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Abstract

Purpose – The purpose of this paper is to reveal and empirically validate a new typology of company strategic profiles regarding intangible resources.

Design/methodology/approach – The study is carried out in three steps. The first stage comes to identify the coordinates of intangibles in which strategic profiles are found. The second stage enables a clusterization of more than 1,600 European companies observed during seven years in the coordinates of intangibles. The last step introduces comparative analysis of these clusters in terms of their performance.

Findings – As a result of empirical analysis three strategic profiles regarding intangibles are discovered. Two of these profiles are called intangible-intensive as they demonstrate clear predominance of a particular set of intangibles. The innovative profile is associated with intensive investment in innovation and networking capabilities. The conservative profile puts emphasis on managerial capabilities and development of business process. The non-intangible-intensive profile, that has been called moderate, evenly allocates resources among intangibles keeping them on a low level relative to the intangible-intensive profiles.

Practical implications – This research is useful for practitioners in strategic and knowledge management. It provides insight into common features of company strategies for intangibles as well their impact on short- and long-term performance.

Originality/value – This work contributes to the field of strategic knowledge management by demonstrating a new relevant typology in company behavior regarding intangibles. Moreover, it equips decision makers in companies with a tool to design strategic vision in intangibles.

Keywords Cluster, Intangible-intensive strategy, Intangibles, Strategic profile

Paper type Research paper

1. Introduction

In the late 1970s and early 1980s, different strategic typologies were proposed by scholars like Miles *et al.* (1978), Porter (1985) and Maidique and Patch (1982). Later, with the resource-based perspective, the research orientation shifted from the study of typologies to that of specific factors in companies (Jusoh and Parnell, 2008). Even when

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a conflict between market-based and resource-based perspectives can exist, since the first put the stress on specific factors in industry and the second in companies, common features in companies can be identified. In that sense, this paper looks for those elements that can generate new typologies regarding the core resources in the New Economy like intangibles in companies. So, the typologies are going to be linked to specific features in companies and not in the industry.

Terms such as knowledge-intensive (Starbuck, 1992; Alvesson, 1993; Williams and Nones, 2009; Martínez-Torres, 2014) and R&D-intensive (Ahern, 1993; Lev and Sougiannis, 1996; Hatzichronoglou, 1997; Williams and Lee, 2009) companies or sectors have recently entered the research discussion. The fact that those concepts have emerged reflects the interest of academics in classifying companies considering their intangible resources. There is still a gap in both theoretical and empirical foundations for a typology of companies in new economy, wherein intangibles, and innovative behavior in particular, are of greater importance. This study aims to fill this gap. We believe that there is room to test typologies that are related to the use of idiosyncratic assets – that is, intangibles. Meanwhile, we expect to determine a specific cluster of companies that introduce innovative orientation in their strategies. In this study, we suggest referring to those companies that introduce clear strategic orientation regarding intangibles as "companies with an intangible-intensive profile". It is important to emphasize that our intention is to carry out an exploratory empirical study without imposing any specific typology of companies' profiles in advance. However, if any clear profile is discovered it would be interesting to understand how it can contribute to the company's higher performance.

Therefore, this paper aims:

(1) to explore companies' profiles related to the components of their intangibles; and

(2) if any profiles are found, to test which ones entail higher performance compared to others.

This understanding would help both academic researchers and practitioners to comprehend how companies are distributed across different intangible-intensive strategies, and what the common features of such strategies are.

2. Literature review

2.1 Strategic profiles

It would be useful for managers to identify how to define strategies for their companies in order to reach better performance. Each company is special. In that sense, Rumelt (1991, p. 167) suggests that industry may not be the most useful unit of analysis when considering the business strategy. Moreover, according to Rumelt, the neoclassical idea that firms in an industry are homogeneous is not correct; in fact, real industries are highly heterogeneous. Osborne and Cowen (2002) remark that companies that have similar sizes, products and years in business can differ greatly in performance. Using their experience as consultants, Osborne and Cowen (2002) look for the common features of high-performance companies, and separate high-performance companies from "also-rans". The present paper will identify company profiles using empirical data.

The existence of factors that gather the common features of firms can help to cluster them and extract consequences in order to outperform companies that lack a clear strategy. Companies stake out their strategic position consciously or unconsciously

(Nickerson and Silverman, 1998). Once these clusters have been identified, they can be analyzed to extract ideas for managers in order to establish a deliberate strategic position that will help their companies to perform better.

Managerial literature looks for profiles of companies that are primarily related to their strategies. Miles *et al.* (1978) present a strategic typology that considers three strategic positions (defenders, analyzers and prospectors) together with what they consider as a strategic failure (reactors). Porter (1985) proposes three broad, generic strategic positions for companies: cost leadership, differentiation and focus or niche strategy. Each one of these provides the company with a long-run advantage that will help it to outperform the competitors. In addition, there is a fourth position: that is, being stuck in the middle (Porter, 1985). Companies with this profile have failed in their positioning and are not able to perform at the same level as their competitors. Insch and Steensma (2006) follow the typology of Maidique and Patch (1982) and point out four profiles in business strategy: first mover, imitator, low-cost producer (LCP) and niche. First movers need innovation and R&D to succeed. They will look for strategic alliances with research firms and universities. Moreover, according to Insch and Steensma (2006), they will aim to evaluate customers' needs.

Osborne and Cowen (2002) draw a profile of high-performance companies, and assert that high-performance companies have solid strategies and superbly execute these strategies.

2.2 Intangibles, their strategic use, and performance

Some idiosyncratic assets must support each strategic position (Nickerson and Silverman, 1998). Intangibles are among those peculiar assets that can provide an advantageous situation, and become core strategic resources for businesses. They enable organizations to differentiate themselves from rivals, and consequently create sustainable value (Lev, 2001; Kristandl and Bontis, 2007).

Knowledge management deals with these idiosyncratic assets and is a main counterpart of the strategic behavior of any company. Nevertheless, the diversity of businesses challenges the specific application areas of knowledge management, depending on the type of a particular company. This study states that the diversity of companies can be understood in relation to a number of homogeneous clusters. The specific features of these clusters represent certain company profiles.

According to Mouritsen (2009), the heterogeneity of intangibles is their key characteristic. Their classification has been studied in recent years. The widely accepted intellectual capital (IC) structure suggested by Edvinsson (1997) consists of three components: human capital (HC), relational capital (RC) and structural capital (SC). Molodchik *et al.* (2014) suggest a subdivision of these components that considers: management capabilities (MC), human resource capabilities (HRC), business process capabilities (BPC), innovative capabilities (InnC), customer loyalty (CL), and networking capabilities (NWC). This study considers these components in order to classify companies.

Nickerson and Silverman (1998) describe a process that integrates business strategy, IC management and technology strategy. The idea is to identify superior business opportunities. IC management must decide how to place, promote or restrain the use of intangibles in order to create competitive advantage. As with any other resource, intangibles are limited; thus, managers have to decide which ones to maximize, maintain or cut back. Identifying the allocation of resources, either formally or implicitly will provide a landscape of company profiles regarding their employment of intangibles.

Some studies analyze a set of companies with common features in order to define a particular profile. For example, Osborne and Cowen (2002) identify high-performance companies and extract the distinctive characteristics that make them unique. This study proceeds the other way round: from an empirical analysis, it identifies profiles and then checks whether any particular profile entails better performance. This additional information will allow managers to better allocate the company's intangible resources.

3. Research design and methodology

The research questions addressed in this paper are:

RQ1. Do companies have certain intangible-intensive profiles? If they do, how do these profiles influence their performance?

The hypothesis for study is as follows: companies are likely to be better off by following a strategy in a certain intangible-intensive profile. This hypothesis is based on the results about company strategic orientation introduced by Cooper (1984) who clustered companies according to their performance and found out differences between companies with and without product strategies. Mosakowski (1993) tested the hypothesis that companies with differentiation strategies are better off. Parnell *et al.* (2000) carried out a comprehensive study on companies' strategic orientation. This paper contributes with the introduction of the analysis of intangible-intensive profile as driver of the outperformance.

To test this hypothesis, a new way to classify companies according to the intensity of their employment of intangibles is proposed. The new classification will reveal intangible-intensive company profiles, and analyzing these will test whether they generate different outcomes.

Thus, this study raises two important issues regarding intangibles:

(1) The use of intangible-intensive company profiles as a way to classify companies.

(2) A comparison of the performance of companies that belong to different intangible-intensive profiles.

According to these two important issues, the analysis is designed in two stages. The first is based on an exploratory investigation. This means that the study does not put forward any hypotheses regarding how many and which intangible-intensive profiles exist. Rather, it explores a sample of more than 1,600 listed European companies observed from 2004 to 2011. It is assumed that these companies can be clustered into a number of groups according to the common features of the intangibles that they employ. The result of this stage of the analysis will be a number of specific company clusters. Assuming that these clusters can be established, each will represent a particular profile. At that point, some of these profiles might be considered intangible-intensive if they evidently reinforce certain intangibles; meanwhile, others could have no clear features related to intangibles intensity. Thus, we will be able to conclude which intangible-intensive profiles exist, and how such profiles can be interpreted.

The second stage of the analysis is based on the results of the previous one. If a number of intangible-intensive profiles are revealed, these profiles could be compared in terms of the economic outcomes they produce. First of all, it is necessary to establish whether the profiles revealed are significantly different from each other, considering each one of the coordinates of intangibles. If differences are noted, it can be concluded

that pronounced intangible-intensive profiles exit. Each profile would represent a common strategic position of a certain group of companies. In most of the cases, this common strategy will be implicit. It will also be interesting to consider how different strategies in the intangibles portfolio impact on companies' performance. Thus, the causal relationship between the company profiles and the performance generated by intangibles will be explored. For that purpose, a model of the interrelation effect of companies' intangibles and intangible-intensive profiles will be specified and regressed to companies' performance. Table I represents the stages of the analysis in more details.

The identification of the intangible-intensive profiles is based on the conceptual framework introduced by Molodchik *et al.* (2014). In this research, an architecture of six elements of intangibles is empirically validated. The main idea is to introduce homogeneous elements into the three classical components of intangibles (Edvinsson, 1997).

The econometric strategy of the research is based on the two stages of the research introduced in Table I. The first stage of this study requires the following steps of analysis:

- Principal component analysis (PCA) for each element of IC (intangibles): HC, RC, SC:
  - Two PCA for HC: MC and HRC.
  - Two PCA for RC: CL and NWC.
  - Two PCA for SC: BPC and InnC.
- K-means clustering:
  - Three clusters with an almost equal number of cases (2,500-3,300).
- Analysis of variance (ANOVA):
  - Estimate the difference between clusters according to each criterion.

The second stage of the empirical study implies a regression analysis of the two following specifications):

$$\begin{cases} MVA = f(EVA, IE_{Pi}, HRC, MC, BPC, InnC, CL, NC, InnP, CP, C) \\ EVA = g(IE_{InnP}, IE_{pi}, HRC, MC, BPC, InnC, CL, NC, InnP, CP, C) \end{cases} \quad (1)$$

1st stage	Identification of the intangible-intensive profiles	Specification of the coordinates of companies intangibles Clusterization of the companies in the system of these coordinates Interpretation and analysis of the revealed clusters
2nd stage	Comparative study of the intangible-intesive profiles of companies	Identification of the significant difference between revealed profiles in all coordinates of intangibles Confirmatory analysis of the causal relationship between revealed clusters of companies and their performance Interpretation of the moderation effect brought by a particular intangible-intensive profile

Table I. Stages of the analysis

where EVA[1] is the economic value added, MVA[2] the market value added, HRC the index of HRC, MC the index of MC, BPC the index of BPC, InnC the index of innovation capability, CL the index of CL, NC the Index of NWC, IE the interaction effect, Pi the dummy variables for the intangible-intensive profile (cluster), C the vector of control variables (industry, year, country).

$$\begin{cases} MVA = \beta_0 EVA + \begin{pmatrix} HRC \\ MC \\ BPC \\ InnC \\ CL \\ NC \end{pmatrix}^T \times \begin{pmatrix} 1 & \cdots & P_{1(n-1)} \\ \vdots & \ddots & \vdots \\ 1 & \cdots & P_{6(n-1)} \end{pmatrix} \times \begin{pmatrix} 1 & \cdots & \beta_{1(n-1)} \\ \vdots & \ddots & \vdots \\ 1 & \cdots & \beta_{6(n-1)} \end{pmatrix} \\ \qquad \times \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix} + \begin{pmatrix} P_1 \\ \vdots \\ P_n \end{pmatrix}^T \times \begin{pmatrix} \beta_{21} \\ \vdots \\ \beta_{2n} \end{pmatrix} + \begin{pmatrix} C_1 \\ \vdots \\ C_m \end{pmatrix}^T \times \begin{pmatrix} \beta_{31} \\ \vdots \\ \beta_{3m} \end{pmatrix}, \\ EVA = \begin{pmatrix} HRC \\ MC \\ BPC \\ InnC \\ CL \\ NC \end{pmatrix}^T \times \begin{pmatrix} 1 & \cdots & P_{1(n-1)} \\ \vdots & \ddots & \vdots \\ 1 & \cdots & P_{6(n-1)} \end{pmatrix} \times \begin{pmatrix} 1 & \cdots & \alpha_{1(n-1)} \\ \vdots & \ddots & \vdots \\ 1 & \cdots & \alpha_{6(n-1)} \end{pmatrix} \times \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix} \\ \qquad + \begin{pmatrix} P_1 \\ \vdots \\ P_n \end{pmatrix}^T \times \begin{pmatrix} \alpha_{21} \\ \vdots \\ \alpha_{2n} \end{pmatrix} + \begin{pmatrix} C_1 \\ \vdots \\ C_m \end{pmatrix}^T \times \begin{pmatrix} \alpha_{31} \\ \vdots \\ \alpha_{3m} \end{pmatrix}, \end{cases} \tag{2}$$

The formula 2 introduces the model in matrix form in order to display the interaction effects of profiles and the intangible portfolio of companies. It means that MVA is a function of EVA and the interaction effects of the different components of IC. The MVA is controlled by the profiles related to intangibles, country, year and industry. The interaction effect is obtained by the multiplication of each component by the dummy variable of the existing profiles. It has to be noted that in the present model, EVA is endogenous because it is explained by the same other variables that explain MVA.

The first model approximates the impact of the intangibles portfolio, together with the intangible-intensive profile, to the market value creation. The second model estimates the contribution of the intangibles portfolio to the economic value added to a company by taking into account its intangible-intensive profile.

4. Data description and empirical results

The empirical analysis is based on data of more than 1,600 European public companies observed during an eight-year period, from 2004 to 2011. Information about companies located in five European countries was collected: UK (44 percent), Germany (24 percent), France (25 percent), Spain (5 percent) and Italy (2 percent). The entire gross domestic product (GDP) of these countries covers more than 70 percent of the European GDP. The composition of this database indicates that it represents the European market. It also accurately represents these countries in relation to the industry structure of the European economy. The Statistical Classification of Economic Activities in the European Community (*Nomenclature statistique des activités économiques dans la Communauté européenne,* NACE) has been applied and the following sectors are included in the database: management of companies and enterprises (25 percent), manufacturing (20 percent), professional, scientific and technical services (12 percent), finance and insurance (10 percent) and other industries (33 percent). The representative rate of small and medium-sized enterprises and large enterprises in the database is 36 and 64 percent, respectively.

The data set in this study has been collected from a combination of detailed longitudinal databases, namely Bureau Van Dijk (Amadeus) and Bloomberg. The database consists of financial and non-financial indicators underlying the variables that reflect several quantitative and qualitative characteristics of IC. The figures in the database were drawn from annual statistics and financial reports. Other information was collected from publicly available sources such as company web sites, patent and information bureaus, and rating agencies.

As a result, 22 variables are involved in the empirical investigation carried out in our study. Table II introduces a description of these variables along with references to papers that have employed the same, or nearly the same, indicators in the analysis of intangibles.

Most of the indicators included in the exploration of intangibles in this study are measured by continuous variables. None of them are normally distributed, as they are skewed and long-tailed. Nevertheless, significant outliers are observed only in financial indicators. This appears to be easily explained, since the database includes all listed companies without putting any restrictions on the scale of their activity.

4.1 Profile identification

4.1.1 Principal component analysis. Molodchik *et al.* (2014) validated six elements of intangibles using a longitudinal dataset of European companies (the same database is used in this research) by applying factor analysis and structural equation modeling. For the purpose of this present research PCA is more appropriate, since the technique makes it possible to identify the standardized index that explains the common part of the variation of indicators involved in estimation of the latent construct. This estimation is more suitable for the future clustering process of the sample compared to that derived using structural equation modeling. It is also notable that the implementation of a different technique makes it possible for us to check the robustness of the results established in the cited research.

By running PCA technique six components were revealed. The results of the empirical testing are introduced hereafter.

4.1.1.1 HC. HC was tested on the basis of six indicators that represent a number of significant features of this part of the portfolio of companies' intangibles. In total, more

Name of the variable	Reference to the literature	Source of the information
Cost of employees	Baiburina and Golovko (2008), Orens *et al.* (2009)	Company's annual report, section financial data
Productivity	Baiburina and Golovko (2008), Orens *et al.* (2009)	Company's annual report, section financial data Earnings before interested and taxes divided by sales
Qualification of board of directors	Tseng and Goo (2005), Orens *et al.* (2009), Kamukama *et al.* (2010), Shakina and Barajas (2012)	Company's annual report, section directors information If more than one-third of directors have postgraduate level of qualification and more than 5 years experience – 2 points. If more than one third of directors have postgraduate level of qualification or more than 5 years experience – 1 point. Another – 0
Human brand	Thomson (2006)	Search on company name in the ranking LinkedIn's most in demand employers on the web site: www.rankingthebrands.com/ If it has a rank – 1 point, otherwise – 0 point
R&D expenditures	Poletti Lau (2003), Gleason and Klock (2003), Sellers-Rubio and Mas-Ruiz (2007), Huang and Wang (2008), Huang and Liu (2005)	Company's annual report, section Financial data
Intangible assets	Sellers-Rubio and Mas-Ruiz (2007), Shakina and Barajas (2012)	Company's annual report, section financial data
Awards for innovation	Anton and Yao (1989)	Company official web sites, sections "Awards" and 'Press releases'
Patents, licenses, trademarks	Tseng and Goo (2005), Sellers-Rubio and Mas-Ruiz (2007), Shakina and Barajas (2012)	Search on company name and number of patents on the web site QPAT: http://library.hse.ru/e-resources/e-resources.htm
Strategy implementation	Tseng and Goo (2005), Kamukama *et al.* (2010), Shakina and Barajas (2012)	Search on company location on their web site using the following words as strategy, strategy implementation If company has news about these as listed above – 1 point, otherwise – 0 points Important to put 1 or 0 in the year of implementation
ERP implementation	Kamukama *et al.* (2010), and Mouritsen, (2011), Shakina and Barajas (2012)	Search on the web site of the company using the following words as "ERP", "Oracle", "NAVISION", "NAV", "SQL", "SAP" If company has news about these things – 1 point, otherwise – 0 points. Important to put 1 or 0 in the year of start implementation
Knowledge management system	Kamukama *et al.* (2010), Murthy and Mouritsen, (2011), Shakina and Barajas (2012)	Search on the web site of the company using the following words as "knowledge management", as "intellectual resources", If company has news about these things – 1 point, otherwise – 0 points

Table II.
Short description of the variables involved in the analysis

(*continued*)

Name of the variable	Reference to the literature	Source of the information
		Important to put 1 or 0 in the year of start implementation
Brand value	Riahi-Belkaoui (2003), Murthy and Mouritsen (2011), Shakina and Barajas (2012)	Search on company name in the ranking BrandFinance Global 500 on the web site: http://www.rankingthebrands.com/ If it has a rank – 1 point, otherwise – 0 point
Citations in search engines	Shakina and Barajas (2012)	Search on company's name and its score in the web site: www.prchecker.info/check_page_rank.php
Advertising expenditures	Hirschey (1982)	From Bloomberg (according to the company ticker)
Associations	Molodchik *et al.* (2014)	Company annual report, section common information + COMPANY web site For those who involved in business associations it is given 1 point and otherwise 0 points
Foreign capital employment	Shakina and Barajas (2012)	Company annual report, section shareholder name, vertical vector country If company has foreign investors it gains 1 point and otherwise 0 points
Subsidiaries	Shakina and Barajas (2012)	Company's annual report, section "subsidiary name" If company has less than 100 subsidiaries put the total number, otherwise use the following vector "First 100 out of Y subsidiaries"
Proximity of University	Huang and Liu (2005), Swartz and Firer (2005), Orens *et al.* (2009), Shakina and Barajas (2012)	Company's annual Report, section common information, the main activity
Location in the capital of a country	Shakina and Barajas (2012)	Search on company's location on their web site, see the status of the city location in Wikipedia If it is the capital of the state (or region) – 1 point, otherwise – 0 points
Global Competitiveness Index – Labor markets	Molodchik *et al.* (2014)	Search on the web site of World Economic Forum in the relevant reports. The scores are different within countries and years
Dummy variables for 2008 and 2009	Molodchik *et al.* (2014)	If year = 2008 or 2009, is 1, otherwise 0

Source: Own elaboration

Table II.

than 10,000 cases were involved in the estimation. As a result, the first two principal components have an eigenvalue of significantly more than 1. The first component is represented by three indicators: qualifications held by the board of directors, corporate university, and strategy implementation. All these indicators pertain to the strategic management of the company and relate to top managers; thus, this principal component is tied to the company's MC.

The second principal component is described by productivity and earnings per employee. These two indicators reflect the overall return on companies' human

resources and are associated in this study with the HRC. The loadings and eigenvectors of principal components for HC are introduced in Table III.

4.1.1.2 RC. RC is split, according to the assumption of this study, into factors of CL and NWC. Ten indicators were investigated to elaborate two principal components of RC. The fraction of explained variance is not very high (about 36 percent); nevertheless, the eigenvalues of the first two components are significantly higher than subsequent ones. The first component is represented by the following set of indicators as a characteristic of CL: brand power, citations in search engines, site quality, and number of subsidiaries. Meanwhile, the second principal component is described by proximity to a university and location in megapolis, which refers to accessibility to developed networks. This component is associated in this study with the NWC of a company. The results of the estimation are shown in Table IV.

4.1.1.3 SC. SC, being the most heterogeneous part of companies' intangibles, is also introduced in this research by two core elements: BPC and InnC. The PCA confirms the initial supposition about the architecture of companies' SC. Two principal components were identified, which together explain about 52 percent of the variance; this represents rather high prediction power. Seven indicators of SC are finally consolidated in two indexes. The first, BPC, is composed of ERP (enterprise resource planning), knowledge management and strategy implementation. The second principal component – InnC – is described by the number of patents, intangible assets and R&D expenditures. The results of the analysis are introduced in Table V.

The overall results of the PCA are represented in Table VI.

As seen in Table VI, six components of intangibles are described by two, three or four key indicators. These indicators explain a significant portion of the phenomena measured in this paper.

4.1.2 Cluster analysis. Thus, the PCA allows us to elaborate a system of six components of companies' intangibles, which are particularly relevant for designing the intangible-intensive profile of a company. These components introduce a system of

Number of components = 2
Trace = 6
$\rho = 0.45$

Number of observations = 10,356

Component	Eigenvalue		
Comp1	1.43		
Comp2	1.25		
Comp3	1.00		
Comp4	0.84		
Comp5	0.75		
Comp6	0.73		
Variable	Comp1	Comp2	Unexplained
Qualification of the board of directors	0.53		0.60
Productivity		0.70	0.38
Corporate university	0.61		0.45
Earnings per employee		0.70	0.38
Share of the wages			0.99
Strategy implementation	0.57		0.52

Source: Own elaboration

Table III.
PCA for human capital

Number of components = 2
Trace = 10
$\rho = 0.36$

Number of observations = 11,002

Component	Eigenvalue		
Comp1	2.01		
Comp2	1.55		
Comp3	1.12		
Comp4	1.02		
Comp5	0.97		
Comp6	0.97		
Comp7	0.87		
Comp8	0.61		
Comp9	0.48		
Comp10	0.38		
Variable	Comp1	Comp2	Unexplained
Advertising expenses			0.93
Participation in associations			0.94
Brand power	0.51		0.47
Citations in the search engines	0.49		0.45
Foreign capital employed			0.96
Site quality	0.31		0.79
Number of subsidiaries	0.52		0.46
University proximity		0.64	0.27
Location in the city with the population more than 1 mln		0.72	0.20
Awards			0.97

Source: Own elaboration

Table IV.
PCA for relational capital

Number of components = 2
Trace = 7
$\rho = 0.52$

Number of observations = 11,226

Component	Eigenvalue		
Comp1	2.07		
Comp2	1.54		
Comp3	0.99		
Comp4	0.84		
Comp5	0.63		
Comp6	0.55		
Comp7	0.38		
Variable	Comp1	Comp2	Unexplained
Awards			0.97
ERP implementation	0.56		0.27
Intangible assets		0.45	0.61
Knowledge management implementation	0.56		0.28
Number of patents		0.55	0.46
Strategy implementation	0.48		0.46
R&D expenses		0.59	0.33

Source: Own elaboration

Table V.
PCA for structural capital

Human Resource Capability	Productivity
	Earnings per employee
Management Capability	Qualification of the board of directors
	Corporate university
	Strategy implementation
Customer Loyalty	Brand power
	Citation in search engines
	Site quality
	Number of subsidiaries
Networks Capability	Proximity of the University
	Location in the city with the population of more then 1 mln
	Foreign capital employment
	Subsidiaries
Innovation Capability	Intangible Assets
	Patents
	R&D expenditures
Internal process Capability	ERP system
	Knowledge management system
	Strategy implementation

Table VI.
Principal components – core six elements of companies' intangibles

coordinates in which the profile of a company should be set. This research assumes that even when companies have very specific features they can be still clustered according to common designs. These frames are very important for recognition of the companies' profiles.

For the purpose of this study, the target is to cluster more than 12,000 cases from more than 1,600 European companies by applying the k-means technique. The study reveals three clusters, which are generated in similar groups; the contents of each group are homogeneous, while the groups are very much heterogeneous compared to one another. The segmentation is based on the six coordinates introduced by the principal components elaborated in the previous stage of the analysis.

Table VII introduces the descriptive statistics of the cluster generated by the k-means technique. By running a number of iterations, the study revealed that three clusters in the system of coordinates of six elements of intangibles are plausible. Each cluster consists of some 2,500-3,300 cases. The robustness check reveals that almost all enterprises belonged to the same cluster during the eight years of the observation. Only a small number moved from one cluster to another during the period. A radar diagram of the generated clusters has been elaborated using the mean values (Figure 1). This figure helps to visualize the comments and explanations below.

ANOVA is used to establish that these clusters significantly differ from one another in every coordinate of intangibles. This might suggest that distinguished profiles of companies have been found.

Some interesting facts appear from the results of this study. The profiles MC, NWC and BPC elaborated from the empirical analysis are very dissimilar according to the six components of intangibles introduced in this study. These profiles are less distinguished in terms of HRC. Looking precisely at these results, it can be observed that at least one component of each intangible is predominant in the profiles revealed in the study.

It is notable that the third profile, being between the others in values of each coordinate of intangibles, finally involves a lower amount of intangibles.

Company profile	Principal component of intangibles	Management capability	Human resources capability	Customer loyalty	Networks capability	Business processes capability	Innovative capability
Innovative profile	Min	−7.52	−63.05	−3.01	−0.60	−1.48	−0.61
	Mean	−0.68	−0.09	0.21	1.16	−0.97	0.31
	Max	9.94	36.62	9.35	2.25	4.41	14.41
Number of companies	2.529						
Conservative profile	Min	−2.30	−1.92	−1.95	−5.14	−0.48	−1.03
	Mean	1.30	0.18	0.41	−0.26	1.89	−0.32
	Max	2.91	28.71	11.05	2.24	9.86	19.88
Number of companies	3.001						
Moderate (low) profile	Min	−3.85	−2.46	−2.43	−2.18	−1.48	−1.03
	Mean	−0.37	−0.05	−0.46	−0.88	−0.44	−0.03
	Max	1.91	20.63	6.71	0.79	2.09	5.44
Number of companies	3.302						
Total	Min	−7.52	−63.05	−3.01	−5.14	−1.48	−1.03
	Mean	0.11	0.02	0.03	−0.08	0.20	−0.03
	Max	9.94	36.62	11.05	2.25	9.86	19.88

Table VII. Results of cluster k-means analysis

This study suggests referring to this profile as "moderate". The other profiles are recognized in this study as "intangible-intensive". It is suggested that the profile with a predominance of BPC and MC be called "conservative intangible-intensive" (or "conservative"). The profile with a predominance of InnC and NWC is referred to as "innovative intangible-intensive" (or "innovative").

The moderate profile does not have notable features in the coordinates of intangibles. The name of this profile is derived from the medium characteristics seen in most the components of intangibles. The reduced value of the moderate profile regarding RC, particularly in CL, indicates that these companies are not sufficiently competitive in the context of a knowledge economy. By keeping all intangibles at a restrained level and failing to intensify them, these enterprises are likely to lose their positions on the market. This kind of profile can be considered to correspond with those companies that are "stuck in the middle" according to Porter (1985); however, in this case, the term pertains to their strategy regarding intangibles.

The moderate profile would be recognized by its stability and low tendency to change. At the same time, the use of NWC approaches zero, whereas other indicators are highly similar. This can result from companies' unwillingness to create new values, wherein they simply use new knowledge created by other companies.

The conservative profile presents strong SC within the business process. These enterprises seem to be intensive in terms of their quality management system, ERP and strategy operationalization. These companies are also characterized by the high quality of their management, and strong CL. At the same time, this profile is not distinguished according to innovative behavior and networks.

The profile is characterized by well-developed business processes. However, the indicators related to HRC, CL and NWC are fairly high; this can be accounted for by

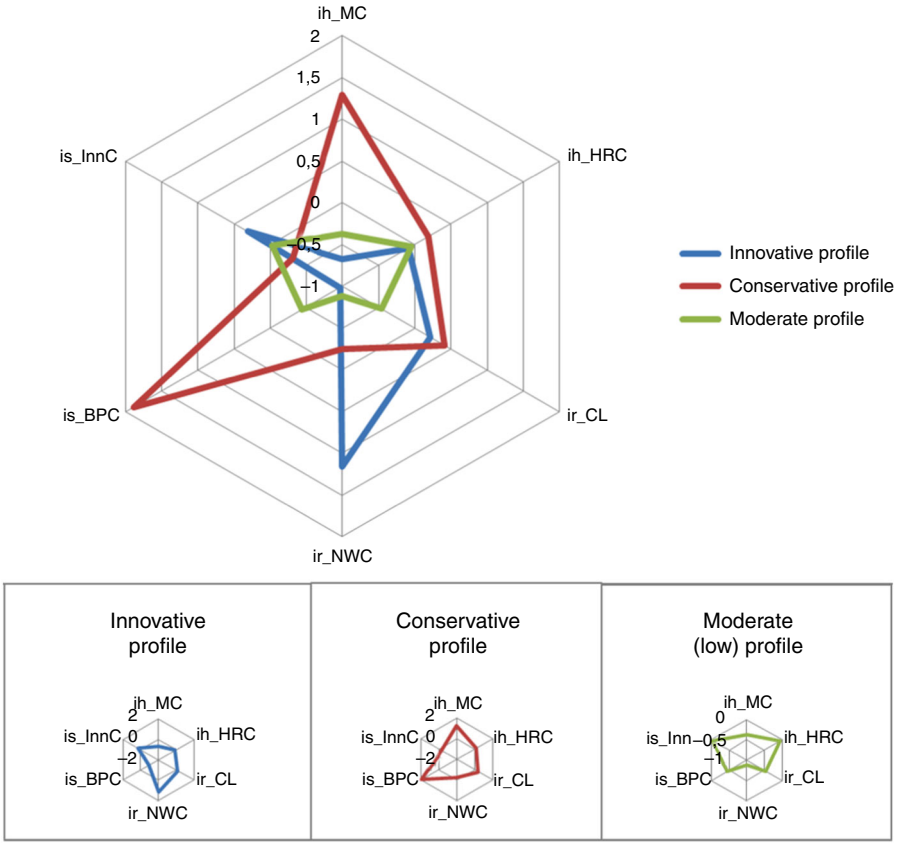

Figure 1.
Radar diagram of three intangible-intensive clusters

high-quality products or well-organized advertising campaigns. InnC is used insufficiently in this profile.

The innovative profile is recognized by the high level of innovative activities and external networks the company should develop. Meanwhile, companies with an innovative profile do not intensify SC within their business processes. This profile fosters the ability to maintain CL. The NWC element is well developed, meaning that these companies have established effective networks of communication with their partners, employees, suppliers and customers. Companies with this profile actively use the opportunities offered by information technologies, which allow them to react quickly to changes, accumulate new experience and convert this experience into new knowledge. All this enhances their competitive advantage; in turn, it increases their capability to create and implement innovative ideas and technologies, and makes these companies more flexible.

At the same time, the profile is characterized by its low level of intensity in business processes, and limited management qualification. This may seem contradictory, but it is possible that in more innovative companies it is more important for managers and directors to be creative, original, risk seeking, entrepreneurial and flexible. These abilities are not related to elements of traditional

qualification such as experience, level of education or the other indicators used in this study. This profile is in line with that of the first movers described by Maidique and Patch (1982).

5. Influence of intangibles on performance according to company profile

The last stage of this empirical investigation is to establish a causal relation between the intangibles portfolio of a company and its performance. To carry out this estimation, two linear regressions, including the interaction effect of the six elements of intangibles with innovative and conservative profiles, were estimated simultaneously. A three-stage least squares estimator was used to analyze the system of simultaneous equations. The moderate profile, which is seen as non-intangible-intensive, is taken as the base. Thus, the results of all of these estimations will be interpreted with regard to the moderate profile.

The econometric model was designed to test whether companies with intangible-intensive profiles (conservative and innovative) outperform companies with the moderate profile by employing intangible resources. It should be noted here that the study purposely did not just statistically compare the average values of EVA (economic value added) and MVA (market value added) for the different profiles; rather a moderation effect regression model was elaborated. This analysis enabled comparison of the conditional contribution of every intangible component of companies' resource portfolio to EVA and MVA. The model also controls for industry, country and year (Table VIII).

The last stage of the analysis provided empirical evidence related to whether intangible-intensive company profiles outperform other profiles (expressed in EVA) and create comparatively more value (expressed in MVA).

The system of regressions revealed the moderation effect of conservative and innovative profiles on companies' performance (EVA and MVA). The first regression revealed a significantly positive impact of EVA on MVA. This fact confirmed the idea set forth in the theoretical model that EVA appears to be a key value driver. Nevertheless, there are a number of significant value drivers apart from EVA. Our estimation introduces these, taking into account the moderation effect of companies' intangible-intensive profiles.

The moderation effect of intangible-intensive profiles on EVA illustrates the increased or decreased influenced of these profiles on the creation of competitive advantages for companies. Meanwhile, the moderation effect in the MVA model reveals how these profiles are perceived by investors. If an increased moderation effect of any intangible-intensive profile is revealed, it can be concluded that investors are likely to recognize intangible-intensive profiles as a positive signal.

The results of the estimations provide some information related to different intangible elements. MC is considered negative both for EVA and MVA in the moderate profile; however, it is conditionally more positive for companies with intangible-intensive profiles for MVA. The total effect of this factor is positive for MVA. Meanwhile, MC are unlikely to be a positive factor of EVA for the conservative profile, as there seems to be an overinvestment for those companies.

HRC does not appear to be a key driver of EVA and MVA for all profiles; it has a conditionally positive impact only in the innovative profile for the creation of competitive advantage (EVA).

CL could be considered a key value driver for all companies; in particular, for companies with an innovative profile, investors recognize CL positively. CL is expected not to be paid back for companies with a conservative profile if they strongly focus on it. This can be asserted because the factor is significantly negative for EVA as a value indicator.

Name of the factor	Code	MVA Coef. (SE)	EVA Coef. (SE)
Economic Value Added	EVAstd	1,765.64***	
		(52.03)	
Management Capabilities in Moderate profile	ih_MC	−370.80***	−107.70***
		(110.03)	(37.01)
Effect of Management Capabilities for Conservative profile	inter_cons_ih_MC	977.90***	−196.24***
		(187.57)	(63.09)
Effect of Management Capabilities for Innovative profile	inter_innov_ih_MC	809.20***	161.52**
		(190.90)	(64.22)
Human resource Capabilities in Moderate profile	ih_HRC	69.29	−3.87
		(104.00)	(35.00)
Effect of Human resource Capabilities for Conservative profile	inter_cons_ih_HRC	−24.14	−78.27
		(158.01)	(53.17)
Effect of Human resource Capabilities for Innovative profile	inter_innov_ih_HRC	262.24*	54.75
		(137.23)	(46.18)
Customer Loyalty in Moderate profile	ir_CL	797.37***	74.99**
		(109.29)	(36.78)
Effect of Customer Loyalty for Conservative profile	inter_cons_ir_CL	699.38***	−297.82***
		(124.82)	(41.89)
Effect of Customer Loyalty for Innovative profile	inter_innov_ir_CL	1,542.87***	133.98***
		(148.57)	(49.97)
Networking Capabilities in Moderate profile	ir_NWC	−384.17***	136.48***
		(140.50)	(47.27)
Effect of Networking Capabilities for Conservative profile	inter_cons_ir_NWC	522.37***	−202.40***
		(157.32)	(52.92)
Effect of Networking Capabilities for Innovative profile	inter_innov_ir_NWC	217.56	−219.66***
		(234.86)	(79.02)
Business Processes Capabilities in Moderate profile	is_BPC	853.91***	−125.98**
		(174.27)	(58.63)
Effect of Business Processes Capabilities for Conservative profile	inter_cons_is_BPC	−318.73	−375.76***
		(237.28)	(79.75)
	inter_innov_is_BPC	−1,399.02***	−249.29***
		(258.12)	(86.83)
Innovative Capabilities in Moderate profile	is_InnC	1,382.75***	−369.55***
		(336.14)	(113.03)
Effect of Innovative Capabilities for Conservative profile	inter_cons_is_InnC	−209.85	286.70**
		(342.26)	(115.13)
Effect of Innovative Capabilities for Innovative profile	inter_innov_is_InnC	−1,135.72***	−321.27***
		(363.15)	(122.17)
Conservative profile	profile_conserv	−99.53	659.93***
		(359.81)	(120.81)
Innovative profile	profile_innov	−306.31	−182.45
		(368.79)	(124.11)
R^2		38.5%	18.47%
Observations		8,150	

Notes: ***, **, *Significance level at < 0.01, < 0.05 and < 0.10, respectively

Table VIII.
Results of the estimations of 3SLS

Regarding NWC, the total effect of this factor is negative for EVA and neutral for MVA. Nevertheless, the negative effect can be primarily associated with intangible-intensive profiles. The conservative profile, which only has a minimum level of NWC, has a conditionally negative impact on EVA. The innovative profile, which is significantly

intense in terms of this resource, also fails compared to the moderate profile. This this may suggest that networks should not be over- or underemployed, as these extreme strategies lead to negative performance. At such extremes, a moderate policy is more suitable.

BPC are a negative driver for EVA and MVA. This phenomenon is particularly clear for companies with an innovative profile, which should reallocate their resources in favor of flexibility and anticipatory behavior.

InnC has an average negative impact on EVA; nevertheless, it is positively associated with investment attractiveness. However, even when considering InnC as a strategic value driver, the conditional negative impact of it on the innovative profile should be noted.

6. Conclusion and further research

Referring the research stated in our study we conclude that three strategic profiles of companies are empirically validated. Two of them were recognized intangible-intensive ones.

Using PCA, six components of IC were revealed in line with the results obtained by Molodchik *et al.* (2014), who used structural equation modeling. Two of these components are related to HC: the first gathers information from three indicators related to the MC of a company; the second represents HRC. RC is composed of elements that represent CL and NWC within the company. Finally, the SC includes two elements: BPC and InnC.

These six components of the firm's intangibles were used to cluster the companies in order to obtain different profiles. Two of these profiles represent greater intensity with respect to the values of some of the identified components of IC. From our analysis of them and consideration of profiles presented in the literature, it is interesting that, from the particular perspective of intangibles, the results are in line with some of the most common profiles or strategic positions. Thus, what in this paper has been referred to as an "innovative profile" is similar to Maidique and Patch's (1982) first mover or first to market, or by Miles *et al.*'s (1978) prospectors; it can even be identified as a differentiation strategy according to Porter (1985). The second profile, which entails greater intensity in terms of BPC and MC, can be considered closer to Maidique and Patch's (1982) LCP and Porter's (1985) cost leadership strategy. There is a third cluster of companies that does not have extreme values related to the intangible components. In this profile, referred to as moderate in the present paper, there is no clear strategy regarding resource intensification in any of the intangible components. In this sense, these companies are "stuck in the middle". Without a strong bet in any idiosyncratic asset, a run-of-the-mill performance (to use Osborne and Cowen's (2002) terminology) can be expected for these companies. The proposed profiles – namely innovative, conservative and moderate – fit well in the general theory of strategic typology or strategic positions.

Considering the non-intangible-intensive moderate profile as the base, the study reveals that intensive profiles (conservative and innovative) outperform companies with moderate profiles by employing intangible resources. Thus, companies that intrinsically or explicitly define their strategies in relation to the use of intangibles are better off than firms that design their strategies based on being moderately and equally good in each of the intangible areas. In this sense, we suggest that some intensity in the employment of intangibles is desirable.

The effect of the different intangible elements on competitive advantage or attractiveness for investors was also checked, and several conclusions can be drawn in this regard. First, MC has a more positive impact for companies with intangible-

intensive profiles, especially innovative ones. Second, HRC conditionally have a positive impact only on the innovative profile when it comes to the creation of competitive advantages. Third, companies with an innovative profile and intensive CL are especially recognized positively by investors. Fourth, networking should not be over- or underemployed, since these extreme strategies lead to negative performance. In such extremes, a moderate policy is more suitable. Fifth, BPC are a negative driver for competitive advantage and attractiveness to investors. This could mean that companies that pay attention to the standardization of activities may fail economically and lose investment attractiveness. This phenomenon is particularly clear for companies with the innovative profile, which should reallocate their resources in favor of flexibility and anticipatory behavior. Sixth, InnC has, on average, a negative impact on competitive advantage; nevertheless, it is positively associated with attractiveness for investors. However, even considering InnC as a strategic value driver, the conditional negative impact of it on the innovative profile should be noted. This result is in line with the theory of the U-shaped relation between innovations and companies' performance (Aghion *et al.*, 2002). There is significant evidence that innovations bring positive results unless they are not overinvested. This paper supports this theory.

The lack of availability of indicators that gathers the whole information about the intangibles in companies can limit the obtained results. However, the employed indicators contribute to an objective evaluation of the intangible portfolio in companies. Moreover, they are comparable and this fact is critical for this kind of studies. They do not disclose some specific features of intangibles in companies but they provide a common understanding of companies' strategies on intangibles.

Managers can use this information in order to first define a clear strategy for their companies, and then to have an idea of what intangibles they should invest in so as to create competitive advantage or value. However, at this point some questions arise. What would the cost of implementing a different strategy in a company be? Will those costs be higher than the benefits obtained by using an intangible intensive strategy? These questions represent a step to developing the present research. Moreover, a specific analysis of the distribution of performance inside each profile would help to better understand the profiles of the high-performance companies in each cluster. It is likely that some common features would appear among them. On the other hand, this study does not consider the evolution of the companies over the time. Future works could develop this research line.

Notes

1. $EVA_t = IC_t{-}1 \times (ROIC_t - WACC_t)$
   where $IC_{t-1} = D_t + E_t$ is the book value of equity and debts, $ROIC_t = NOPAT_t/IC_{t-1}$ the return on invested capital, $NOPAT_t = EBIT_t(1-T)$ the net operation profit after taxes, $WACC_t = D_t/(D_t + E_t) \times kd(1\text{-}T) + E_t/(D_t + E_t) \times ke$ the weighted average cost of capital, D_t is the book value of debt, E_t is the book value of equity, $kd = krf$+default spread of the company + default spread of the country the cost of debt, $ke = krf + \beta \times (km - krf)$ the cost of equity, krf the risk-free rate–return on the treasury bonds of US government, β the bottom-up build beta (adjusted by Hamada's equation), km the historical return on the market portfolio (market index), T the effective tax rate.
2. $MVA = EV{-}BV$
   where EV = Market capitalization + D is the enterprise value equals market capitalization and company's debts (market value), $BV = E + D$ the book value of a company equals sum of the company's equity and debts (book value).

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