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Article

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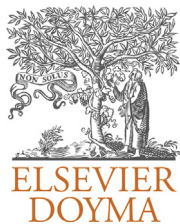
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ARTICLE

A contingent approach to the role of human capital and competencies on firm strategy



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Abstract Employees play a relevant role in firm competitiveness due to their personal competencies and the human capital they constitute for the organisation. The objective of this paper is to assess whether different strategic contexts condition the emergence of different employees competencies. Moreover, accordingly with the strategy chosen, we analyse to what extent these competencies explain the differences in terms of value and uniqueness of the human capital. A set of proposed hypotheses is tested by means of structural equation models considering a sample of manufacturing firms. Results support the finding that prospectors favour proactive and customer-oriented competencies, while defenders foment competencies much more results-oriented. We also observe that the competency of customer orientation explains the value of human capital in prospectors, whilst this human capital dimension is explained by means of results oriented competencies in defender firms. Finally, regarding the uniqueness of human capital, it is explained by proactive competencies in prospectors but we do not find any significant result for defenders.

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Introduction

The search of factors that explain the competitive advantage of companies have revealed that individual competencies are resources that enable companies to generate

profits and maintain their competitive edge (Subramaniam and Youndt, 2005; Youndt et al., 2004). Moreover, the design and implementation of the strategic option chosen by the company conditions the different behaviours, skills and knowledge that employees bring to the company (Gupta and Govindarajan, 1984; Wright and McMahan, 1992; Jackson and Schuler, 1995; Soosay, 2005). Thus, for example, it has been shown that prospector strategies define behaviours of individuals that are different to defender strategies (Miles and Snow, 1978; Kabanoff and Brown, 2008; Song et al., 2008). Therefore, it seems logical to think that

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the company's strategy determines the competencies that its employees should have to help and support successful development.

Current literature has essentially been concerned with the analysis of relations of human resource management practices, either individually or considered as a system, together with the strategy (Marler, 2012). The relation of the strategy and personal competencies has been analysed, focusing on managerial competencies or on the ones that boost innovation (Kabanoff and Brown, 2008; Song et al., 2008), but no works have specifically dealt with the analysis of how different competencies developed by individuals in their work depend on the strategy chosen to compete.

This gap leads us to consider our first research question: Does a company's strategy condition the competencies of its staff? Is there a universalistic approach, in the sense that there are competencies that are valid for any strategic option or, on the contrary, do the competencies developed in the workplace differ according to the strategy chosen to compete? What are these competencies in each strategic context? The strategic options considered in this article, the choice of which is justified in a subsequent section, are two of those established by Miles and Snow: prospector and defender strategic options.

In general, personal competencies are defined as essential characteristics of an individual that predict an effective and/or better performance at work (Spencer and Spencer, 1993) and refer to the type of knowledge, behaviour and skills that employees have and use in their jobs.

Bearing in mind the conceptualisation of competencies and that human capital is defined as the combination of the knowledge and skills of the people working in a company (Nahapiet and Ghoshal, 1998; Subramaniam and Youndt, 2005; Lepak and Snell, 1999; Wright and McMahan, 2011), a certain element of overlap could be considered between these two concepts, when actually they are complementary concepts. The competencies define and specify the knowledge and skills required to efficiently perform the job, while the human capital considers these in a generic and global manner. That is, competencies refer to the decomposition, disintegration and realisation of human capital. Thus, while human capital has been considered as a whole, with an absolute value (Subramaniam and Youndt, 2005), or as a variable with two dimensions, value and uniqueness of knowledge (Lepak and Snell, 1999), several typologies of competencies have nevertheless been established.

Therefore, considering the different types of competencies that appear in the literature, in this article we study the competencies of innovation, adaptability, customer-orientation, results-orientation and technical expertise (Spencer and Spencer, 1993; Zingheim et al., 1996). These competencies have been considered to be those that are most linked or related to the activity of companies, and furthermore, those most required by companies (Gutierrez et al., 2012; Spencer et al., 2008).

Taking into account the inter-relations between competencies and human capital, the next question that we consider is what competencies define a company's human capital? Is it sufficient to say that it is valuable or unique? Or is it possible to identify which competencies condition and define the value and uniqueness of the company's human capital? What is a valuable competency for one company

may not be so for another, depending on its strategic option. In other words, what makes the human capital of a company valuable and unique are the individuals' competencies which adapt to the requirements of the strategy chosen to compete. Thus, the second goal of this article is to respond to the previously posed questions and to examine to what extent individual competencies influence and define the value and uniqueness of human capital, according to the company strategy.

The analyses of these relationships contribute to the literature of human resources and to the Resource Based View of the firm. This article will firstly reinforce and define the role played by individual competencies in the competitiveness of companies, since different types of competencies are proposed, depending on the strategy. Thus, it is interesting to consider that the competency based profiles of individuals will be contingent on the company strategy. A second contribution is that not only do we establish what types of competencies are promoted under a certain strategic option of the company, but also how the dimensions of human capital (value and uniqueness) are defined in different strategic contexts, depending on the competencies of individuals. Human Capital value and uniqueness are two concepts that differ in their content and in this work they are associated with the company strategy, clearly indicating what defines each of these two dimensions. In short, this paper entails a conceptual exploration and empirical contrasting of contents and relations that are not established in the literature.

To tackle our goals, this article is organised in the following manner. Following this introduction, the second and third sections comprise a literature review about strategy and individual competencies and about those competencies that explain the value and uniqueness of the company's human capital. This review helps us to propose and argue our work hypothesis. In the fourth section, the empirical analysis performed is explained, including the definition of the population studied, the sample, the measuring of our variables and the results of the study. The empirical contrasting of the hypotheses was performed by applying structural equation modelling (SEM). The article ends with the main conclusions, implications and limitations of this study.

Relation between the company strategy and employees' competencies

A company's human resources have been highlighted as the greatest source of sustainable competitive advantage (Barney, 1991), and consequently the relation between the company strategy and the employees should be explored. Harvey and Novicevic (2005) claim that one of the challenges of the strategic human resource management is how to develop or acquire the appropriate competencies to compete in a global context, and how those competencies fit into the company, contributing to the company's competitiveness. Several studies have identified employees' competencies as the main contribution from individuals to the company's competitiveness (Spencer and Spencer, 1993; Hayton and McEvoy, 2006). The specificity and complexity of competencies turn employees' competencies into the source of competitive advantage (Hayton and McEvoy, 2006).

More specifically, it has been demonstrated that competencies that are not available in the labour market cannot be easily duplicated or imitated by other companies and, therefore, provide a strong potential for competitive advantage (Wright and McMahan, 1992; Snell et al., 1996). Nevertheless, employees' competencies only contribute significantly if they are in line with the company's strategic objectives (Capelli, 1993; Rodriguez et al., 2002).

For all these reasons, the relation between organisational strategy and employees' competencies needs to be analysed in more depth. Previous research has pointed to the link that exists between the different characteristics and behaviours of employees (Gupta and Govindarajan, 1984; Miles and Snow, 1984; Wright and McMahan, 1992; Jackson and Schuler, 1995; Hunter et al., 2001; Hughes, 2003; Soosay, 2005). It can be considered that each strategy defines a number of desired competencies, meaning a combination of specific knowledge, skills and behaviours that together help to achieve a better performance, emphasising the specificity, situation and complexity that make people a source of competitive advantage (Hayton and McEvoy, 2006).

Different classifications of strategy are identified in the specialised literature. For this article we have chosen the typology proposed by Miles and Snow (1978), since it is one of the most used and this strategic model is widely accepted in specialised literature and has been applied for decades in different industries (Shortell and Zajac, 1990; Peck, 1994; Hambrick, 2003; DeSarbo et al., 2005, 2006). We have also chosen this typology because Miles and Snow (1984) identify behaviours demonstrated by individuals who support the development of these strategies. Moreover, recently, different authors have analysed the relations between strategy, competencies and capacities, using Miles and Snow's strategic typology, considering the competencies of managers or identifying the ones that boost innovation (Kabanoff and Brown, 2008; Song et al., 2008).

Although Miles and Snow's (1978) strategic typology describes three strategic patterns, in this article we only consider those companies that follow a prospector or defender strategy. This is because these strategic options, being considered as opposing, will require clearly differentiated competencies, while the analyser strategy is an intermediary option between the prospector and defender strategy (James and Hatten, 1995), using competencies from both strategies (DeSarbo et al., 2006, 2005; Miles and Snow, 1978).

The five competencies of employees considered in this article are those that are most demanded or sought-after by companies. These competencies have been validated in different countries for 30 years by the research conducted by the McBer and Hay Groups (Spencer et al., 2008), and include competencies of innovation, adaptation, customer-orientation, results-orientation and technical expertise. Several authors such as Floyd and Lane (2000), Buchanan (2003), Hsieh and Chen (2011), Zingheim et al. (1996), Zingheim and Schuster (2003), Sheppeck and Militello (2000), Som (2003), Mathew (2007), Farndale and Kakabadse (2003), Boyatzis (1982), Spencer and Spencer (1993) and Collins and Porras (1995) and more recently Gutierrez et al. (2012) have focused their research on these competencies.

Below a description is provided of each of the five competencies that we use, considering the studies of Spencer

and Spencer (1993) and Zingheim and Schuster (2003). The first one, innovation, means that the employee is able to provide original ideas to improve or promote organisational objectives. The second competency, adaptation, means that the individual works efficiently in a variety of situations, with diverse individuals and groups. The third, customer-orientation, refers to assisting and helping others to meet a given set of needs. It includes the understanding of diverse, opposing and even changing perspectives of a subject, knowledge of customers' needs, the purchasing processes of consumers and means of communication for the exchange of information between the company and the customers. The fourth competency, results-orientation, refers to the setting of objectives and priorities to maximise the use of resources and the connection between the results obtained and the organisational objectives. Lastly, the competency of technical expertise is linked to learning and personal development through the acquisition and perfecting of the technical and professional skills needed in those areas related to the workplace, meaning a specialisation in the individual's expert knowledge.

Since our first objective is to examine if strategy influences or conditions the development of employees' competencies, we should assess if prospector or defender strategies encourage different competencies among the company's employees. The main characteristics of prospector and defender companies were originally described by Miles and Snow (1984), although other authors emphasised them (Conant et al., 1990; Walker et al., 2003; DeSarbo et al., 2005, 2006). Prospector companies compete to develop new products and new market opportunities (Miles and Snow, 1984) and to do so they apply "first to market" strategies. Their success depends on their ability to develop new technologies, products and enter markets swiftly (Conant et al., 1990). Prospector companies devote many resources to enterprising activities, to the monitoring of the evolution of market trends and to the development of new products (Conant et al., 1990; Walker et al., 2003).

To implement a prospector strategy, companies need employees who work well in situations of uncertainty and constant change. These companies require high levels of product research, development and engineering as well as marketing activities, in addition to creating close links with distribution channels to ensure that their innovation and development activities result in products and services that meet the needs of their customers (Shortell and Zajac, 1990; Walker et al., 2003). Therefore, the employee's behaviour in prospector companies entails taking on ambitious and challenging objectives, which may be set by them themselves or by management.

On the contrary, companies following a defender strategy endeavour to acquire and maintain a segment in a secure market associated with a stable product area and will rarely devote efforts to the development of new products or market opportunities (Shortell and Zajac, 1990; Walker et al., 2003). Defender companies only provide a limited range of products, and their main concerns are efficiency in the use of their resources and improving their current processes as a means of minimising production costs and prioritising efficiency (Miles and Snow, 1978; Conant et al., 1990).

The above discussion suggests that organisational strategies will determine the ideal profile of competencies to be

developed by individuals, and that employees' competencies will vary in different strategic contexts. In fact, the characterisation of prospector and defender companies performed enables us to identify the competencies adapted to each type of company.

In prospector companies the competency of innovation plays a relevant role, on account of its emphasis in the continuous quest for new market opportunities (Miles and Snow, 1984). Furthermore, the less standardised nature of the objectives, activities and tasks of individuals in prospector contexts justifies that this type of company needs employees who have the competency of adaptation, due to the ever-changing and turbulent atmospheres in which they compete (Shortell and Zajac, 1990; Walker et al., 2003).

Likewise, due to the emphasis placed by prospector companies on new products and on identifying and exploiting market opportunities (Miles and Snow, 1984), marketing activities are carried out and close links are established with distribution channels to ensure that the clients' needs are met (Shortell and Zajac, 1990). Therefore, we expect the customer-orientation competency to be present in prospector companies, since this competency enables the company to attend to new groups of clients (Benner and Tushman, 2002; Song et al., 2008). These arguments lead us to identify the characteristic competencies developed in prospector strategies, considering our first set of hypotheses:

H.1.1. The prospector strategy has a positive influence on the innovation competency of employees.

H.1.2. The prospector strategy has a positive influence on the adaptation competency of employees.

H.1.3. The prospector strategy has a positive influence on the customer-orientation competency of employees.

Moreover, although both prospector and defender companies pursue their goals, these differ in that defender companies seek efficiency while prospector companies focus on product and market development. Defender companies highlight the need to improve existing processes to minimise production costs (Miles and Snow, 1978). Therefore, defender companies would be characterised for establishing individual objectives and priorities to maximise the use of resources and the connection between the results obtained and the organisational objectives, as indicated by Spencer and Spencer (1993). This would justify defender companies' concern for developing the competency of results-orientation in their employees.

Furthermore, defender companies, which rarely develop new products, focus their activity on seeking maximum efficiency in existing processes (Miles and Snow, 1984), which they achieve through the competency of technical expertise, since this helps to reduce costs by developing expert knowledge (Day, 1994). Bearing the above in mind, we propose the following hypotheses referring to key competencies developed in defender strategies:

H.2.1. The defender strategy has a positive influence on the results-orientation competency of employees.

H.2.2. The defender strategy has a positive influence on the technical expertise competency of employees.

Strategy, competencies and human capital

Up to this point, we have emphasised that the competencies that individuals apply in their work are conditioned by the strategy the company chooses in order to compete. But the strategic implementation cannot only fall to skilled individuals who work well on their own. The company must establish mechanisms to add individual competencies and create the human capital of the company. In this vein, Barney and Wright (1998) point out that the competitiveness of the company increases if its human resources are qualified and make up a valuable and unique human capital. Harvey and Novicevic (2005) establish that the challenge does not just lie in developing or acquiring the appropriate competencies to compete in a global context, but in how to transform them into a "stock" of human capital that is seized and retained by the company and that affects its competitiveness.

Human capital, defined as the knowledge and skills that individuals have and use in their work (Schultz, 1961; Subramaniam and Youndt, 2005; Wright and McMahan, 2011), is valuable if the employees contribute to improving organisational efficiency, collaborating in the reduction of costs, or providing additional benefits to clients. On the contrary, human capital is unique or firm specific if it is scarce and specialised to the company. When both situations occur at once it is said that human capital contributes to the competitiveness of the company (Lepak and Snell, 2002).

The above arguments suggest that the value and uniqueness of human capital are not homogeneous concepts or dimensions, but that somehow each of them are defined differently for each strategy in which the company wants to compete. Thus, what makes the human capital of a company valuable and unique are the different competencies of the individuals that are promoted by the strategy, whether prospector or defender. Analysing to what extent the value and uniqueness of human capital are conditioned by different competencies, depending on the strategy of the company, is our second research objective.

The Resource Based View of the Firm indicates that resources are valuable when they help to improve efficiency, exploit opportunities and neutralise threats (Barney, 1991). In the context of strategic management, the creation of value focuses on increasing the ratio of benefits for the client compared to the associated costs. The strategic value of human capital refers to its potential to improve the efficiency and effectiveness of the company, exploit market opportunities, and/or neutralise threats (Barney, 1991; Ulrich and Lake, 1991). In this regard, the human capital of the company can add value if it contributes to obtaining lower costs, provides an additional service or adapts the characteristics of the products to the clients (Lepak and Snell, 1999). Therefore, both prospector and defender companies will endeavour to avail a valuable human capital, since both seek organisational efficiency and customer satisfaction, although with a different orientation or form.

Although all the personal competencies selected in this study contribute to a greater or lesser extent to meeting clients' needs and to achieving organisational goals, the competencies of customer-orientation, results-orientation and adaptation are mainly linked to the value of human capital. The reason for this is that the competency of customer-orientation refers to meeting certain needs that

arise through the analysis of diverse and changing perspectives. Results-orientation concerns the establishment of objectives and priorities to maximise the use of organisational resources. In turn, the adaptation competency refers to working with different individuals and situations, broadening knowledge that helps to modify the base of products and services provided by the company (Spencer and Spencer, 1993). Therefore, there are three different ways to generate valuable human capital.

Although, as we have just pointed out, the personal competencies of customer-orientation, results-orientation and adaptation support the attainment of valuable human capital for the company, their contributions will differ depending on whether the company follows a prospector or defender strategy, since their organisational objectives are different. As indicated, prospector companies seek continuous innovation, new markets and new clients, while defender companies focus on achieving efficiency. Therefore, we expect that in prospector contexts, the value of human capital is boosted by the competencies of customer-orientation and adaptation. This is due to the fact that companies with a prospector strategy operate in changing environments, seeking new business opportunities, for which they need to have a work force that is capable of developing, and that is able to identify and exploit opportunities that arise and minimise dangers that appear (Shortell and Zajac, 1990; Walker et al., 2003). That is, in companies with this strategy, the value of their human capital depends on the competencies that facilitate the development of the strategy.

In turn, in defender situations the results-orientation competency contributes to the value of human capital. In defender contexts, characterised by relatively stable settings, seeking efficiency is the main objective, and improving the process of attaining the known becomes a priority for competition. Therefore, the generation of value is attained by improving performance and the efficiency of productive activities.

The above discussion about the key competencies developed in different strategic contexts and the value of human capital leads us to propose the following hypotheses:

H.3.1. The customer-orientation competency has a positive influence on the value of human capital.

H.3.2. The adaptation competency has a positive influence on the value of human capital.

H.4. The results-orientation competency has a positive influence on the value of human capital.

In order for the company to be able to maintain a competitive advantage over time, the resources that support this advantage, in addition to valuable, must be inimitable and irreplaceable. That is, they should be specific to the company (Barney, 1991). The duration of the competitive advantage will depend on the "isolating mechanisms". Thus, when the uniqueness of the human capital increases, the more in-depth knowledge that it has helps to reduce risks and capitalise its productive potential (Collis and Montgomery, 1995).

The uniqueness of the human capital refers to the degree to which this is firm specific and it is developed internally

in the company (Barney, 1991; Williamson, 1975). The theory of transaction costs indicates that companies achieve a competitive advantage when they have resources that are specific to the company, and that cannot be copied by competitors (Barney and Wright, 1988; Williamson, 1975). Therefore, in order to maintain their competitive advantage over time, both prospector and defender companies require a specific human capital, and consequently, both, using their employees' knowledge, will invest in training aimed at deepening (defender) or broadening (prospector) knowledge, seeking inimitability by competitors (Koch and McGrath, 1996; Snell and Dean, 1992; Mahoney and Pandian, 1992). This leads us to consider which competencies the specificity of human capital depends on in each of the strategic contexts.

Companies with prospector strategies perform an intense innovative activity both in terms of products and markets, with a view to adapting their portfolio of products and services to the changing demands of their customers (Conant et al., 1990; Walker et al., 2003). In this regard, we consider that the personal competency of innovation defines the uniqueness of human capital in prospector companies, since by their very nature, what makes the knowledge and skills of these companies unique and idiosyncratic is the ability of their individuals to develop new knowledge (Hayton and Kelley, 2006; López Cabrales et al., 2009; Spencer and Spencer, 1993). Prospector companies operate in changing and uncertain environments, and continuous innovation is their objective. Consequently, they require employees who generate new ideas and apply them to provide solutions to market demands.

On the contrary, what makes the human capital of defender companies unique (specific) is the personal competency of technical expertise, which seeks to improve organisational efficiency by perfecting the well-known (D'Aveni, 1994). This competency seeks the deepening of individuals' knowledge about the work position they hold (Spencer and Spencer, 1993) achieving an improvement in products and processes (Shortell and Zajac, 1990; Walker et al., 2003; Conant et al., 1990). Thus, the competency of technical expertise, essential in defender companies, explains the greater or lesser uniqueness of human capital in these companies.

In short, we expect that the uniqueness of human capital is explained by the competency of innovation in prospector companies and by the competency of technical experience in defender strategies. The above considerations are gathered in the following hypotheses:

H.5. The competency of innovation has a positive influence on the uniqueness of human capital.

H.6. The competency of technical experience has a positive influence on the uniqueness of human capital.

Methodology

Population and sample

The data used to test the hypotheses were taken from a sample of companies obtained from the SABI database.

We selected manufacturing companies with more than 500 employees, since it is a large number which guarantee a real human resources management competency-based strategy and thereby eliminating peculiarities or specific cases that could arise in small companies with a low number of employees, which may even lack a Human Resources Management Department (Shaw et al., 1998). In this way, a valid population of 395 companies was obtained.

The unit of analysis chosen was that of employees in the production area. We focus on this area because its employees could be considered to be essential or “core” employees in the industrial sector, and this would justify the interest in examining their competencies and their impact on the human capital (Lepak and Snell, 1999, 2002). Moreover, it has been demonstrated that the competencies-based systems chosen are more suitable for manufacturer activities than for the services industry (Shaw et al., 2005).

Each company was sent two identical questionnaires about strategy, competencies and the value and uniqueness of human capital, addressed to the human resources manager and the production manager. These two managers were surveyed in order to guarantee that they knew the variables to study in the production departments (competencies, human capital and strategies), and to guarantee that there would be contrasting information that did not come from one respondent, in order to assess the levels of consensus or agreement between both managers. The final sample included 110 companies, for which both questionnaires were obtained. The response ratio was 27.84%.

To analyse the presence of a possible non-response bias, an ANOVA analysis was performed among the companies that answered the questionnaire and those that did not, considering the number of employees, income and labour and production costs. The results showed that there were no significant differences between the dimensions analysed, and consequently no effect of the non-response was detected, as observed in Table 1.

Of each of the 110 companies in the sample, two responses were obtained, from the human resources manager and the production manager. The inter-agreement ratio (r_{wg}) was calculated to analyse if both responses were similar.

This ratio indicates that different interviewees within the same company agree in their assessments about the characteristics of the organisational strategy, the employees' competencies and the uniqueness of human capital. We use the r_{wg} to test the agreement of various respondents within the same company to ensure the validity of adding the cases (Kozłowski and Hatrup, 1992). The inter-agreement ratio or r_{wg} was calculated for each of the variables in accordance with the procedures described by James et al. (1995). We obtain $r_{wg} = 0.85$ for the organisational strategy, $r_{wg} = 0.88$ for personal competencies and $r_{wg} = 0.87$ and $r_{wg} = 0.86$ for the value and uniqueness of human capital respectively. In all cases, the r_{wg} ratio shows favourable values.

Measurement

The hypotheses were tested using structural equation models (SEM), following the two-step procedure recommended by Anderson and Gerbing (1988). Firstly, the model

was adjusted in such a way that it enabled us to specify the relations between the observable variables and theoretical concepts. Then the structural models were adjusted, specifying the relations between the theoretical concepts used and enabling us to check the hypotheses of the model.

In order to analyse the reliability and validity of the scales used and to study the composite reliability and discriminant validity of the factors obtained, a confirmatory factor analysis (CFA) was performed, since it is considered to be the most suitable technique for this purpose (Bagozzi et al., 1991). The validity of content is guaranteed by the literature review (Bollen, 1989).

We decided to analyse Miles and Snow's (1978) strategy types, using Dess and Davies' scale (1984). Traditionally, this scale has been used to measure the organisational strategy, in line with Porter's classification (1980). However, it can also be used to analyse Miles and Snow's typology (1978) since these two scales are equivalent (Miles and Snow, 1984). Specifically, Porter's differentiation strategy is similar to Miles and Snow's prospector strategy and Porter's cost leadership strategy is similar to Miles and Snow's defender strategy (Kim et al., 2004). Furthermore, a second reason for using Dess and Davies' scale is the added richness brought to the analysis by the fact that these authors consider various items to identify the company's strategic option.

Dess and Davies' scale (1984) identify three dimensions of the organisational strategy that correspond to the prospector, analyser and defender strategic options. As previously indicated, the analyser strategy has not been considered in this study because it is a hybrid strategy combining elements from the prospector and defender patterns (James and Hatten, 1995; DeSarbo et al., 2005, 2006). We performed a cluster analysis and an ANOVA analysis with a view to identifying the proportion of prospector and defender companies in our sample and in order to guarantee significance. We identified 65 companies that follow a prospector strategy and 45 defender companies, meaning that 59.09% and 40.91% of the companies in our sample were prospector companies and defender companies respectively. The results of the analysis performed can be observed in Table 2.

The competencies analysed—innovation, technical expertise, adaptability, customer-orientation and results-orientation—were measured using Spencer's scale (2004). The competencies indicated refer to those used by the employees of the production department. Lastly, the value and uniqueness of human capital was analysed using the scales proposed by Lepak and Snell (2002).

In this study, we measured all the items using a Likert scale of 1–7 (1 = totally disagree, 7 = totally agree).

The firm size was included as a control variable. We measured the firm size by the number of employees. The values for said variable varied from 500 to 15,486 employees. On account of the great dispersion, we used the Napierian logarithm of the number of employees in the company in the estimation in order to avoid the scale effect.

The CFA confirms the reliability and validity of the scales used. Table 3 shows the standardised solution for the complete model, which includes the company strategy, the employees' competencies and the value and uniqueness of human capital. As shown in Table 3, two factors were obtained for strategy: the first refers to the prospector strategy ($t = 4.511$) and the second refers

Table 1 Non-response bias analysis.

Variable	Group	Mean	Standard deviation	F value (significance)
Number of employees	Respondent (1)	1599.38	2167.86	0.93 (0.33)
	Non-respondent (0)	1796.05	3600.72	
Sales revenue	Respondent (1)	2.0E+008	193409593.7	0.35 (0.55)
	Non-respondent (0)	2.0E+008	189423073.7	
Labour costs	Respondent (1)	35494039	36468341.30	0.01 (0.91)
	Non-respondent (0)	36014511	36192666.94	
Production costs	Respondent (1)	2.2E+008	213017568.6	0.05 (0.82)
	Non-respondent (0)	2.0E+008	192802049.8	

Table 2 Cluster analysis and ANOVA.

	Conglomerate		Error		F	Sig.
	Root mean square	df	Root mean square	df		
Prospector strategy (n = 65)	101.652	1	0.458	108	221.792	0.000
Defender strategy (n = 45)	1.512	1	0.596	108	2.538	0.014

to the defender strategy ($t=4.726$). Four factors were obtained for personal competencies. The first, which we call ‘‘proactive behaviour’’ ($t=4.646$), combines the competencies of innovation and adaptability, which is logical since [Spencer and Spencer \(1993\)](#) claim that these two competencies are closely related. The other three factors refer to the competencies of technical expertise ($t=6.294$), customer-orientation (5.726) and results-orientation (4.559) respectively. Lastly, two factors were obtained for human capital: the first refers to the value ($t=5.985$) and the second refers to uniqueness ($t=3.905$).

For each factor, only those indicators with parameters that were estimated to be significant and with factor loadings of more than 0.7 were included. Some of the items from the original scales were eliminated on account of not being statistically significant. As can be observed in [Table 3](#), in all cases the estimations were significant at 99% ($t > 2.576$). Convergent validity was guaranteed since the factor loadings were above 0.7 and statistically significant ([Hair et al., 1999](#); [Bagozzi et al., 1991](#)).

The goodness of fit indexes of the CFA appear in [Table 4](#). As can be observed, all the values are favourable.

The data observed in [Table 5](#) show that all our scales are reliable and that there is convergent and discriminant reliability. The reliability of these scales is measured by the composite reliability, which in all cases is higher than 0.7. Convergent validity is guaranteed by the average variance extracted, which in all cases is above 0.5. Discriminant validity between the factors is also confirmed in line with the procedure indicated by [Fornell and Larcker \(1981\)](#). In all cases, the average variance extracted (main diagonal in [Table 3](#)) is higher than the square of the correlations between factors.

Results: test of hypotheses

The hypotheses proposed are compared using covariance structure models. As a starting point we use the theoretical

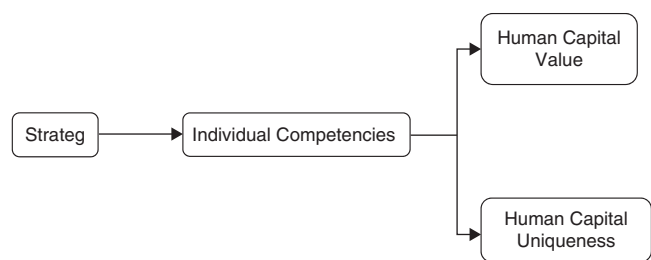


Figure 1 Theoretical model.

model in which the organisational strategy has some effect on the competencies, and these on the value and uniqueness of human capital. This model assumes the mediator role that employees’ competencies play between strategy and human capital ([Fig. 1](#)).

As we use structural equation modelling to test the hypotheses of this study, we apply the methodology proposed by [Anderson and Gerbing \(1988\)](#). The correlations between different factors and their significance are analysed, as well as the composite reliability associated with each factor ([Table 6](#)). [Table 6](#) shows that the scales are reliable and that structural equation modelling can be applied ([Bollen, 1989](#)).

In order to verify the existence of mediator effects of personal competencies on the relations between strategy and the value and uniqueness of human capital, we use the method proposed by [Baron and Kenny \(1986\)](#) and [Judd and Kenny \(1981\)](#), which consists of the estimation of three models:

$$Y = \beta_{10} + \beta_{11}X + \varepsilon_1 \tag{1}$$

$$Me = \beta_{20} + \beta_{21}X + \varepsilon_2 \tag{2}$$

$$Y = \beta_{30} + \beta_{31}X + \beta_{32}Me + \varepsilon_3 \tag{3}$$

where Y is the dependent variable, X is the independent variable and Me is the mediator variable. The coefficients β_{10} ,

Table 3 Confirmatory factor analysis (standardised solution).

	EP	ED	PRC	OC	OR	ET	VAL	ESP	t
EST10: Brand identification...	0.809**								5.808
EST11: Innovation in marketing techniques and methods	0.853**								2.913
EST18: Advertising...	0.720**								6.367
EST3: Operating efficiency		1							
A1: Smoothly handle multiple demands, shifting priorities, and rapid change...			0.725**						6.247
A2: Adapt their responses and tactics to fit fluid circumstances.			0.761**						5.965
A3: Are flexible in how they see events...			0.723**						7.704
I1: Sep out fresh ideas from a wide variety of sources.			0.838**						5.820
I4: Take fresh perspectives and risks in their thinking.			0.805**						6.558
OC1: Understand customers' needs and match them to services or products...				0.793**					7.230
OC2: Seek ways to increase customers' satisfaction and loyalty...				0.877**					3.110
OC4: Grasp a customer's perspective, acting as a trusted advisor				0.686**					6.829
OR1: Are results-orientated, with a high drive to meet their objectives and standards.					0.808**				3.501
OR2: Set challenging goals and take calculated risks					0.762**				3.665
OR3: Pursue information to reduce uncertainty and find ways to do better					0.784**				5.184
OR4: Learn how to improve their performance.					0.830**				5.136
ET1: Attend courses and carry out diverse activities in order to maintaining their abilities and knowledge...						0.868**			5.222
ET2: Show curiosity to explore beyond the limits of their jobs...						0.846**			5.403
ET3: Collaborate in the resolution of technical problems.						0.809**			5.809
VAL1: Are instrumental for creating innovations							0.841**		4.383
VAL2: Create customer value.							0.897**		4.3654
VAL3: Help minimise cost of production service, or delivery...							0.730**		5.725
ESP1: Are not widely available in the labour market...								0.664**	5.660
ESP2: Would be very difficult to replace.								0.665**	5.120
ESP4: Are widely considered the best in our industry.								0.792**	5.070
ESP10: Distinguish us form our competitors.								0.833**	4.997

Note: EP, prospector strategy; ED, defender strategy; PRC, proactive behaviour; OC, customer orientation; OR, results orientation; ET, technical expertise; VAL, human capital value; ESP, human capital uniqueness.

** p<0.01

Table 4 Confirmatory factor analysis: goodness of fit indexes (standardised solution).

Satorra-Bentler chi cuadrado	df	p	BB-NFI	BB-NNFI	CFI	RMSEA
299.1689	262	0.05688	0.937	0.969	0.975	0.036

Table 5 Discriminant validity.

	Prospector strategy	Defender strategy	Proactive behaviour	Customer orientation	Results orientation	Technical expertise	Human capital Value	Human capital uniqueness
Prospector strategy	0.633393212							
Defender strategy	0.004761	1						
Proactive behaviour	0.014884	0.002209	0.5688039					
Customer orientation	0.013225	0.003136	0.011881	0.622531379				
Results orientation	0.015876	0.002916	0.014161	0.01	0.65183147			
Technical expertise	0.021609	0.004225	0.018769	0.014884	0.018769	0.704338125		
Human capital value	0.021609	0.004624	0.0144	0.011664	0.010609	0.014884	0.68164438	
Human capital uniqueness	0.011236	0.003025	0.012996	0.010609	0.009604	0.016384	0.015376	0.58734007

Note: The values in the diagonal are the AVE.

Table 6 Means, standard deviations, and correlations between factors and composite reliability.

	Prospector strategy	Defender strategy	Proactive behaviour	Customer orientation	Results orientation	Technical expertise	Human capital value	Human capital uniqueness	Mean	S.D.
Prospector strategy	0.83761259								5.2335	1.1018
Defender strategy	0.069*	1							6.3182	0.6730
Proactive behaviour	0.122**	0.047*	0.84041366						4.6446	0.8780
Customer orientation	0.115**	0.056**	0.109**	0.83048403					5.0243	0.8124
Results orientation	0.126**	0.054**	0.119**	0.100**	0.8487962				4.5425	0.8977
Technical expertise	0.147**	0.065**	0.137**	0.122**	0.137**	0.8263465			4.261	0.8124
Human capital value	0.147	0.068**	0.120**	0.108**	0.103**	0.122**	0.86446257		4.5539	1.0025
Human capital uniqueness	0.106**	0.055**	0.114**	0.103**	0.098**	0.128**	0.124**	0.8088775	4.0079	0.8573

The values in the diagonal are the composite reliability of each factor.

** p<0.01

+ p<0.1

β_{20} and β_{30} represent the control variables. Furthermore, the following conditions must be met:

1. In the second equation, β_{21} must be significant.
2. In the third equation, β_{32} must be significant.
3. In the third equation, β_{31} must be less than (in absolute terms) β_{11} in the first equation.

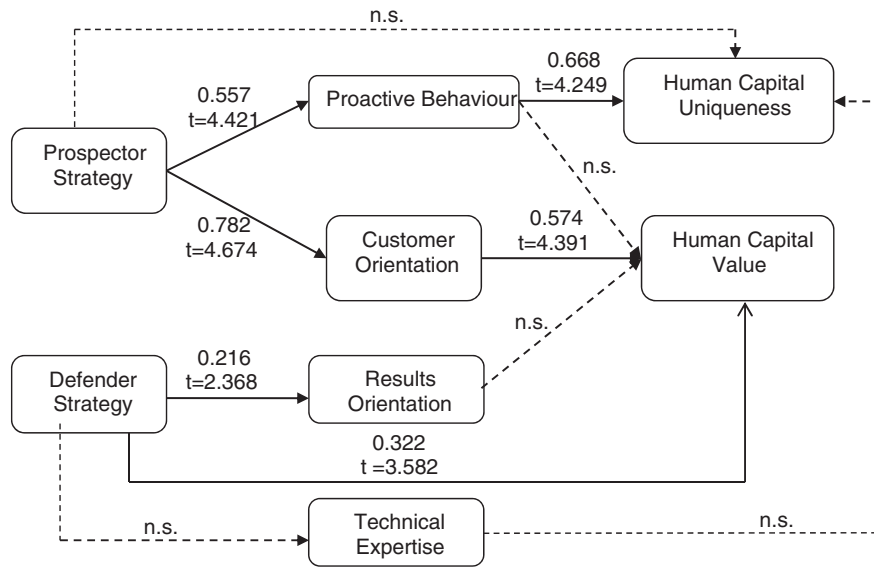
As can be seen in the table attached to Fig. 2, said mediation conditions are verified.

To demonstrate if the mediation established through the personal competencies—proactive behaviour (innovation, adaptability), customer-orientation, results-orientation and technical expertise—of the employees is partial or full, we propose two structural models: that of partial mediation (Fig. 2) and that of full mediation (Fig. 3). Once both proposed models have been estimated, using the chi-squared test, we determine which of them demonstrates a better adjustment. The theoretical model of partial mediation, represented in Fig. 2, shows a good adjustment ($\chi^2 = 172.8888$, gl = 133, p value = 0.01437; BB-NFI = 0.874; BB-NNFI = 0.941; CFI = 0.966; RMSEA = 0.051) (Mueller, 1996).

The value of the estimated parameters and their statistical significance (t) can be observed in Fig. 2. The results obtained confirm the mediator nature of the competencies between strategy and human capital. Specifically, they show positive and significant relationships between the prospector strategy and the personal competencies of proactive behaviour (innovation and adaptability) and customer-orientation and, between the competencies of innovation and adaptability (included in the proactive behaviour factor) with the uniqueness of human capital and between the competency of customer-orientation and the value of human capital. Moreover, the defender strategy demonstrates a positive relationship with the competency of results-orientation and the value of human capital, with no mediator effect being found for employees' competencies. In both cases, all the relationships are 99% significant. The competency of technical expertise is not related with any of the variables of the partial mediation model proposed.

Eliminating the direct relationship between the value and uniqueness of human capital and the organisational strategy, we propose the full mediation structural model (Fig. 3), in which it can be observed that the personal competencies proactive behaviour (innovation and adaptability) mediate in the relationship between the prospector strategy and the uniqueness of human capital, and the competency of customer-orientation mediates in the relationship between the prospector strategy and the value of human capital. Moreover, the competency of results-orientation mediates in the relationship between the defender strategy and the value of human capital. The goodness of fit indices of this full mediation model show a good adjustment again ($\chi^2 = 174.7190$, gl = 134, p value = 0.01038; BB-NFI = 0.872; BB-NNFI = 0.938; CFI = 0.964; RMSEA = 0.053).

A simple comparison of the goodness of fit indices of the adjustment suggests that the full mediation model presents a better adjustment than the partial mediation model. To confirm this opinion, we apply a χ^2 test, using the programme "sbdiff.exe" developed by Satorra and Bentler (2001). The results obtained (Satorra-Bentler scaled difference = 1.7119, $p = 0.190736$) lead us to state that the full



Coefficients and goodness of fit indexes for model of partial mediation

	Proactive behaviour	Customer orientation	Results orientation	Technical expertise	Human capital value	Human capital uniqueness
Prospector strategy	0.557**	0.782**			0.087 .n.s.	0.156 n.s.
Defender strategy			0.216**	0.152 n.s.	0.322**	0.032 n.s.
Proactive behaviour					0.130 n.s.	0.668**
Customer orientation					0.574**	
Results orientation					0.084 n.s.	
Technical expertise						0.092 n.s.

**p<0.01
 $\chi^2=172.8888$, gl=133, p valor= 0.01437; BB-NFI=0.874; BB-NNFI= 0.941; CFI=0.966; RMSEA= 0.051

Figure 2 Model of partial mediation.

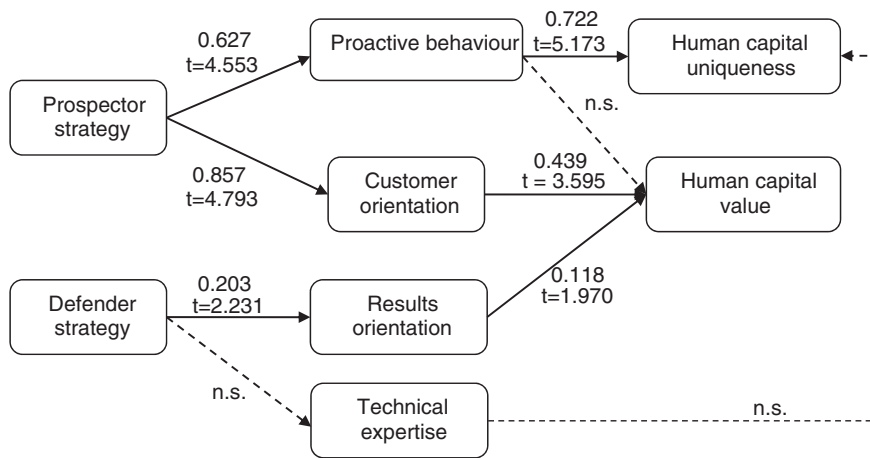
mediation model displays a better adjustment than the partial mediation model. Therefore, it can be stated that personal competencies mediate in the relationship between organisational strategy and valuable and specific human capital.

In short, regarding the relationships between personal competencies and organisational strategy, the results show that the prospector strategy has a significant and positive influence on the competencies that fall under proactive behaviour—innovation and adaptability—(estimated coefficient of 0.627) and customer-orientation (estimated coefficient of 0.857). Therefore, Hypotheses H.1.1–H.1.3 are verified.

In turn, the defender strategy positively and significantly conditions the competency of results-orientation only (estimated coefficient 0.203). Consequently, Hypothesis H.2.1 is verified, but H.2.2, which related the defender strategy with the competency of technical expertise, is not.

As regards the following hypothesis, the results show that in the case of a prospector strategy, the competency of customer-orientation is positively and significantly related with the value of human capital (estimated coefficient 0.439) and that the competency of proactive behaviour (which includes the competencies of innovation and adaptability) displays a positive relationship with the uniqueness of human capital (estimated coefficient 0.722). Therefore, Hypotheses H.3.1 and H.5 are verified, but Hypothesis H.3.2 is not.

In the case of the defender strategy, the competency of results-orientation displays a significant and positive relationship with the value of human capital (estimated coefficient 0.118). Consequently, Hypothesis H.4 is verified, but H.6 is not, since no significant relationship was found between the competency of technical expertise and the uniqueness of human capital in the case of defender companies.



Coefficients and goodness of fit indexes for model of full mediation

	Proactive behaviour	Customer orientation	Results orientation	Technical expertise	Human capital value	Human capital uniqueness
Prospector strategy	0.627**	0.857**	.			
Defender strategy			0.203**	0.091 n.s.		
Proactive behaviour					0.059 n.s.	0.722**
Customer orientation					0.439**	
Results orientation					0.118**	
Technical expertise						0.075 n.s.

**p<0.01
 ($\chi^2=174.7190$ gl=134, p valor= 0.01038; BB-NFI=0.872; BB-NNFI= 0.938; CFI=0.964; RMSEA= 0.053)

Figure 3 Model of full mediation.

Finally, it is important to note that the control variable of company size was not significant in any case.

Discussion and practical implications

The aim of this article was to respond to some questions that still remain in the literature: How does the organisational strategy influence the development of different types of employees' competencies? To what extent do different strategies explain different competency-based profiles? Furthermore, and considering the literature insists on the need to develop valuable and specific human capital to compete, new questions appear: Are the concepts of value and specificity homogeneous for companies? Or are these aspects found in different competencies depending on the strategy? We have found a response to these questions both through the literature review and in the statistical analysis performed.

One aspect that was highlighted in the analysis of the five competencies considered in this work is that two of them, innovation and adaptation, fall under one. This competency,

which we have called proactive behaviour, means that both concepts are united and it can be understood that innovation means endeavouring to adapt to new contexts and that adaptation occurs through innovation (Spencer and Spencer, 1993).

Secondly, it is confirmed that there are no "best competencies" that companies should incorporate and that are valid for any type of context, or in other words, we cannot discuss universal competencies. This result is interesting, because it adds value to the contingent approaches of competencies recently described in the literature (Spencer et al., 2008) by specifying that the strategy defines the desired competencies. Our results show that different strategic orientations influence different combinations of employees' personal competencies. Specifically, we observe that the prospector strategy explains proactive behaviour, i.e. the competencies of innovation and adaptation, and customer-orientation, which is consistent with that argued, since this type of strategy is innovative and continuously seeks new markets and products. Moreover, in the case of the defender strategy, the results show that firms pursuing such strategy encourage its employees to develop the

results-orientation competency. The reason for this is the strong emphasis placed by defender companies on seeking organisational efficiency. We can deduce that if these competencies are linked to the strategies, human resources management should be aimed at strengthening and promoting them, via suitable processes of competency-based management.

A third relevant aspect demonstrated by the results is that although the development of valuable and company-specific human capital is essential both from the perspective of a prospector and defender strategy, the content of what determines value and specificity differs according to the strategic choice. Specifically, in the case of the prospector strategy, the main objective of which is constant innovation and seeking new products and markets, we observe that the value of human capital is explained by the competency of customer-orientation, and the uniqueness of human capital by the competency of proactive behaviour. Moreover, the main aim of the defender strategy is to achieve organisational efficiency. Our results for this strategy show that the value of human capital is directly and positively linked to the competency of results-orientation, which endeavours to achieve organisational goals by efficiently using the available resources. We understand that the analysis performed contributes significantly to the literature on human resources management and, more specifically to that on human capital, since the competencies that define and give substance to their dimensions could be differentiated. In other words, value and uniqueness of human capital are not homogeneous concepts.

We highlight this contribution in line with that expressed by [Wright and McMahan \(2011\)](#) who called for more studies about the content and dimensions of human capital, a resource that has been somewhat disregarded by human resources theorists who were more interested in studying how to influence it rather than analysing its nature, according to the above-mentioned authors. Also, recently, [Campbell et al. \(2012\)](#) carried out an in-depth study of one dimension of human capital (uniqueness) to see to what extent contingent factors appear, which explain its contribution to the competitive advantage of a company. Our findings linking prospector strategies, proactive behaviour competency and uniqueness of human capital may help in this regard.

A fourth contribution of this work is the revelation that employees' competencies play a mediating role in the relationship between the organisational strategy and the human capital of the company. Specifically, in the case of the Spanish manufacturing sector, we have found that for prospector companies, the personal competency of customer-orientation mediates in the relationship between the prospector strategy and the value of human capital. Furthermore, the competency of proactive behaviour plays a mediating role in the relationship between the prospector strategy and the uniqueness of human capital. In the case of the defender strategy, the results show that the competency of results-orientation mediates in the relationship between the defender strategy and the value of human capital. The different individual competencies adapted to each strategy explain the differences in terms of human capital. In this regard we are in agreement with that revealed by [Ployhart and Moliterno \(2011\)](#) who carried out an

in-depth study of the construct of human capital; we have contributed different individual competencies associated to different dimensions of the construct.

We consider that the results obtained contribute to both the literature on human resources management and human capital, and on the Resource Based View of the Firm, since different competencies are identified for different strategies. Although the comments we have made result from the relationships found, it is also important to reflect on those links that we established conceptually and that are not confirmed by the data. In particular we consider it relevant to mention the fact that the uniqueness of human capital is not linked, in the case of defender strategies, to the competency of technical expertise. This may lead us to think that the means via which companies try to obtain better results, at least in the companies from the sample, are not related to an internal improvement linked to the deepening of existing knowledge that leads to the technical efficiency of the production processes.

This opens up a research path to identify what is the sphere of knowledge and skills that determines uniqueness in the case of companies with the defender strategy. In this respect, some authors even begin to question to what extent the uniqueness of human capital is a desirable dimension for the company, as it is not a guarantee of competitive advantage ([Campbell et al., 2012](#); [Wright and McMahan, 2011](#)).

We also believe that the association of the competencies of innovation and adaptation in one single factor merits wider contrasting in other organisational units or on an organisational level. It could be assumed that although innovation implies adaptation, adaptation is not necessarily associated with innovation, unless innovation is considered in a restrictive way, i.e. on a company level.

From the perspective of the practical implication of the results, we consider that they clearly demonstrate not only the importance of appropriately selecting competencies according to the company's strategy, but also the different contribution made by these through the human capital of the company. This enables different intervention strategies to be designed depending on whether the company wants to influence the value or uniqueness of human capital. We consider the practical interest of our results to be high, especially on account of the wide dissemination of models of competency based management among human resources consultancy firms. It is important to note that, according to the company's strategic priorities and to whether the value or specificity of the company's human capital is to be increased, some competencies will be more suitable than others, and this would enable the company to design human resources management systems aimed at identifying, measuring and encouraging those competencies in individuals.

The contributions we have indicated must be qualified with some limitations present in this study. Although the sample of companies is of an acceptable size, and the response ratio is higher than that obtained in similar studies, only one activity sector, the manufacturing sector, and one group of employees, those from the production area were considered. Nevertheless, it is true that although this limitation helps to focus the aim and results of the work, the fact that other activity sectors and other groups of employees within the companies from our sample were not considered limits the study. A second limitation of the work lies

in the fact that the strategic options of the companies were reduced to two: prospector versus defender. Other strategic orientations would help to enrich the impact of personal competencies. Also, the fact that company performance measures were not included could be mentioned as another limitation. Recent literature points to the need to further explore the strategic impact and organisational results of human capital (Lengnick-Hall et al., 2009). Moreover, the competencies analysed are those found in a certain department, the production department, and may or may not vary in other operational units of the company. Lastly, it is important to mention that this study is cross-sectional, which may be an obstacle when verifying whether the causal relations mentioned in the proposed hypotheses were met or not.

The limitations indicated also mark out future lines of research. For example, including the effects of human resources practices such as compensation, training, etc. and observing whether these would strengthen the development of a human capital that is in line with the organisational strategy. It would also be relevant to observe whether

differences exist in the competencies of employees in different jobs within the same company and in the level of demand of these competencies, as well as in companies belonging to other activity sectors. To do so, we would need to verify whether the consideration of individual competencies as a strategic factor depends on the work position. By analysing the competencies required in each job and the valuable and/or unique human capital, we could observe whether the human resources management should differ according to the above mentioned characteristics, and the type and level of competencies required.

Acknowledgement

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Appendix A. Questionnaire

Please, mark the option according to your organization.								
The strategic priority of your organization is...								
1= Strongly disagree, 2= Disagree, 3= Lightly Disagree, 4= Nor agree neither disagree, 5= Lightly Agree, 6= Agree, 7= Strongly Agree								
							Strongly Disagree	Strongly Agree
E1	New product development.....	1	2	3	4	5	6	7
E3	Operating efficiency.....	1	2	3	4	5	6	7
E4	Product quality control.....	1	2	3	4	5	6	7
E10	Brand identification.....	1	2	3	4	5	6	7
E11	Innovation in marketing techniques and methods	1	2	3	4	5	6	7
E12	Control of channels of distribution.....	1	2	3	4	5	6	7
E13	Procurement of raw materials.....	1	2	3	4	5	6	7
E16	Capability to manufacture specialty products.....	1	2	3	4	5	6	7
E17	Products in high price market segments.....	1	2	3	4	5	6	7
E18	Advertising.....	1	2	3	4	5	6	7
E19	Reputation within industry.....	1	2	3	4	5	6	7
E20	Forecasting market growth.....	1	2	3	4	5	6	7
E21	Innovation in manufacturing processes...	1	2	3	4	5	6	7

Note: items E1, E10, E11, E12, E17, E18, E19 and E20 identify a prospector strategy. Items E3, E4, E13, E14 and E21 identify a defender strategy

Production employees...		Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7
OC1	Understand customers' needs and match them to services or products.....	1	2	3	4	5	6	7
OC2	Seek ways to increase customers' satisfaction and loyalty.....	1	2	3	4	5	6	7
OC3	Gladly offer appropriate assistance.....	1	2	3	4	5	6	7
OC4	Grasp a customer's perspective, acting as a trusted advisor.....	1	2	3	4	5	6	7
OR1	Are results-orientated, with a high drive to meet their objectives and standards...	1	2	3	4	5	6	7
OR2	Set challenging goals and take calculated risks.....	1	2	3	4	5	6	7
OR3	Pursue information to reduce uncertainty and find ways to do better....	1	2	3	4	5	6	7
OR4	Learn how to improve their performance.....	1	2	3	4	5	6	7
A1	Smoothly handle multiple demands, shifting priorities, and rapid change.....	1	2	3	4	5	6	7
A2	Adapt their responses and tactics to fit fluid circumstances.....	1	2	3	4	5	6	7
A3	Are flexible in how they see events.....	1	2	3	4	5	6	7
I1	Sep out fresh ideas from a wide variety of sources.....	1	2	3	4	5	6	7
I2	Entertain original solutions to problems..	1	2	3	4	5	6	7
I3	Generate new ideas.....	1	2	3	4	5	6	7
I4	Take fresh perspectives and risks in their thinking.....	1	2	3	4	5	6	7
ET1	Attend courses and carry out diverse activities in order to maintaining their abilities and knowledge.....	1	2	3	4	5	6	7
ET2	Show curiosity to explore beyond the limits of their jobs.....	1	2	3	4	5	6	7
ET3	Collaborate in the resolution of technical problems.....	1	2	3	4	5	6	7

Note: OC, customer orientation; OR, results orientation; A, adaptability; I, innovation; ET, technical expertise;

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