An Alternative Methodology for Testing a Resource-Based View Linking Intangible Resources and Long-Term Performance

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ABSTRACT

The aim of this study is to discuss, from a theoretical and an empirical perspective, the linkage between a group of intangible resources and performance in Spanish SMEs (small to medium enterprises). The relationship between intangibles (reputation, quality, participative managerial style and strategic attitude) and performance was tested using hierarchical segmentation as an alternative methodology. This study is one of the first attempts of using hierarchical segmentation modelling to monitor the relationship between intangible resources and performance in Spanish SMEs. The results of the empirical study are statistically significant and show a positive relationship between a group of intangible resources and organisational performance.

Key Words: Intangible Resources; Competitive Advantage; Performance and Hierarchical Segmentation Modelling.

INTRODUCTION

This paper proposes an alternative methodology to test the relationship between intangible organisational resources and performance. The methodological tool utilised in the empirical study to test the

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resource-based view (RBV) was an application of hierarchical segmentation modelling. The influence of these intangible resources was measured through management perceptions based on a study of Spanish SMEs.

THEORY DEVELOPMENT: BACKGROUND

In the early 1980s, a strategic explanation of competitiveness and of a firm's success was generally held to lie within the structure-conduct-performance paradigm, which was advocated by the Positioning School (Porter, 1985) and accepted by industrialists. These ideas gradually gave way to a 'new' perspective: the resource-based view of the firm. This emphasised the importance of a firm's resources as the prime generator of sustainable competitive advantage (Wernerfelt, 1984; Grant, 1991).

RBV theory identifies intangible resources as those which essentially drive and determine organisational performance (Penrose, 1959; Wernerfelt, 1984; Prahalad and Hamel, 1990; Barney, 1991; Teece, Pisano and Schuen, 1997). The contributions of Aaker (1989) and Hall (1992) affirm that a 'resource' is that which is owned or possessed, and a 'capacity' or 'skill' is something that must be realised. According to Cuervo (1999) however, skills are interactions between resources. This occurs in such a way that capabilities become linked to 'abilities' in order to develop resources and/or competencies. It is noted from research that not all resources may be deemed 'strategic' (Grant, 1991). The literature foresees that an asset may be termed strategic[1] when it fulfils a series of prerequisites, that is when the asset is scarce, valuable, inimitable and non-substitutable (Barney, 1991).

The importance of the intangible nature of resources, as constituting a competitive factor that is both difficult to create and imitate is nothing new; authors such as Itami (1987), Aaker (1989) and Hall (1992) previously showed the importance of intangible factors as a source of sustainable competitive advantage.

It is relatively common to come across extremely restrictive definitions of resources that include only those items that may be subject to objective evaluation, such as physical assets (Jacobson, 1992). Jacobson highlights the plethora of empirical analyses orientated towards measuring the capacity of tangible resources as a

means of explaining the differences in profitability levels between businesses. He goes on, however, to underline the dearth of research of this type that looks at determining the actual role of intangible resources.

Studies that steered resource theory towards an analysis of intangible resources and their capacity for generating sustainable competitive advantages, and thus improved performance, were somewhat scarce until the publication of two seminal works by Hall (1992 and 1993). These studies set out two types of classifications for intangible resources:

- Assets and Skills: among those intangible resources that are classified as assets are commercial brands, patents, copyrights, registered designs, contracts, commercial secrets, reputation and networks of personal and business contacts. Skills on the other hand take in human capital and culture.
- Resources that are dependent on personnel or persons and those that are independent: the former include human capital (employees, distributors, suppliers, etc.), organisational culture, reputation and networks. The latter include those intangible resources that are independent of people and include contracts, licences, commercial secrets, intellectual property rights and databases.

As a result of his research, Hall (1992: 140–141) found that the intangible resources that most significantly influence the potential capacity of firms to generate sustainable competitive advantages are the firm's reputation, the reputation of the product, employee know-how and the organisational culture.

The dependent variable in this study is the firm's performance. This has been the object of considerable controversy in relevant literature (Venkatraman and Ramanujan, 1986). There would seem to be no clear agreement regarding what is the most important indicator of performance. The bibliographical review carried out in this study would however indicate that there are four significant and distinct blocks of indicators: profitability indicators (Venkatraman and Ramanujan, 1986), growth or market position indicators (Pettus, 2001), sector-adjusted economic profitability indicators (Dehaene, De Vuyst and Ooghe, 2001) and subjective performance indicators (Powell, 1996).

This analysis uses sector-adjusted average economic profitability for the period 1994–1997. It formulates a hypothesis which expresses the positive relationship between a firm's performance and the presence of intangible resources within the organisation. The analysis takes this hypothesis as its starting point. Managerial perceptions are used to proxy the presence of these intangibles. It is important to highlight that all the variables utilised are taken from the literature reviewed within this study (Likert, 1961; Buzzel, Bradley and Sultan, 1975; Dees and Davis, 1984; Barney, 1986; Weigelt and Camerer, 1988; Fombrun and Shanley, 1990; Juran, 1990; Hall, 1992 and 1993; Brown and Perry, 1994; Doppler and Lauterburg, 1998). The constructs used to analyse the item-based intangibles are however derived from the variable reduction statistical technique known as Principal Components Analysis. The research output contained results which were not entirely consistent with those contained within the pertinent literature of the study bibliography (Hall, 1992).

EMPIRICAL STUDY: OBJECTIVES, SAMPLE AND METHODOLOGY

This empirical study attempts to identify those intangible resources that affect a firm's profitability. These resources are measured by referring to the perceptions of company managers. Specifically, the analysis sets out hypotheses that look at the relationship between levels of profitability and factors such as reputation, quality, managerial style and strategic attitude. The hypothesis to be tested states that a firm's profitability will increase when:

H1: its reputation improves
H2: there is an increased orientation towards quality
H3: participative management styles are introduced
H4: greater levels of strategic attitude are perceived within and by the management.

The sample population used for the empirical model was taken from the Ardán data base (financial and economic data of Spanish SMEs) and was made up of 166 Spanish SMEs, all of which possessed the ISO 9000:1994 quality certificate. The sample was finally reduced

to 72 firms. The data gathered via postal surveys and personal interviews with management personnel focused on their perceptions of the presence of a series of intangible resources within their respective organisations.

After a preliminary analysis of the data and the subsequent purging of the original data set, the study was carried out using 61 of the 72 firms for which data was obtained.

The methodology was carried out as follows:

1. The four factors corresponding to Reputation (NREPUTAC), Quality (NQUALITY), Participative Managerial Style (NSTYLE) and Strategic Attitude (NATTITUDE) were established using main components analysis, based on items evaluated on a seven-point Likert scale.
2. The factorial scores (metric variables) were transformed into categorical variables (ordinal) by using the quartiles of the corresponding distributions. As a result there were four groups for each variable, each containing four observations.
3. A hierarchical segmentation was carried out based on the dependent variable (Average Economic Profitability) in three categories, in order that each category had the same number of cases (low, medium and high profitability). The categorical variables cited in previous paragraphs were used as explanatory variables.
4. A factorial analysis of the variance was carried out in order to detect which of the four (ordinal category) constructs significantly affected the Average Economic Profitability criteria variable, in this case measured on a metric scale. A further hierarchical segmentation was then undertaken, in order to check the extent to which the results of the ANOVA were corroborated; also in order to discover which factors best explained the metric criteria variable.

RESULTS AND DISCUSSION

Table 4.1 gives the most important statistical values for the 'criteria' variable used in the study. The Average Economic Profitability for the four-year period immediately prior to the field study was converted into an ordinal categorical variable with three levels

Table 4.1: Dependent Variable Statistics

	Statistic
Mean	0.1036
Median	0.0937
Variance	0.0379
Standard deviation	0.0616

(low, medium and high),[2] in such a way that each of the groups contained the same number of observations.

For a better understanding of the contents of each of the profitability groups, Table 4.2 sets out the basic statistics grouped according to the three basic categories (low, medium and high profitability).

Table 4.3 exhibits the results of the Principal Components Analysis used in the elaboration of the four constructs that serve as explanatory variables for economic profitability.

In accordance with the methodology proposed, four new ordinal variables were created, based on the factorial scores derived from the factorial elaboration of the four constructs described above. Quartiles were used as a means of converting the metric variables into categorical variables. As a result, four groups were obtained which each contained an identical number of observations for each of the constructs being considered.

The main goal of the analysis is to use the set of four explanatory tetratomic profitability variables, in order to discover which of them exerts a significant influence on the criteria variable, and which of them are the best predictors. The CHAID[3] algorithm, which is provided by the SPSS AnswerTree application, is utilised as the basic tool for carrying out this analysis. The tree that is generated can be seen in Figure 4.1.

The tree contains six nodes, four of which are final nodes. The most significant variable in terms of explaining economic profitability is the Quality variable ($p = 0.0000$; $\chi^2 = 46.30$, degrees of freedom $= 1$).

The firms that fall into the lower categories of the Quality variable (groups 1 and 2) are also those firms that scored worst in terms of economic profitability. Nineteen (65.5 per cent) of these firms

Table 4.2: Levels of Profitability

		Statistic	SE
Group 1 Low Economic Profitability	Mean	0.0444	0.0045
	Median	0.0487	
	Variance	0.0004	
	Deviation	0.0201	
	Minimum	0.0032	
	Maximum	0.0710	
	Range	0.0678	
Group 2 Medium Economic Profitability	Mean	0.0940	0.0035
	Median	0.0937	
	Variance	0.0003	
	Deviation	0.0158	
	Minimum	0.0714	
	Maximum	0.1236	
	Range	0.0522	
Group 3 High Economic Profitability	Mean	0.1730	0.0111
	Median	0.1581	
	Variance	0.0025	
	Deviation	0.0496	
	Minimum	0.1243	
	Maximum	0.3386	
	Range	0.2142	

SE: Standard Error

obtained low profitability, ten (34.4 per cent) medium profitability, whilst none whatsoever obtained high profitability levels. The scenario was effectively reversed for those firms in the high Quality categories (levels 3 and 4). The vast majority of these firms obtained either high or medium levels of profitability, 62.50 per cent and 34.38 per cent respectively. Only one of the firms (3.13 per cent) belonging to the high Quality category obtained low profitability.

For the firms in the low Quality categories (1 and 2), the Reputation variable ($p = 0.0098$; $\chi^2 = 7.9142$, degrees of freedom $= 1$) is the only one that goes some way to explaining profitability. These results therefore indicate that the better the firm's reputation, the more

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Table 4.3: Principal Components Analysis: Constructs

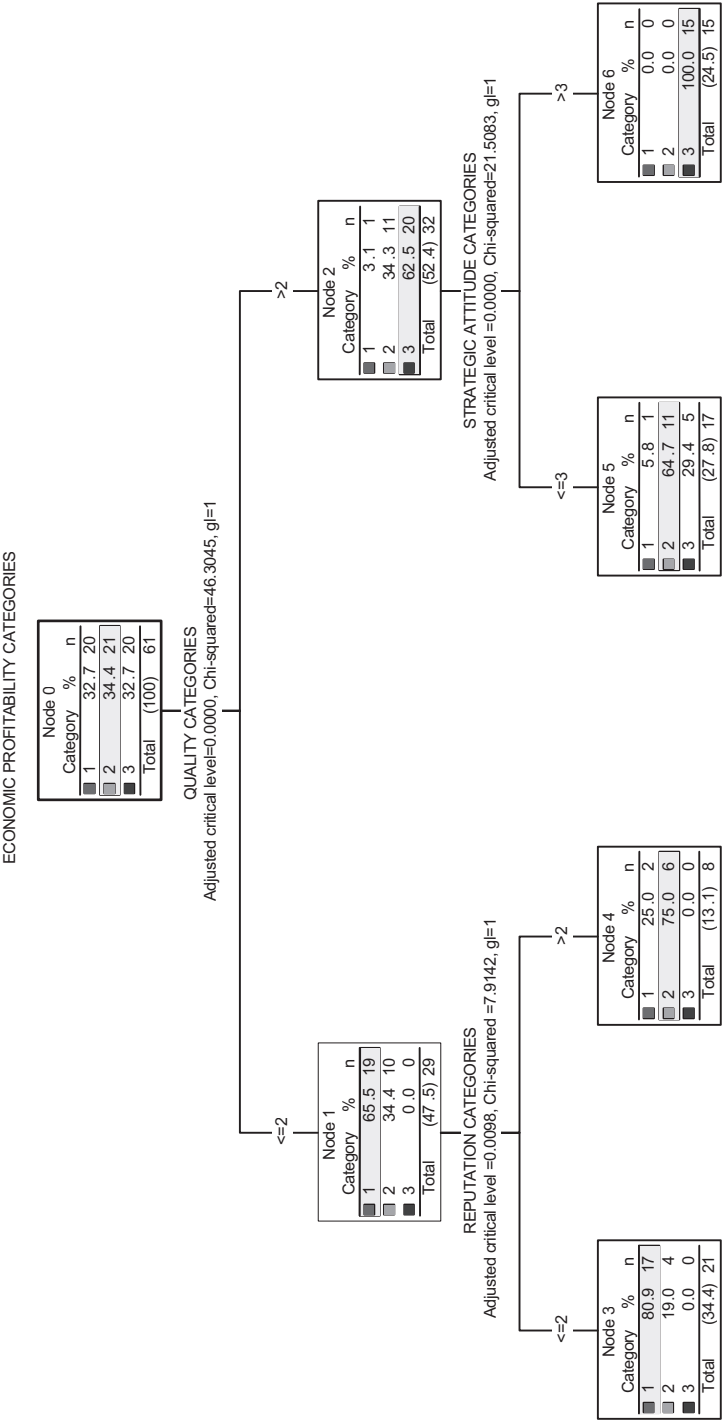| Factors	Factorial Score
Items	
Reputation (NREPUTAC) (Alpha = 0.71; KMO = 0.715)	
Firm's social compromise	0.814
Financial position	0.757
Monitoring of established objectives	0.686
Presence of quality products	0.593
Prestige of management	0.570
Quality (NQUALITY) (Alpha = 0.68; KMO = 0.68)	
Quality control	0.807
Customer-tailored product development	0.797
Annual quality planning	0.797
Participative Managerial Style (Alpha = 0.57; KMO = 0.606) **(NSTYLE)**	
Subordinate–director interaction	0.807
Effective ascendant vertical communication	0.776
Attraction–tenure of skilled personnel	0.657
Managerial confidence in subordinates	0.341
Strategic Attitude (NATTITUDE) (Alpha = 0.57; KMO = 0.609)	
Quality of the explicit formulation of strategies	0.836
Team work	0.768
Predisposition to change	0.530
Effectiveness of the implementation of strategies	0.520

KMO: Kayser-Meyer-Olkin Measure
Alpha: Cronbach's Alpha

positively the criteria variable evolves, although evidently without reaching high levels of profitability. Similarly, of the firms in the first and second levels of the Quality category, 80.95 per cent of those that were deemed to have a low Reputation obtained low levels of

Figure 4.1: Hierarchical Tree 1

ECONOMIC PROFITABILITY CATEGORIES

Node 0		
Category	%	n
1	32.7	20
2	34.4	21
3	32.7	20
Total	(100)	61

QUALITY CATEGORIES
Adjusted critical level=0.0000, Chi-squared=46.3045, gl=1

<=2 | >2

Node 1		
Category	%	n
1	65.5	19
2	34.4	10
3	0.0	0
Total	(47.5)	29

Node 2		
Category	%	n
1	3.1	1
2	34.3	11
3	62.5	20
Total	(52.4)	32

REPUTATION CATEGORIES
Adjusted critical level =0.0098, Chi-squared =7.9142, gl=1

STRATEGIC ATTITUDE CATEGORIES
Adjusted critical level =0.0000, Chi-squared=21.5083, gl=1

<=2 | >2

<=3 | >3

Node 3		
Category	%	n
1	80.9	17
2	19.0	4
3	0.0	0
Total	(34.4)	21

Node 4		
Category	%	n
1	25.0	2
2	75.0	6
3	0.0	0
Total	(13.1)	8

Node 5		
Category	%	n
1	5.8	1
2	64.7	11
3	29.4	5
Total	(27.8)	17

Node 6		
Category	%	n
1	0.0	0
2	0.0	0
3	100.0	15
Total	(24.5)	15

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profitability. The majority of those with better reputations, on the other hand, were able to obtain medium levels of profitability (75 per cent).

On looking at the high Quality categories (3–4), it is found that the Strategic Attitude variable ($p = 0.0000$; $\chi^2 = 21.5083$, degrees of freedom $= 1$) only really helps to explain the criteria variable in the analysis. This result indicates that the companies within the high quality levels, and which also have a strong strategic attitude (groups 3 and 4) are assured high levels of economic profitability (100 per cent). Conversely, if the firms are to be found in the lower levels of the Strategic Attitude category they, more often than not, obtain medium levels of profitability (64.71 per cent), given that those with low profitability levels constitute a figure of only 5.88 per cent and those in the maximum category 29.41 per cent.

As a consequence, there are four clearly distinguishable groups of firms, differentiated according to their levels of profitability:

- Group I: organisations with low levels of reputation and quality which, in the main, fall into the low profitability category (80.95 per cent of the firms that make up the group).
- Group II: organisations with high levels of reputation and low levels of quality, the majority of which fall into the medium profitability category (75 per cent of the firms that make up the group).
- Group III: organisations with high levels of quality but relatively low levels of strategic planning; firms that form part of medium profitability category (64.71 per cent of the group members). 29.41 per cent of the firms that obtained high profitability levels are to be found in this group.
- Group IV: organisations with high levels of quality and a strong orientation towards strategic planning. 100 per cent of these firms achieve high profitability.

It is worthwhile mentioning that none of the firms in groups I and II attained high levels of profitability, whereas none of the firms in group IV sustained either low or medium levels of profitability.

Table 4.4 provides a matrix of the classification and the risk estimation[4] for the process carried out. The table indicates that more than 80 per cent of the cases are classified correctly. Specifically, 100 per cent of the high profitability firms are classified correctly,

Table 4.4: Classification Matrix

Risk Estimation	0.196721	**Actual Categories of Performance**			
SE of the Risk Estimation	0.0508972	**1**	**2**	**3**	**Total**
Estimated Categories of Performance	1	17	4	0	21
	2	3	17	5	25
	3	0	0	15	15
	Total	20	21	20	61

80.9 per cent of the low profitability firms, and just 68 per cent of the medium profitability firms.

As Figure 4.1 shows, Participative Managerial Style has no significant effect. Thus the hypothesis tested in this analysis and laid out above is only partially verified. Quality has a significant effect on levels of profitability, reputation only has an influence when the firm's quality levels are low, and strategic managerial outlook when firms are positioned within the higher echelons of the quality ranking.

The factors that explain economic profitability may also be explained by using the criteria variable (economic profitability) on the metric scale. Table 4.5 provides the factorial analysis of the variance. It can be observed that, with the exception of Participative Managerial Style, the rest of the variables have a significant effect on the criteria variable ($p < 0.05$).

A hierarchical segmentation is now carried out in order to discover which of the variables perform as the best predictors. Figure 4.2 provides the tree generated by the CHAID.

In this case the tree has nine nodes, six of which are final nodes. In contrast to the previous analysis, the most significant variable for explaining economic profitability is now Reputation ($p = 0.0000$; $F = 51.31$). The firms that are to be found in the lowest set of the Reputation variable (group 1) are those that maintain the lowest scores in the criteria variable, having an average economic profitability of 4.39 per cent. Those firms that are located in the intermediate categories (2 and 3), on the other hand, possessing a Reputation of level 3 or 4 have an average profitability of 9.37 per cent which is slightly

Table 4.5: Factorial Analysis of Variance

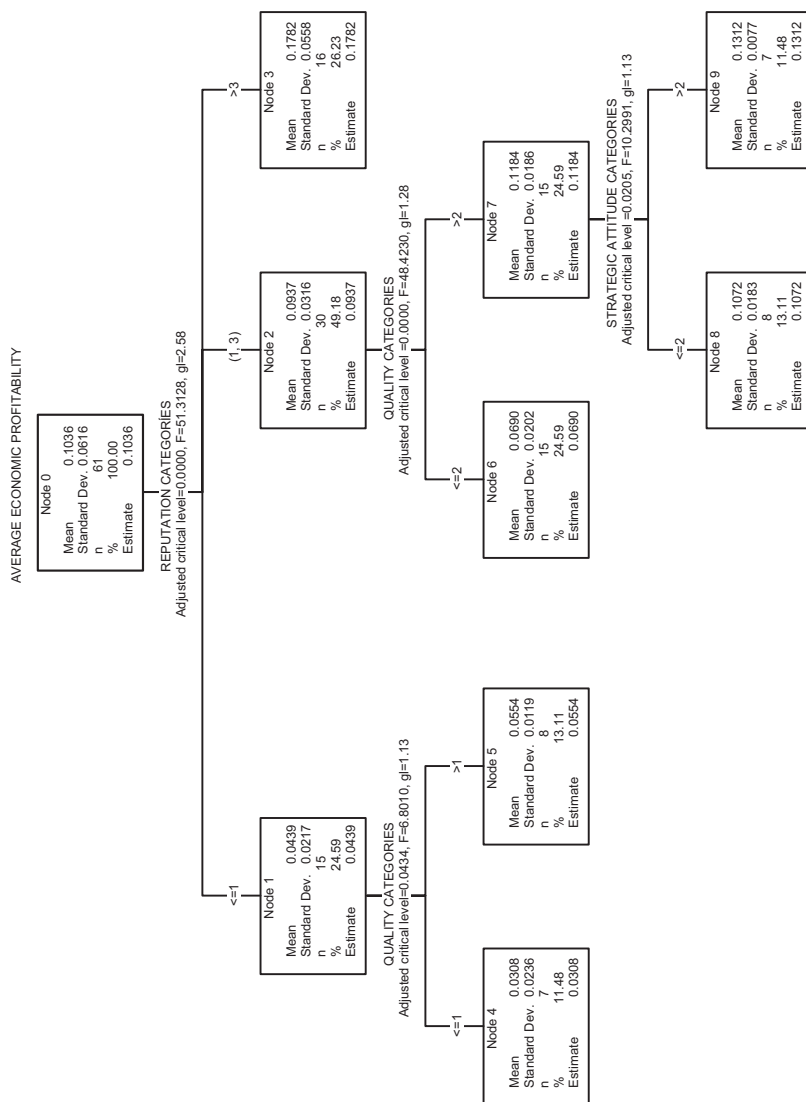| Dependent Variable: AVERAGE ECONOMIC PROFITABILITY					
Source	Sum of type III squares	gl	Quadratic Mean	F	Significance
Model	0.831[a]	13	6.390E-02	70.408	.000
NATTITUDE	1.212E-02	3	4.038E-03	4.449	.008
NQUALITY	9.385E-03	3	3.128E-03	3.447	.024
NSTYLE	3.646E-03	3	1.215E-03	1.339	.273
NREPUTAC	1.529E-02	3	5.098E-03	5.617	.002
Error	4.266E-02	47	9.076E-04		
Total	.873	60			

[a]R squared = .951 (R squared corrected = .938)

higher than those of the previous group but lower than the highest reputation group which had an average profitability of 17.82 per cent.

For the lowest Reputation group, the Quality variable helped to explain the profitability level ($p = 0.0434$; $F = 6.80$): the low quality group (1) has an average profitability of 3.08 per cent, slightly lower than the other three groups in the higher categories (5.54 per cent). Quality is also influential in the profitability of the medium Reputation groups ($p = 0.0000$; $F = 48.4230$): the groups with low levels of quality (1–2) had an average economic profitability of 6.9 per cent whilst the high quality groups (3–4) maintained an average of 11.84 per cent. It is this latter group in which Strategic Attitude has the capacity to explain profitability levels ($p = 0.0205$; $F = 10.2991$) given that in the groups with lower levels of strategic positioning (1–2) average profitability (10.72 per cent) is significantly lower than in higher categories for the same variable (13.12 per cent).

Thus, the tree that appears in Figure 4.2 allows us to establish the following groups:

- Group A (average profitability = 17.82 per cent): made up of firms belonging to the high reputation group (4).

Figure 4.2: Hierarchical Tree 2

AVERAGE ECONOMIC PROFITABILITY

Node 0
Mean	0.1036
Standard Dev.	0.0616
n	61
%	100.00
Estimate	0.1036

REPUTATION CATEGORIES
Adjusted critical level=0.0000, F=51.3128, gl=2.58

<=1 → Node 1

Node 1
Mean	0.0439
Standard Dev.	0.0217
n	15
%	24.59
Estimate	0.0439

QUALITY CATEGORIES
Adjusted critical level=0.0434, F=6.8010, gl=1.13

<=1 → Node 4

Node 4
Mean	0.0308
Standard Dev.	0.0236
n	7
%	11.48
Estimate	0.0308

>1 → Node 5

Node 5
Mean	0.0554
Standard Dev.	0.0119
n	8
%	13.11
Estimate	0.0554

(1, 3) → Node 2

Node 2
Mean	0.0937
Standard Dev.	0.0316
n	30
%	49.18
Estimate	0.0937

QUALITY CATEGORIES
Adjusted critical level =0.0000, F=48.4230, gl=1.28

<=2 → Node 6

Node 6
Mean	0.0690
Standard Dev.	0.0202
n	15
%	24.59
Estimate	0.0690

>2 → Node 7

Node 7
Mean	0.1184
Standard Dev.	0.0186
n	15
%	24.59
Estimate	0.1184

>3 → Node 3

Node 3
Mean	0.1782
Standard Dev.	0.0558
n	16
%	26.23
Estimate	0.1782

STRATEGIC ATTITUDE CATEGORIES
Adjusted critical level =0.0205, F=10.2991, gl=1.13

<=2 → Node 8

Node 8
Mean	0.1072
Standard Dev.	0.0183
n	8
%	13.11
Estimate	0.1072

>2 → Node 9

Node 9
Mean	0.1312
Standard Dev.	0.0077
n	7
%	11.48
Estimate	0.1312

- Group B (average profitability = 13.12 per cent): made up of firms belonging to the intermediate reputation group (2–3), medium to high quality levels (3–4) and high levels of strategic attitude (3–4).
- Group C (average profitability = 10.72 per cent): firms with an intermediate level reputation (2–3), medium to high quality levels (3–4) and low levels of strategic attitude (1–2).
- Group D (average profitability = 6.90 per cent): made up of firms belonging to the intermediate reputation groups (2–3) and those of low quality (1–2).
- Group E (average profitability = 5.54 per cent): firms with low levels of reputation (1) and medium to high levels of quality (2–3–4)
- Group F (average profitability = 3.08 per cent): firms with low levels of reputation (1) and low levels of quality (1).

The risk estimation[5] in this second tree is of 0.000975234 (Standard Error (SE) = 0.000429501). As with the previous tree, there is no level in Figure 4.2 at which Participative Managerial Style has a significant effect. The hypotheses tested within this study are therefore only partially verified, in the sense that, given the results provided by the second tree, Reputation significantly affects profitability levels. Quality only has an influence when the firm belongs to medium or low level Reputation groups and not high level goups. Finally, Strategic Attitude only affects two of the six groups analysed.

CONCLUSIONS

The empirical study broadly verifies the explanatory power of the conceptual framework defined by the RBV. The RBV framework corroborates the relationship that exists between a firm's store of intangible assets and the possession of competitive advantages, which in turn produces higher levels of performance. Therefore, the hypothesis being tested that posits a positive relationship between economic profitability and the set of intangible assets under scrutiny is verified, but is subject to the caveats and limitations formulated below.

More specifically, Hierarchical Segmentation Methodology allowed the analysis not only to capture the main underlying relationships, but also to classify these relationships according to the extent to

which they affected the dependent variable. The methodology also provided the logical foundations for building sets of firms divided according to different levels of profitability (dependent variable) based on intangible factors measured as independent categorical variables.

Thus it may be affirmed that:

- Independently of how the criteria variable is defined (categorical or metric), there is a relationship of positive dependency between economic profitability (dependent variable) and the explanatory variables of reputation, quality and strategic attitude. Participative managerial style fails to have a significant influence on performance in every case.
- There is a hierarchical element to the factors that influence profitability. Further, whilst each of the different variables is capable of explaining profitability to a different degree, this explanatory power is also conditioned by the different levels of the other independent variables.
- When profitability is classified in terms of different levels, it is found that quality is the foremost factor when it comes to explaining different levels of organisational performance. Reputation only has an influence, and always positively, in those organisations that are situated amongst the ranks of those firms with low levels of quality. Strategic attitude, on the other hand, has an influence that appears to be capable of setting different levels of performance in those firms in which there is greater emphasis placed on quality.
- When profitability is defined as a metric variable, it is reputation that best defines the evolution of performance. This result is so evident that it can be affirmed that those firms with strong, consolidated reputations need no other intangible assets in order to assure the highest levels of profitability. The rest of the firms, on the other hand (that is, those organisations that lack high levels of reputation), need to fall back on quality, a factor that moderates the profitability of all the firms within the lower reputation groups. Strategic attitude would improve profitability in those firms that possess medium levels of reputation and high levels of

quality. Strategic attitude has no influence on any other groups of firms.

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1 A review of the different conceptual frameworks that have been used in analysing the strategic nature of resources appears in Fernández and Suárez (1996: 76–77).
2 The three stepped levels of profitability were defined using the centiles 33 and 66 for the corresponding frequency distributions, as the limits of the intervals for each profitability levels.
3 CHAID: Chi-Squared Automatic Interaction Detector.
4 When the criteria variable is categorical (nominal or ordinal), the risk is calculated as a proportion of the cases making up the sample that are erroneously classified by the tree.
5 When the criteria variable is continuous, the risk is calculated as the variance within the node compared to the average of the node.

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