conditions of the industry wherein firms carry out their activity have a decisive influence on strategy formulation to achieve sustainable competitive advantages, thereby conditioning the firm's economic returns.[1]

Despite being well accepted, the nature of this model as a unique explanatory guide of the entrepreneurial competitiveness has been questioned, with the appearance of a wide range of empirical works. These works have demonstrated that the structural characteristics of industries only partly explain differences in entrepreneurial returns (Schmalensee, 1985; Cool and Schendel, 1988; Hansen and Wernerfelt, 1989; Rumelt, 1991; Montgomery and Wernerfelt, 1991), while establishing a greater difference in returns between firms of the same sector than between firms from

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different ones. These questions led to a reconsideration of the importance of firms' *internal factors* as the grounds for business strategy and the basis of competitive success (*Resources based view-RBV-*).[2]

On this line, RBV has defended the fact that developing and maintaining competitive advantages is based on possessing a series of internal factors which, as they are largely intangible, mostly explains a firm's superior returns in its activity sector (Rumelt and Wensley, 1980; Wernerfelt, 1984; Rumelt, 1984). These resources have been considered as strategic if they are also heterogeneous, rare, valuable, imperfectly imitable and non-substitutable (Barney, 1991; Grant, 1991; Peteraf, 1993).

In this sense, numerous studies have positively correlated the achievements of a firm possessing certain intangibles such as R + D (Hirschey, 1982; Lev and Zarowin, 1998), software capitalization (Aboody and Lev, 1998), advertising expenses (Bubblitz and Ettredge, 1989; Chauvin and Hirschey, 1993), brands (Smiddy, 1983; Kim and Chung, 1997), covenants not to compete (Russell, 1990), or human capital strategic management and their impact on the value of the firm (Wright *et al.*, 1994; Truss and Gratton, 1994; Hand, 1998; Huselid, 1999).

However, despite the significant role played by managers in the strategic process (decisions about acquisition, development and deployment of organizational resources, the conversion of these resources into valuable products and the delivery of value to organizational stakeholders), this has not been sufficiently studied in the sphere of RBV. Faced with this circumstance, as explained by Castanias and Helfat (1991) and Lado *et al.* (1992), we understand that these can be potent sources of managerial rents and sustained competitive advantage.

Thus, for Ulrich and Lake (1990), the achievement of higher returns over a long period by the best-known organizations may be due to their managers' efficient decision-making processes, which enable them to develop sustained competitive advantages, in such a way that managers with superior human capital generate above-average firm performance (Castanias and Helfat, 2001).[3]

In this sense, Barney (1991) argues that '*Managers are important in this model, for it is managers that are able to understand and describe the economic performance potential of a firm's*

endowments. Without such managerial analyses, sustained competitive advantage is not likely'.

In line with this approach, therefore, the role of managerial capabilities is particularly significant. These are defined by Lado and Wilson (1994) as the unique capabilities of the organization's strategic leaders enabling them, firstly, to articulate a strategic vision and communicate it to the entire organization, providing its members with the power to carry it out (Wesley and Mintzberg, 1989) and, secondly, to foster a beneficial organization-environment relationship (Hambrick and Mason, 1984; Tushman and Romanelli, 1985).[4]

Finally, a manager's accurate perception of environmental structural conditions is a crucial first step towards correctly implementing strategies leading to business success in the long term (Day and Nedungadi, 1994). In this sense, Mahoney (1995) understands that the management team's attributes may satisfy conditions for achieving and maintaining competitive advantage. The management team is valuable when it exploits opportunities and/or neutralizes threats in a firm's environment.

These approaches seem to be in line with those of authors who consider the convergence of RBV towards a firm's internal factors to be excessive, as occurred in the 1980s with environmental conditions, which has led Barney (2001) to finally accept that '*A complete model of strategic advantage would require a full integration of models of the competitive environment with models of firm resources*'.

However, a revision of the strategic literature reveals that this integrative focus is not entirely novel, since there is currently a significant body of works from both a theoretical and empirical perspective.

In the theoretical sphere, rooted in industrial organization and organizational theories, the main contributions have attempted to explain a firm's competitive position based on a set of factors and how they interrelate: business position, industry environment, strategy and structure (White and Hamermesh, 1981), environment and organization structure (Lenz, 1981) or strategy, structure and environment (Miller, 1986). Following these lines, subsequent works such as those by White (1986), Levinthal (1997) or Siggelkow (2001) have highlighted the importance of internal and external fit to achieve a better position than competitors.

Among empirical contributions, studies by Grinyer *et al.* (1988), Hansen and Wernerfelt (1989), Collis (1991) or Rivkin (2000) have revealed that both external (market share, entry barriers or size) and internal factors (management style, control of human resources, complex strategies or working conditions, etc.) determine business success. For their part, Maijoor and Van Witteloostuijn (1996), Miller and Shamsie (1996) or Fahy (1996) have tested the positive relationships between industry and firms' resources.

Within this framework, the objective of the present study is to contribute empirical evidence that may be instrumental to a greater understanding of the factors behind the firm's competitive position, based on the joint consideration of both strategic trends. In order to achieve this, we have used a survey carried out in 1999 on 287 executives from the service sector in the province of Santa Cruz de Tenerife, where we analysed the differential factors that distinguish the strategic performance of competitive and non-competitive firms, by jointly assessing the variables representative of the sector in which the firm performs (five competitive forces defined by Porter) and variables of an internal feature (managerial decisions).

The use of the cluster analysis to classify firms according to their level of competitiveness based on managers' perception, and the application of the *See5* induction algorithm to determine differential factors that distinguish competitive from non-competitive firms, place our main contribution in the methodological field.

Our work has been structured as follows: the second section presents the methodology developed to achieve the previous objectives, the third describes the results obtained by applying the inductive analysis, and finally, we summarize the main conclusions.

METHODOLOGY

Characteristics of the Sample

The data were extracted from a survey carried out in 1999, whose main characteristics are set down in the card below:

- **Population**: 2368 small and medium size firms in the service sector located in the province of Santa Cruz de Tenerife, Canary Islands, Spain.

- **Direct Interview**: with the manager or top managerial position[5] undertaken by a field crew comprising of nine persons trained for this purpose.
- **Date of survey**: 5th and 30th April 1999.
- **Selection process**: 600 firms were chosen from the Economic Activity Tax list, according to a double stratification process, proportional to the weight of the strata (per activity sector and production branch) with a final simple random selection.
- **Completed Questionnaires**: 287 of the 600 firms initially chosen. This was due to the impossibility of physically locating 313 firms, owing to a lack of information concerning their business address or to business closure.
- **Sampling error**: lower than $\pm 5.5\%$, which guarantees 95.5% reliability.

From this initial sample of 287 firms, 38 questionnaires were eliminated because they belonged to low representational activities or because they lacked accurate information about their activity sector, and 76 questionnaires were eliminated due to absences in observations concerning some of the variables to be analysed. As a result, we obtained a final study sample of 173 firms, whose main characteristics are given in Chart 1:

- All the analysed firms belong to the service sector, where commercial activity predominates for 64% of the firms in the sample (Chart 1). The service sector was chosen for study because of its importance within the economic activity of Canary Islands, involving 86% of firms (Chart 2).
- Age is a distinguishing feature of the firms included in the sample: around 46% have been operating for over 10 years, while just over 9% have been doing so for 50 years. This data demonstrate a long-standing tradition of activity in commerce and services in the economic structure of Canary Islands.
- Individual firms and private limited companies constitute the legal framework preferred by the entrepreneurs polled, representing over 73% of the total sample (40.5 and 32.9%, respectively). This fact, along with a scant presence of public limited companies (16.2% of all firms), gives us an idea of the small size of Canary Islands' firms.
- The work force of almost 40% of the firms included in the sample is made up of 2 workers

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or fewer. On the contrary, firms that declare the presence of over 10 employees are fewer than 15%. These data, along with data shown in Chart 2, confirm the previous perception about the reduced size of firms.

Chart 1. Characteristics of the sample.

Main activity	N° Firms	%
Commerce	111	64.2
Hotel trade	18	10.4
Transport, Warehousing and Communications	8	4.6
Financial Intermediation	12	6.9
Real Estate Activities and Entrepreneurial Services	14	8.1
Other social activities and personnel services	10	5.8
Total	173	100

Distribution by age	N° Firms	%
Up to 5 years	48	31.5
Between 6 and 10 years	34	22.4
Between 11 and 25 years	30	19.7
Between 26 and 50 years	26	17.1
Over 50 years	14	9.3
Average age of firms in the sample	19,1	—

Distribution by legal personality	N° Firms	%
Individual firm	70	40.5
Public Liability company	28	16.2
Private limited company	57	32.9
Cooperative	1	0.6
Workers' Cooperative	3	1.7
Others	14	8

Distribution by number of workers	N° Firms	%
No salaried staff	22	12.7
From 1 to 2 salaried staff	46	26.6
From 3 to 9 salaried staff	80	46.2
From 10 to 19 salaried staff	9	5.2
From 20 to 49 salaried staff	12	6.9
From 50 or more	4	2.3

Source: Own elaboration.

The insular character of Canary Islands, their remoteness from main markets and a lack of industrializable natural resources have left their mark on the economic structure of the islands, giving rise to a high level of tertiarization based on tourism and commercial activities.[6]

Apart from large number of firms present in a limited market of long-standing tradition, firms in the service sector, particularly commercial ones, find up against a series of structural difficulties that call for a closer analysis of the factors that distinguish their competitiveness. These difficulties include:

- An insular nature and remoteness from the main continental markets have a marked effect on firms' commercial relations, restricting the size of the market in which they move, in most cases merely insular and not even regional. These circumstances preclude the appearance of economies of scale.
- Remoteness from external markets obliges firms to sustain higher costs due to transport overcharge, and, subsequently, to create greater stocks of raw materials and manufactured products.
- Being an international tourist destination gives rise to greater commercial density in tourist areas and a unique profile of commercial activities associated with this sector (high fragmentation, smaller size businesses, specific products).
- The predominance of small size firms was altered by the appearance of superstores in the early 1990s, with subsequent changes in consumer purchasing habits. The result of this new situation is that traditional businesses are permanently seeking a formula to increase their competitiveness.

Chart 2. Canary Firms. Distribution by activity and number of workers.

Total	Total		Industry		Construction		Services	
	100,008	100%	5,891	6%	8,378	8%	85,739	86%
No salaried staff	51,044	51%	2,239	38%	3,387	40%	45,418	53%
From 1 to 2 salaried staffs	27,085	27%	1,651	28%	1,893	23%	23,541	27%
From 3 to 9 salaried staffs	15,411	15%	1,302	22%	1,848	22%	12,261	14%
From 10 to 19 salaried staffs	3,532	4%	369	6%	630	8%	2,533	3%
From 20 to 49 salaried staffs	2,002	2%	235	4%	416	5%	1,351	2%
From 50 or over	934	1%	95	2%	204	2%	635	1%
Total salaried staff	100,008	100%	5,891	100%	8,378	100%	85,739	100%

Source: INE (2003)

Firm Classification: Competitive–Non-competitive

The achievement of this research's objective requires a classification design to differentiate between competitive and non-competitive firms, and a way in which to assess firms' competitiveness.

Business competitiveness has traditionally been understood from the perspective of market success (Michalet, 1981; Mathis *et al.*, 1988). In this sense, a firm is considered competitive when it is capable of maintaining or increasing its sales volume compared with the total sales of the market where it operates.

Despite the fact that market share has been explained by economies of scale, market power, and product quality valuation as a determining factor for business returns (Jacobson, 1988), there is no conclusive empirical evidence of this relationship on the basis of these variables.[7]

Alternatively, developments in the field of Industrial Economics and the firm have explained that, aside from the possible cause–effect relation between market share and returns, both elements may be simultaneously affected by specific factors, such as industry structure, the adopted competitive strategy or internal resources, particularly intangibles.

Nevertheless, despite the decisive role of intangible assets (Itami, 1987; Teece *et al.*, 1994; Markides and Williamson, 1996; Teece, 1998), they have been permanently absent from the models that attempt to assess business competitiveness.[8]

This circumstance is essentially justified by the following arguments:

- Normal accountancy systems do not incorporate intangible assets as an integral part of equity, owing to difficulties of identification and valuation (Grant, 1991; Wallman, 1995; Wallman, 1996).

- Only some intangible assets can be protected with property rights through patents, reproduction rights, brand registration, etc. (Hall, 1992).

Despite these difficulties, we understand that a complete framework aiming to measure and assess business competitiveness cannot be restricted to quantitative indicators, but it must explicitly include measurements of the firm's qualitative results through their possession of intangibles and competencies.[9]

Chart 3 shows the variables used in our research to assess the level of business competitiveness. The guidelines for the selection process were as follows:

1. We adopted a multi-dimensional scale by combining quantitative indicators of positioning in the product market (market share, profits and performance), with measurements of the qualitative results achieved by firms thanks to the possession of intangible assets. We used a subjective assessment method by which firms' managers made a self-assessment of their organization compared with industry competitors.[10]

2. Based on a revision of the literature, we have chosen the intangibles usually considered as key factors to business success (Hansen and Wernerfelt, 1989; Hall, 1992; Hall, 1993; Amir and Lev, 1996; Brooking, 1997; Grant, 1997; Lev and Zarowin, 1998; Aboody and Lev, 1998; Young, 1998; Vickery, 1999, etc.). This choice was combined with the operative aims of the questionnaire, which limited the number of indicators considered.

For this measurement, we used a method of subjective assessment by which the entrepreneur should position himself according to the degree of advantage perceived in relation to competitors and to the 14 indicators selected (Chart 3). For this, we used a Likert scale from 1 to 3 (1 = very advantageous situation; 3 = very disadvantageous situation).[11]

Chart 3. Variables used to determine firms' level of competitiveness.

1	Market share	8	Managers' educational background
2	Profits	9	Customer royalty
3	Returns	10	Supplier loyalty
4	Technological provision	11	Location of establishment
5	Financial management	12	Employees' professional know-how
6	Quality of products-services	13	Employees' commitment and loyalty
7	After sales service	14	Firm's reputation

We applied a cluster analysis to the 173 firms in the sample to avoid subjectivity when categorizing firms as competitive or non-competitive and to be able to work simultaneously with the 14 indicators selected.

Cluster is a multi-variant analysis whose main purpose is to categorize individuals into groups, so that the characteristics of individuals belonging to the same group are as homogeneous as possible between them and highly heterogeneous in relation to those of other groups. The classifying method applied in this case was the *k*-means cluster analysis.[12]

By applying the cluster analysis, three conglomerates of firms have been obtained (non-competitive, average level of competitiveness and competitive). The valuation of the *F* statistic from the variance analysis led us to observe a limited level of significance in the indicator 'location of establishment',[13] in relation to the remaining variables. This circumstance led us to perform a second cluster analysis by only taking into account the thirteen remaining variables. Chart 4 illustrates the final distribution of the groups.

Chart 4.   Distribution of the sample by conglomerates.

Conglomerate	Number
Conglomerate 1. Non-competitive Firms	38
Conglomerate 2. Average level competitive Firms	80
Conglomerate 3. Competitive Firms	55

Source: Own elaboration.

Chart 5.   Variance analysis.

Variable	*F*-Statistic	Significance
Market share	39.480	0.000
Profits	42.014	0.000
Returns	50.893	0.000
Technological provision	84.294	0.000
Financial management	48.970	0.000
Quality of products-services	27.156	0.000
After sales service	25.845	0.000
Managers' educational background	61.608	0.000
Customer loyalty	31.649	0.000
Suppliers' loyalty	19.569	0.000
Employees' professional know-how	56.875	0.000
Employees' commitment and loyalty	35.524	0.000
Firm's reputation	30.829	0.000

Source: Own elaboration.

For the latter, the values attained by the *F* statistics of the 13 variables considered (Chart 5) reveal the positive contribution that each made towards group distinction. The variables that contributed most information to defining firms according to their level of competitiveness were: technological provision, managers' educational background, employee know-how, performance and financial management.

Variable Selection

Once the groups of firms have been constituted, we select the variables that allow us to assess the differential aspects that distinguish the strategic behaviour of competitive *vis-à-vis* non-competitive firms. To this end, we have sounded out managers' opinions by considering two types of variables:

1. Perception about the attraction of their activity sector: based on the five competitive forces defined by Porter (degree of rivalry between existing competitors, likelihood of new competitor entry, threat of substitute products or services, supplier and customer negotiating power). For each of them, the manager was to position himself on a Likert scale of 1–3 (1 = very high, 2 = high, 3 = normal) (Chart 6).
2. Managers' strategic decisions with regard to: the way to compete in the product market, specialization, investment, technological innovation, internationalization and business growth (expansion and diversification). The manager was to position himself between the different alternatives given according to their degree of correspondence with the activities undertaken by his firm.

Analytical Technique

To achieve the ultimate goal of our research (evaluation of the differential aspects that distinguish competitive from non-competitive firms), based on the joint assessment of the variables considered, we have used Quinlan's See5 package (1997).

This package descends from the Concept Learning System introduced by Hunt *et al.* (1966). This algorithm performs successive binary participations of the explanatory variables, through inductive learning[14] to construct a classification tree. This tree is constructed so that,

Chart 6

Variables represented in the study	Scale of the variables
(a) Industry variables.	
Perception about number of competitors	1 - Very high, 2 – High, 3 – Normal
Perception of rivalry between competitors	1 - Very high, 2 – High, 3 – Normal
Perception about the likelihood of new competitor entry	1 - Very high, 2 – High, 3 - Normal
Perception about the threat of substitute product or service entry	1 - Very high, 2 – High, 3 - Normal
Perception about supplier negotiating power	1 - Very high, 2 – High, 3 - Normal
Perception about customer negotiating power	1 - Very high, 2 – High, 3 - Normal
(b) Managerial decision variables	
	Generic strategies
Way of competing in the product market	1- Price, 2 - Quality, 3 - Both
	Specialization
Customer specialization	1- All customers, 2 - Segments
Specialization in range of products	1- All ranges, 2 - Specific range
Specialization by geographical areas.	1 - All areas, 2 - Specific areas
	Investment
Investment decisions	1 – New installations, 2- Renewal of installations, 3 - Research
	Technological innovation
Incorporation of informatics tools	1 - Yes, 2 - No
	Internationalization
Area of activity	1 – Local, 2 - Island, 3 - Provincial, 4 - Regional, 5 - National, 6 - International
Relevance of imports over purchases	1 - Very high, 2 - High, 3 - Low, 4 - Null
Relevance of exports over sales	1 - Very high, 2 - High, 3 - Low, 4 - Null
	Business expansion
Business Expansion	1 - Yes, 2 - No
Expansion: development in traditional markets and products	1 - Yes, 2 - No
Expansion: new products, traditional markets	1 - Yes, 2 - No
Expansion: new markets, traditional products	1 - Yes, 2 - No
Diversification: new markets, new products	1 - Yes, 2 - No

Source: Own elaboration.

according to an enthropic measurement or quantity of information, the variable contributing the most information is chosen in each partition.

Using the tree, easily interpretable classification rules are elaborated facilitating a definition of the characteristics that most differentiate between the two initially established groups: competitive and non-competitive firms. The rules are constructed according to the principle of Minimum Description Length (MD), which guarantees a percentage of classification successes almost as high as those obtained with the tree.

The advantages of this algorithm include a greater explanatory capacity, with simpler, easily understood models that are more user-friendly than those obtained by other inductive methods (artificial neuronal networks), or by methods of multi-variant analysis (discriminant or logit). Furthermore, through its learning process, this algorithm is known for its greater capacity to filter the noise that accompanies subjective information (surveys), while offering better results when the number of individuals (cases) is not very high (as occurs in our research).

In addition to the reasons mentioned above, this choice of technique is justified by its greater flexibility, since no previous hypothesis about data structure and interactions is required, and it is not subject to the normality restrictions of variable distribution, or to their dichotomic characteristics. Chart 7 shows the Kolmogorov–Smirnov normality contrast and how the variables considered in our study as potentially explanatory are far removed from reality.

For an easier identification of variables differentiating between competitive and non-competitive firms, we have excluded average competitive level firms from the *See5*, which has reduced the analysis sample to 93 cases: 38 non-competitive and 55 competitive. Sixteen of these 93 have been

Chart 7.   Normality test for explanatory variables. Kolmogorov–Smirnov test.

Explanatory variables	Kolmogorov–Smirnov Z	Asintotic significance (bilateral)
Perception about number of competitors	4.441	0.000
Perception of rivalry between competitors	3.268	0.000
Perception about the likelihood of new competitor entry	3.994	0.000
Perception about the threat of substitute product	4.669	0.000
Perception about supplier negotiating power	4.962	0.000
Perception about customer negotiating power	4.313	0.000
Ways of competing in the product market	5.370	0.000
Specialization in customers	4.789	0.000
Specialization in product range	5.098	0.000
Specialization by geographical areas	5.044	0.000
Investment decision	4.579	0.000
Incorporation of informatics tools	5.526	0.000
Area of activity	5.530	0.000
Relevance of imports over purchases	3.086	0.000
Relevance of exports over sales	5.217	0.000
Expansion: development in traditional markets and products	2.948	0.000
Expansion: new products, traditional markets	4.892	0.000
Expansion: new markets, traditional products	4.107	0.000
Diversification: new markets, new products	2.948	0.000

Source: Own elaboration.

Chart 8.   Decision tree for differentiating between competitive and non-competitive firms.

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Business expansion = No:
: ..............Incorporation of informatics tools = No: Non-competitive (17.5 / 3.5)
: .............. Incorporation of informatics tools = Yes:
:                    :........... Perception about number of competitors = Very high: Competitive (7.0/1.0)
:                                  Perception about number of competitors = High: Competitive (4.0)
:                                  Perception about number of competitors = Normal: Non-competitive (7.5/1.5)
Business expansion = Yes:
:................... Degree of specialization by geographical areas = All: Competitive (22.8/0.6)
                    Degree of specialization by geographical areas = Specific:
                            :............Investment decisions = Renewal of installations: Competitive (9.8/1.0)
                                          Investment decisions = Research: Non-competitive (1.4)
                                          Investment decisions = New installations:
                                          ........Likelihood of new competitor entry = Very high: Non-competitive (1.0)
                                                  Likelihood of new competitor entry = High: Competitive (2.0)
                                                  Likelihood of new competitor entry = Normal: Non-competitive (5.0)
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Source: Own elaboration.

reserved for the validation process, leaving the training sample with 48 competitive and 29 non-competitive firms, which will be used to generate the decision tree and rules.

RESULTS

The results obtained from applying the *See5* algorithm, by interpreting the decision tree (Chart 8) and the set of generated rules (Chart 9), have enabled us to discover the variables that mark the biggest strategic differences between competitive and non-competitive firms. The comparative analysis of these firms will be complemented with a descriptive reading of the survey results (Appendix A).[15]

The *Business Expansion* variable is presented as contributing most information, dividing the tree into two main branches. Thus, approximately 69% of correctly classified competitive firms show a positive attitude towards growth (branch 2), as opposed to an identical percentage of non-competitive firms that have not expanded their business (branch 1).

In this manner, as shown in Appendix A, expansion in the same activity sector[16] is revealed as the strategic growth option most frequently implemented by all the firms analysed and is

Chart 9. Decision rules for differentiating between competitive and non-competitive firms.

Rule 1: (coverage 20)
Degree of specialization by geographical areas = All
Business expansion = Yes
- > Competitive class (0.955)

Rule 2: (coverage 22)
Investment decisions = Renewal of installations
Business expansion = Yes
- > Competitive class (0.917)

Rule 3: (coverage 6)
Likelihood of new competitor entry = High
Investment decisions = New installations
- > Competitive class (0.875)

Rule 4: (coverage 4)
Perception of number of competitors = High
Incorporation of informatics tools = Yes
Business expansion = No
- > Competitive class (0.833)

Rule 5: (coverage 26)
Perception of number of competitors = Very high
Incorporation of informatics tools = Yes
- > Competitive class (0.821)

Rule 6: (coverage 6)
Likelihood of new competitor entry = Normal
Degree of specialization by geographical areas = Specific
Investment decisions = New installations
- > Non-competitive class (0.875)

Rule 7: (coverage 17)
Incorporation of informatics tools = No
Business expansion = No
- > Non-competitive class (0.789)

Rule 8: (coverage 7)
Perception of number of competitors = Normal
Incorporation of informatics tools = No
Business expansion = No
- > Non-competitive class (0.778)

Rule 9: (coverage 5)
Investment decisions = research
- > Non-competitive class (0.714)

Source: Own elaboration.

specially relevant for competitive firms. The latter, in comparison with non-competitive firms, are also distinguished by a greater propensity towards incorporating new goods and/or services as opposed to marketing similar products and a decided inclination towards seeking new markets rather than expanding into similar ones.

RBV argues that the expansion of firms' activities towards new products and/or markets is based on an excess of resources and capabilities susceptible to multiple uses, from which the firm will maintain or develop sustainable competitive advantages. Firms with an excess of specific physical and intangible resources will more likely grow in the direction of business which is proximal or similar to their original activity (Montgomery and Wernerfelt, 1989; Chatterjee and Wernerfelt, 1991). This is the behaviour demonstrated by the majority of the competitive firms polled.

Descending the first branch of the tree, we discover managers' strategic attitude towards technological innovation as a second level discriminatory factor, which is represented by the variable *Incorporation of New Informatics Tools*. The 46% of correctly classified non-competitive firms have neither included an informatics tool nor expanded their business (Rule 7), whereas competitive firms show a greater awareness of this strategic requirement (Appendix A).

The apparent simplification of identifying technological innovation with the incorporation of new informatics tools is justified by the decisive role that they play as a basis for incorporating the wide range of possibilities offered by the new information and communication technologies, thereby facilitating the decision-making process and providing new marketing channels.

Bearing in mind the profile of the firms analysed (essentially commercial services) for the latter case, the role of Internet, as indicated by Porter (2001), is especially significant, since it has created new opportunities for both supply and demand to articulate and develop sustainable competitive advantages based on cost and differentiation.

Executives in competitive firms demonstrate greater skilfulness at conceiving, developing and exploiting information technologies. These results are in accordance with those obtained by Powell and Dent-Micallef (1997) and Mata et al. (1995), which determine the likelihood of achieving competitive advantages from information

technology based on the existence of other intangible resources.[17]

The *Perception of the Number of Competitors in the Industry* variable is seen as having the smallest classificatory capacity of those that make up the first branch of the tree. This capacity is significant for competitive firms, since 52% perceive the number of competitors as high or very high (rules 4 and 5).

Taking into account the fact that 86% of Canary firms belong to the service sector (INE, 2003) and that this coincides with the entire sample analysed, we can infer that competitive firms have a more accurate perception of environment complexity.[18] This result establishes a link with previous research emphasizing managers' skilfulness at accurately perceiving the environment as being a determining factor of business returns, since it conditions the definition of successful strategies (Day and Nedungadi, 1994; Liao and Greenfield, 1997).

From the RBV, obstacles in the way of a correct perception and adaptation of the industry would be explained by a firm's lack of resources and capabilities, such as deficient entrepreneurial capacity or insufficient organizational means (for example, information systems).

An analysis of the second branch of the tree reveals the *Degree of Firm Specialization by Geographical Area* as a second level differentiating factor, by correctly classifying 46% of competitive firms under the commercial strategy of cornering the entire market (branch 2). In the same sense, decision rule 1 demonstrates that approximately 40% of these firms perform in a much wider geographical area, besides showing a positive attitude towards business expansion.

These issues explain why the majority of competitive firms market their goods and/or services in regional, national or international markets, while non-competitive firms focus their performance on a local market (Appendix A).

In this second branch, *Investment Decisions* are presented as a third level explanatory factor when establishing differences between competitive and non-competitive firms. Thus, 42% of the correctly classified competitive firms have made some effort to renew and modernize their productive structure (Rule 2).

In this fashion, despite the fact that the efforts made to incorporate new installations reveal no performance differences between competitive and

non-competitive firms in this sphere, renovating existing facilities, the investment strategy most frequently used by executives from both kinds of firms, is especially significant for competitive ones (Appendix A).

The perception variable *Likelihood of New Competitor Entry* is situated as a final differentiating factor (fourth level). Analysis suggests that 11% of competitive firms consider this likelihood as high (rule 3), as opposed to the less dynamic view of non-competitive firms, 19% of whom qualify this as a normal risk (rule 6). These results strengthen the argument about the greater complexity and accuracy with which competitive firms perceive competitive conditions in their activity sector.

Chart 10 shows the high classificatory capacity obtained from the rules and decision tree. For the first case, the success index figures as 89%, while the percentage of well classified firms, according to the nine rules generated, is placed at 92.2%.

Given that these values refer to 'training data', we have applied two types of analysis incorporating the *See5* algorithm to validate the accuracy and capacity of the results obtained: firstly, a crossvalidate analysis; and secondly, a validation analysis of the classificatory capacity of this model with the 16 firms previously reserved for that purpose.

The crossvalidate analysis enables us to recalculate the decision tree based on different initial samples. The new samples are obtained by eliminating one case each time the process is repeated. The random composition of the samples has led us to repeat this procedure 50 times, with a mean error of around 12% and a typical deviation of 1.4%. The new decision rules and trees obtained in this process confirm the importance of the previous variables for distinguishing the strategic performance of competitive *vis-à-vis* non-competitive firms.

Chart 10. Classificatory capacity of rules and decision tree.

Training data assessment (77 cases):

Decision tree		Rules	
Size	Errors	N°	Errors
10	8 (10.4%)	9	6(7.8%)
(a)	(b) < - classified as		
44	4 (a): Competitive class		
2	27 (b): Non-competitive class		

Source: Own elaboration.

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Chart 11. Classificatory capacity. Validation sample.

Validation data assessment (16 cases):

Decision tree		Rules	
Size	Errors	N°	Errors
10	0 (0.0%)	9	0 (0.0%)
(a)	(b)	< - classified as - - - -	- - - -
7		(a): Competitive class	
	9	(b): Non-competitive class	

Source: Own elaboration.

This is also confirmed by the decision trees obtained for the 16 firms in the validation sample, whose classificatory capacity reached 100% (Chart 11).

CONCLUSIONS

The results from the analysis defined in the previous pages have enabled us to comprehend the strategic variables that largely explain the competitive position of a sample of firms.

For this purpose, we have jointly assessed variables representative of the characteristics of the industry where the firm performs (economic paradigm), based on the five competitive forces defined by Porter, with variables characteristic of the organizational paradigm, which locate the firm's internal factors in the epicentre of competitive success. For the latter, we have concentrated on managerial capabilities because of the significant role played by executives in the strategic decision-making process.

The results from the *See 5* induction algorithm indicate that both groups of variables intermingle when explaining the competitive position achieved by firms. However, in the first branches of the tree, the strategic variables providing most information for differentiating between competitive and non-competitive firms belong to the internal category (*Decisions about Business Expansion, Incorporation of new Informatics Tools* and *Degree of Specialization of the Firm by Geographical Area*), while external variables (*Perception about the Number of Competitors in the Activity Sector* and *Likelihood of New Competitor Entry*) are less significant.

The important classificatory capacity, demonstrated by these variables in the *See5* induction analysis, and the low percentage of error when cataloguing new firms not included in the initial sample, highlight the importance of these factors for explaining the competitive capacity of the firms analysed.

In this sense, we would like to point out that the methodological process is the most relevant contribution of this work, and more specifically in the following aspects:

- The data have been extracted from a survey aimed at the top executives of the firms analysed: the main figures in the decision-making process. This has enabled us to include, in the classification process, measurements of the qualitative results with intangible resources.
- Cluster analysis has been used to objectively classify firms as competitive and non-competitive, depending on an ample group of indicators (14 variables). It has permitted us to overcome the arbitrary nature that usually characterizes competitive positioning studies, since it is normally the researcher who classifies firms using a small number of variables.

  Moreover, applying the *See5* induction algorithm of rules and decision trees has enabled us to identify the factors that contribute most information for differentiating between competitive and non-competitive firms. This artificial intelligence technique provides qualitative information with a better fit, as opposed to the multivariant statistical techniques most frequently used in this kind of study.
- The characteristics of the sample analysed—small and medium size firms in the service sector—compared with the usual tendency of this kind of research, aimed at large firms (especially in the industrial sector).

A straightforward reading of the results obtained leads to the conclusion that a joint consideration of both internal and external factors is important when analysing the causality chain of entrepreneurial competitiveness. Therefore, it would be advisable to continue along these lines of integrative research, which seeks to create one single model from the incorporation of the two trends that endeavour to explain competitiveness: internal resources and capabilities and explanatory industry factors.

APPENDIX A: ANALYSIS OF THE FREQUENCY OF THE VARIABLES IN THE SURVEY

Variables	Competitive	Non-Competitive	Differences
	Significant variables according to *See5*		
Business expansion	Yes: 71% No: 29%	Yes: 34% No: 66%	● Significant differences regarding decision to expand.
Incorporation of informatics tools	Yes: 82% No: 16%	Yes: 53% No: 47%	● Competitive firms tend to incorporate informatics tools.
Perception about number of competitors	High-Very high: 78.18% Normal: 21.82%	High-Very high: 52.63% Normal: 47.37%	● Competitive firms, unlike non-competitive firms, perceive their environment as having a larger number of competitors.
Degree of specialization by geographical areas	All: 53% Specific: 38%	All: 16% Specific: 71%	● Competitive firms have a wider sphere of action than their non-competitive counterparts.
Investment decisions	Renewal of installations: 69% Research: 11% New installations: 20%	Renewal of installations: 53% Research: 8% New installations: 39%	● The strategic option preferred by competitive firms is to renew and modernize existing installations
Perception of the likelihood of new competitor entry	High-Very high: 58.18% Normal: 41.82%	High-Very high: 36.84% Normal: 60.53%	● Competitive firms perceive a greater likelihood of new competitor entry.
	Insignificant variables according to *See5*		
Perception of rivalry between competitors	High-Very high: 78% Normal: 22%	High-Very high: 74% Normal: 26%	● There is hardly any difference in the perception of the degree of rivalry between competitors.
Perception of threat of substitute products or services	High-Very high: 44% Normal: 55%	High-Very high: 38.2% Normal: 58.6%	● No great differences are appreciated in the degree of perception about the threat of substitute products or services.
Perception of suppliers' negotiating power	High-Very high: 40.20% Normal: 59.80%	High-Very high: 45.25% Normal: 54.75%	● There is no great difference between both groups of firms regarding supplier negotiating power.
Perception of customer negotiating power	High-Very high: 52.23% Normal: 46.77%	High-Very high: 48.2% Normal: 50.8%	● There is hardly any difference in customer negotiating power.
Decisions about ways of competing in the market	Prices: 16.7% Quality: 77.8% Joint: 5.6%	Prices: 27% Quality: 73% Joint: (-)	● Unlike non-competitive firms, competitive firms tend to give priority to quality more than price.
Customer specialization	Unspecialised: 65% Specialised: 29%	Unspecialised: 53% Specialised: 37%	● Competitive firms target wider segments of the market.
Product specialization	Unspecialised: 47% Specialised: 45%	Unspecialised: 49% Specialised: 50%	● There are barely any differences between both groups of firms.

Sphere of action	International: 10.9% National: 9.1% Other islands: 43.6% Local: 36.4%	International: (−) National: 2.6% Other islands: 23.7% Local: 73.7%	● Non-competitive firms tend to limit their actions to the local market, unlike competitive firms who adopt a more global attitude.
Relevance of imports over purchases	High-Very high: 38.9% Normal-Low: 59.6%	High-Very high: 40% Normal-Low: 58.8%	● There are few differences in importing behaviour.
Relevance of exports over sales	High-Very high: 5.70% Normal-Low: 94.3%	High-Very high: 2.9% Normal-Low: 97.1%	● Although there is a minor difference, competitive firms show a greater tendency to export.
Product expansion	Similar: 25.6% New: 71.8%	Similar: 39.5% New: 61.5%	● Both groups prefer to develop new products, though this tendency is greater with competitive firms.
Market expansion	Similar: 29.6% New: 70.8%	Similar: 55.6% New: 44.4%	● There are differences in the strategic preferences of each group.

Source: Own elaboration.

Notes

1. Along these lines, works such as those by Caves and Porter (1977), Porter (1980, 1985), Miller (1986), Miller and Friesen (1986) and Buzzell and Gale (1987) analyse the environmental conditions in which a firm would obtain a higher level of returns.

2. In spite of the initial contribution of Penrose (1959), the official birth of this approach is usually given as 1984 with the initial contributions by Wernerfelt (1984), though it is understood that development did not take place until several years later with the appearance of new theoretical and empirical studies by authors such as Barney (1986), Dierickx and Cool (1989), Aaker (1989), Prahalad and Hamel (1990), Barney (1991), Grant (1991), Hall (1992), Peteraf (1993), or Amit and Schoemaker (1993). Priem and Butler (2001) illustrate RBV's high degree of penetration, having detected since 1991 works with this approach in thirteen of the eighteen essential research subjects in the strategic area defined by Schendel and Hofer (1979).

3. It is true that managers are as much responsible for their organization's success as they are for its failure (Penrose, 1959; Reed and DeFillipi, 1990; Castanias and Helfat, 1991; Lado and Wilson, 1994).

4. Harris and Helfat (1997) use Becker's classification (1964) suggesting that, at a basic level, managerial function consists of three types of capabilities: (a) generic capabilities that are transferable throughout sectors and firms, (b) sector-specific capabilities and (c) firm-specific capabilities. It is precisely the latter which forms the basis of exclusive achievements in the market (Castanias and Helfat, 1991; Harris and Helfat, 1997).

5. As shown by Chart 2, firms in Canary Islands are generally small. This circumstance explains why in many of the cases polled the manager was also the owner of the firm.

6. The Archipelago of the Canaries (Spain) comprises of seven islands and currently has a population of 1.7 million. It is located at over 1800 km from Madrid and almost 3000 km from Brussels, and, after the French DOM is the second outermost region in the European Union. According to the data from 2001, the Canaries, with 10.7 millions of foreign visitors is the leading tourist region in Spain (IET, 2003), a country that holds second place in the world tourism ranks (WTO, 2003). Tourist consumption in the Canaries represents around 40% of domestic consumption, which confirms the significant effect of tourist demand on the local market.

7. Proof of this is the fact that an image of quality often calls for a perception of exclusiveness, which is incompatible with high market shares (Porter, 1980); that the likelihood of competitor expansion may prevent firms from exercising their market power despite their large share (Fisher et al., 1983); or that an efficient minimum scale may be achieved with a relatively small market share (Schmalensee, 1987).

8. In this sense, Dierickx and Cool (1989) point out that, 'a number of scholars have expressed concern

that much of the strategy literature focuses too narrowly on privileged product market positions as a basis for competitive advantage and above-normal returns (Gabel, 1984; Wernerfelt, 1984; Barney, 1986). The fact that resource bundles need to be deployed to achieve or protect such privileged product market positions is often overlooked'.

9. Chakravarthy (1986), using a comparison between seven firms in the electronics sector recognised as being excellent (Peters and Waterman, 1982) with another seven non-excellent firms, confirms that the traditional economic-financial indicators of performance and sales cannot sufficiently explain the differences between the two groups of firms. Thus, he proposed using measurements that consider two aspects: (a) the quality of strategic changes regarding a firm's capacity of fit, and (b) the degree of satisfaction of the organization's interest groups and the running of the organization.

10. There is certain empirical evidence that subjective managerial assessments are generally quite consistent with objective business performance (Dess and Robinson, 1984; Venkatraman and Ramanujam, 1986; Smith *et al.*, 1989), avoiding some of the problems involved in the latter. With this method, performance assessment does not depend on individual perceptions, but on objective indicators either published or accessible through a database. Restricted information and a tendency towards the use of single item scales are its main limitations.

11. Linguistic scales (for example, low, medium, high) are always preferable to numeric scales for subjective assessment methods, since the use of language reduces the respondent's bias when being questioned about complex and vague variables (Zadeth, 1965; Zimmer, 1983; Schwenk, 1984; Rangone, 1997).

12. This procedure is the most appropriate when attempting to identify groups of relatively homogeneous cases, based on a series of characteristics selected according to the likelihood of establishing a more accurate classification of individuals by allowing re-allocations between groups. With this method, the set of individuals is divided into conglomerates, so that at the end of the process each case belongs to the cluster whose centre is closest to it. The Euclidean distance is the measurement used to establish the proximity between each case and the centre of its respective cluster. The centre of the cluster is given by the mean number of individuals who make up each variable.

13. In cluster analysis, the *F* statistic may only be used for a descriptive purpose, since the conglomerates have been created to maximize the differences between cases from different groups. Despite this, the relative size of the statistics provides information about the contribution of each variable to group separation.

14. Inductive learning is particular amongst learning techniques based on examples and its task is to induce rules from the historical data available. Each example must have the same consistent structure in a conclusion (decision) and a number of characteristics or attributes that define this conclusion or decision. Subsequently, a generalization process is produced in such a way that the decision tree correctly classifies the examples given. Furthermore, this tree is characterized as being optimum in the sense that it minimizes the number of attributes required for reaching the conclusion-decision.

15. Appendix A includes an analysis of the frequencies obtained for each (relevant and irrelevant) indicator incorporated into the survey used as initial information for this research.

16. By following Ansoff's (1965) approach to the growth vector, in addition to an increase in sales of current products in traditional markets, we have considered the introduction of current products into new markets or the sale of new products in traditional markets as decisions to expand. We have reserved using the term diversification for delimiting the simultaneous entry of the firm into new markets with new or similar products.

17. According to Keen (1993), the main difference between the economic and competitive benefits that firms obtain from information technology is due to managerial and not technical differences.

18. According to Jurkovich (1974), an environment is considered complex when there is a high number of elements affecting the firm, since this is significant for a good course of business. In the same way, a simple environment will have a small number of environmental elements that are significant for good organizational performance.

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