The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0143-7720.htm

Strategic consensus, top management teams, and innovation performance

Carmen Camelo and Mariluz Fernández-Alles
Business Administration Department, University of Cádiz, Cádiz, Spain, and
Ana B. Hernández
Department of Business Management, Rovira i Virgili University, Reus, Spain

Abstract

Purpose – The purpose of this paper is to analyze how the educational level and diversity of a firm's top management team (TMT), moderated by strategic consensus, influence its innovation performance.

Design/methodology/approach – Using Poisson regression analysis, the proposed models were tested on 97 innovative Spanish firms selected from the Dun and Bradstreet database of 2000.

Findings – Results show that a higher educational level in the TMT has a positive and direct effect on innovation performance, while functional diversity and diversity in TMT tenure have a direct and negative effect. However, in a situation of strategic consensus in the TMT, the relationship between functional diversity and innovation is positive.

Originality/value – The paper makes several contributions to previous research. First, few studies have considered the influence of the characteristics and composition of the TMT on the organization's innovation performance. Second, this paper responds to the calls of researchers to enrich the upper echelon theory by considering strategic consensus as a process of interaction between the members of the TMT that modifies the relationship between TMT diversity and the firm's innovation performance.

Keywords Senior management, Innovation, Management strategy, Spain

Paper type Research paper

1. Introduction

In today's dynamic and competitive business context, innovation has become a key factor for the successful performance and survival of most firms. Innovation is a core theme in the management literature (van de Ven and Poole, 1995) – it can help a firm acquire new capabilities, enter new businesses, and improve profitability and economic growth (Zhou, 2006). These arguments justify researchers' strong interest in identifying the factors that promote this strategy (Zahra *et al.*, 2000).

Although many variables affect innovation, this paper explores the impact the top management team (TMT) has on innovation. Drawing on the findings of Hambrick and Mason (1984), researchers have suggested that top managers play a crucial role in

International Journal of Manpower
Vol. 31 No. 6, 2010
pp. 678-695

0143-7720
DOI 10.1108/01437721011073373

The authors are grateful to the anonymous referees of this journal for helpful comments and suggestions. They also thank the Junta de Andalucía (Research Project SEJ02478) for financial support.

strategic change and strategic decision. Research on the TMT (Knight *et al.*, 1999; Pelled *et al.*, 1999; Bunderson and Sutcliffe, 2002) addresses these questions by linking the TMT's characteristics to outcome variables such as strategic change, innovation, and firm performance.

The role the TMT plays in promoting a strategy of innovation can be understood as a process of influence (Hoffman and Hegarty, 1993). The influence and orientation of the firm's most senior managers can be discerned from both the team's demographic characteristics and its composition (Wiersema and Bantel, 1992; Hoffman and Hegarty, 1993; Wally and Becerra, 2001). According to the upper echelon line of research, the diversity and educational level of the TMT have traditionally been considered features that promote an orientation toward innovation (Bantel and Jackson, 1989; Daellenbach *et al.*, 1999; Kor, 2006). However, empirical results from upper echelon research are inconclusive (Daellenbach *et al.*, 1999; Wally and Becerra, 2001). This has led, within the upper echelon theory, to a new line of inquiry proposing that organizational decisions and results cannot be explained by the composition of the TMT alone; the analysis also requires consideration of the processes and situations deriving from the relationships between TMT members. A variety of opinions on this topic have recently appeared in the literature. Kauer *et al.* (2007) state that the effects of team characteristics on decision outcomes are far more complex than previous studies had assumed. Cannella *et al.* (2008) report that an increasing number of authors emphasize the need to examine interaction processes among the TMT members when the relationship between the diversity of the TMT and the performance of the company is analyzed (Carpenter, 2002; Cannella and Holcomb, 2005) because diversity can produce negative as well as positive effects. As Cannella *et al.* (2008, p. 768) state:

> [. . .] this "dual aspect" of TMT diversity suggests that the relationship between diversity and firm performance is not unilaterally positive or negative, but rather that the context in which a team functions moderates this relationship.

Combining the traditional with this new current of upper echelon theory, the objectives of this study are to analyze:

- the effects of a high level of education within the TMT on the firms' innovation performance; and
- the effects of functional diversity and diversity in TMT tenure on innovation performance given the moderating effect strategic consensus has on the TMT.

Few studies have considered innovation performance within the upper echelon line of research. With regard to the educational level of the TMT, some studies have found a positive association between a high educational level and the innovative capacity in companies (Bantel and Jackson, 1989; Grimm and Smith, 1991; Schoenecker *et al.*, 1995; Camelo *et al.*, 2005; Herrmann and Datta, 2005). However, other empirical studies, such as those of Daellenbach *et al.* (1999) and Wally and Becerra (2001), reject the hypothesis because it has not been found to be statistically significant. Hence, it is relevant to analyze whether cognitive complexity, which can be inferred from the educational level of the TMT, constitutes a determining factor for the firm's innovation performance. With regard to diversity of the TMT, some researchers believe it is important to test the assertion that differences within the TMT must be expressed through task-focused conflict or debate if the company wishes to benefit from this diversity (Priem, 1990;

Simons, 1995). Strategic consensus within the TMT operates as a moderating factor on the relationship between the diverse composition of the TMT and the company's innovation performance. This moderating effect means that diversity will have an impact on innovation that varies with the existence of consensus. With this analysis, we are responding to the calls of previous researchers for the upper echelon theory to be enriched – in this case, by including processes of interaction between the members of the TMT (Knight *et al.*, 1999; Li and Hambrick, 2005; Simsek *et al.*, 2005).

This paper is organized in four parts. After this brief introduction, the Section 2 presents the study's theoretical foundations and consequent hypotheses. The following Section 3 describe the sample, establish the variables, and Section 4 present the data analysis and results. Finally, Section 4 summarize the most relevant conclusions drawn from the analysis.

2. Theory and hypotheses: the influence of the TMT on innovation performance

The TMT constitutes the dominant coalition of individuals responsible for the management of a company, particularly in formulating and implementing strategies for change (Chen *et al.*, 2006). Some authors have established that a manager's orientation can be discerned from demographic aspects and from the team's composition (Wiersema and Bantel, 1992; Hoffman and Hegarty, 1993; Wally and Becerra, 2001). Other research has suggested that the composition of the TMT has an impact on organizational decisions to commit resources for innovation (Hayes and Abernathy, 1980). All this research has been conducted within the framework of the upper echelon theory. Traditionally, the theory has argued for the positive effects that the composition and certain characteristics of the TMT have on the team's strategic orientation. From the literature review, a high educational level and diversity linked to the task or function for which each team member is responsible seem to be demographic characteristics that may endow the organization with proactive attitudes (Wiersema and Bantel, 1992; Hambrick *et al.*, 1996; Boeker, 1997; Pitcher and Smith, 2001).

However, the results of empirical research on the existence of any direct relationship between the TMT's characteristics and successful innovation are inconclusive. Previous research studies like those of Daellenbach *et al.* (1999) and Wally and Becerra (2001) did not find any relationship between innovation and higher educational levels of the TMT. Similarly, studies have reported contradictory results in relation to functional diversity in the TMT (Schoeneker *et al.*, 1995; Daellenbach *et al.*, 1999). These contradictions and lack of findings have stimulated a new line of thinking within upper echelon theory – that organizational decisions and results cannot be explained by the composition of the TMT alone. Some authors include other factors that affect the way the behavior of individual TMT members is integrated. Processes such as the exchange of information, joint decision making, and collaborative behavior are considered essential for explaining the existence of a good understanding between members, willingness to exchange information, and the probability of reaching a common premise when making decisions (Hambrick, 1994; Simsek *et al.*, 2005).

On the other hand, some authors attribute importance to the conflict or consensus that may result from differences in the characteristics of TMT members, as well as the process of how they interact with each other (Amason and Mooney, 1999; Hambrick *et al.*, 2001; Li and Hambrick, 2005). Given the preceding arguments, this

study proposes that a specific TMT composition does not guarantee that its members will achieve the necessary degree of common understanding, fluid exchange of information, and possibility of reaching a shared opinion decision making (Michel and Hambrick, 1992). Therefore, a sufficient degree of consensus among TMT members on the importance of innovation for the company is considered a requirement for the support of innovation.

This research aims to analyze the effects of three main factors on the company's innovation performance: the TMT's educational level, its diversity, and the existence of strategic consensus within the team. Strategic consensus is treated as a variable that could exert a moderating effect on the relationship between the diversity of the TMT and the firm's innovation performance.

Educational level

Previous studies have utilized the educational level of the TMT as an indicator of the team members' abilities (Bantel and Jackson, 1989; Wiersema and Bantel, 1992; Bantel, 1993; Boeker, 1997). They posit that higher levels of education should be associated with a high degree of cognitive complexity. Ginsberg (1990) argued that cognitive complexity is associated with a team's capacity to confront the uncertainty of the environment and to make decisions to stimulate renewal and change in an organization. This author claims that cognitive complexity can be inferred from educational level.

Therefore, a more highly educated team would be:

- more aware of the need for innovation and change (Bantel and Jackson, 1989; Wiersema and Bantel, 1992);
- able to process more information faster;
- capable of discriminating among a wider variety of stimuli and signals (Wiersema and Bantel, 1992); and
- capable of rigorously analyzing highly complex problems with multiple dimensions (Bantel, 1993; Herrmann and Datta, 2005).

Similar studies state that a TMT with a high average level of education will develop greater tolerance of ambiguity, be more receptive to ideas, and possess a base of knowledge and competences necessary for seeking new opportunities and evaluating numerous options (Datta and Rajagopalan, 1998; Herrmann and Datta, 2005).

In previous research, numerous studies have found a positive association between a high educational level and positive attitudes toward innovation and strategic change (Bantel and Jackson, 1989; Grimm and Smith, 1991; Wiersema and Bantel, 1992, Schoeneker *et al.*, 1995; Camelo *et al.*, 2005; Herrmann and Datta, 2005). From the above arguments, we derive the following hypothesis:

H1. There is a positive relationship between the average educational level of the TMT and the firm's innovation performance.

Functional diversity and diversity in TMT tenure: the moderating effect of strategic consensus in the TMT

In earlier studies of the relationship between TMT diversity and innovation, functional diversity and diversity in TMT tenure seemed to emerge as characteristics that may have a positive effect on innovation (Bantel and Jackson, 1989; Daellenbach *et al.*, 1999;

Lyon and Ferrier, 2002). Pelled *et al.* (1999) argue that these two types of diversity are closely job related, and both are defined by the individual's workplace experience. The first is related to experience in a particular functional area, and the second to the length of time the individual has held a particular job or position within the TMT. Heterogeneity in these variables will tend to generate task conflict, which is one dimension of conflict that leads groups to develop new ideas, thus improving the innovative character and quality of the team's decisions (Amason, 1996; Chen *et al.*, 2006; Mooney *et al.*, 2007).

Functional diversity. The principal arguments put forward with respect to functional diversity rest on the idea that managers with different kinds of functional experience will probably possess different types and levels of knowledge, as well as different perspectives and attitudes toward the issues requiring TMT decisions.

Some authors argue that functional diversity stimulates wider discussion and debate about the different ways to focus the activities of the company, and this leads to more innovative, higher quality solutions (Bantel and Jackson, 1989; Hambrick *et al.*, 1996). When diversity leads to disagreements regarding opportunities, threats, or the development of future markets, the members of the TMT come to be more aware and to encompass more perspectives in their analyses, and this in turn allows more innovative actions (Bantel and Jackson, 1989; Miller *et al.*, 1998).

Diversity in TMT tenure. Some researchers claim that diversity in TMT tenure can bring together different kinds of experience, alternative perspectives, attitudes, and values that can stimulate the TMT to become more predisposed toward change and innovation (Wiersema and Bantel, 1992; Boeker, 1997; Tihanyi *et al.*, 2000; Pitcher and Smith, 2001; Elenkov *et al.*, 2005; Barkema and Shvyrkov, 2007). Wierseman and Bantel (1992) state that time of entry into a group is an important determinant of a person's communication patterns within it. Long average group tenure results in decreasing levels of overall communication because group members feel they are able to anticipate the viewpoints of other members, and increased specialization occurs (Katz, 1982; Wiersema and Bantel, 1992). Therefore, long team tenure may lead to increased isolation with respect to external sources of information, and this could lead members to become less receptive to change and innovation.

A manager who has been a member of a TMT for several years has probably experienced previous innovations and will likely have a different point of view, experience, and way of understanding opportunities in innovation compared with someone who recently joined the TMT, who would most likely bring fresh experience from outside the TMT and the company (Barkema and Shvyrkov, 2007).

The moderating effect of strategic consensus in the TMT. From our review of the literature, we find that empirical results directly linking TMT diversity and the company's innovation performance are inconclusive (Barkema and Shvyrkov, 2007; Clark and Soulsby, 2007). The most critical arguments indicate that disagreements in the TMT are inevitable consequences of diversity and may affect the organizational results in different ways; hence, conflict should not be ignored in this relationship (Amason, 1996; Eisenhardt *et al.*, 1997; Amason and Mooney, 1999; Pelled *et al.*, 1999). As stated by Amason (1996) and Mooney *et al.* (2007), the effect of conflict on the decision-making process, and particularly on innovation, is paradoxical – it may be an essential means of increasing the quality of decisions by making them more innovative and creative, but it may also make it more difficult for the team to reach

consensus and, consequently, may prevent the effective acceptance of decisions, which in turn would have adverse repercussions.

Because the various types of diversity analyzed in this study are related to activities of team members, they may produce task conflict. This conflict is functional in character, and arises from differences in members' approaches to the achievement of common objectives, so it could be positive for innovation. However, Pelled *et al.* (1999) and Li and Hambrick (2005) suggest that task conflict could result in emotional conflict if the TMT has inadequate processes for managing debate and divergences in viewpoints and opinions. Emotional conflict is risky for the efficacy of the team's decision making because it involves interpersonal incompatibilities, mistrust, and animosity. Jackson (1992) states that TMT diversity has a positive impact on the resolution of complex problems; however, difficulties of communication and understanding may exist in these teams and, for this reason, some of the advantages of both diversity and homogeneity may be reflected in the team's performance. The benefits of the differences will appear when diverse perspectives are reconciled and integrated in the decision-making process (Simons, 1995); in other words, when the TMT reaches a strategic consensus.

Rapert *et al.* (2002) and Kellermanns *et al.* (2005) present the concept of strategic consensus as the vision shared by the managers on the strategic priorities of the organization. Strategic consensus is critical for resolving differences, promoting a unified management, and increasing strategic commitment (Dess and Priem, 1995; Rapert *et al.*, 2002).

This research considers the moderating effect that consensus can exert on the relationship between TMT diversity and organizational innovation. Simons (1995) states that the existence of differences in teams does not necessarily mean that their members will make constructive – rather than conflictive – use of such differences. The effects of differences will depend on the discussion and on the decision-making processes taking place; through these processes, the team may be able to integrate its differences to reach shared decisions.

Although some studies consider the interaction processes between the members of the team as mediators of the relationship between TMT composition and company performance (Jackson, 1992; Smith *et al.*, 1994; Knight *et al.*, 1999; Olson and Parayitam, 2006), other authors, such as Priem (1990), Hambrick (1994), and Simons (1995), suggest a relationship of moderation. According to Simons (1995), the distinction between mediation and moderation is not merely statistical. A mediating relationship would imply that a situation of diversity without consensus would have a neutral effect on innovation. A relationship of moderation means that diversity will have an impact on innovation that will vary when consensus exists.

To summarize, the existence of strategic consensus in the team, engendered by processes that reduce or manage emotional conflict, may direct divergent yet creative points of view toward more innovative decisions and actions. These arguments foster the following hypothesis:

H2. The positive influence of the TMT's functional diversity and diversity in TMT tenure on the firm's innovation performance is reinforced in a situation of strategic consensus in the team.

Figure 1 shows the relationships considered in the hypotheses.

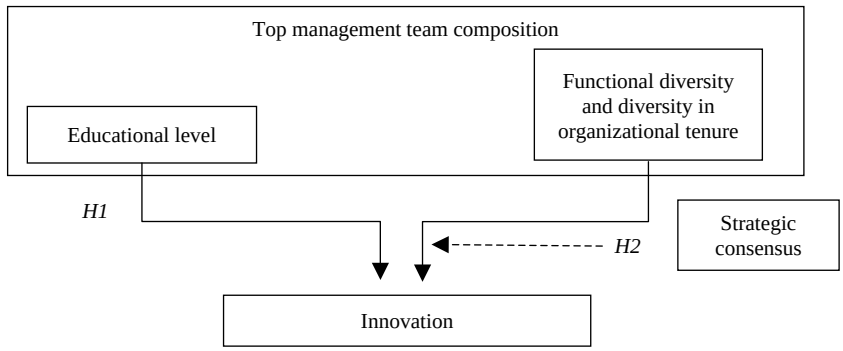

Figure 1.
The influence of top management teams on innovation: hypotheses

3. Method

Participants

The sample for this study was selected from the Dun and Bradstreet database (2000). The population includes those companies with more than 50 employees in the three Spanish sectors with the most registered patents according to statistics provided by the Spanish Patent and TradeMark Office (960 companies). The sectors were: manufacture of industrial and agricultural machinery (Sector 1); electrical and electronic machinery and material (Sector 2); and basic chemical manufacturing (Sector 3). These innovative sectors ensure that the sample includes companies that undertake technological innovation in products.

Questionnaires

To collect the data, the study used the extant literature to design a questionnaire that was completed via telephone interview; in some cases, respondents also requested this by post. A professional company contracted for this purpose collected information from all members of a TMT; however, the research team obtained a prior commitment from the companies to participate in the research. This questionnaire contained 23 items designed to obtain information on the team's characteristics, strategic consensus in the TMT, characteristics of the company, and information on its innovation performance. A minimum requirement was receiving at least four completed questionnaires from managers in each firm, including the chief executive. A total of 97 valid responses and 390 questionnaires were obtained. The analysis of 97 management teams falls within the normal range of responses utilized in the literature for this type of research (in the study by Knight *et al.* (1999), 83 management teams were analyzed). The information on the characteristics and strategic consensus in the TMT refers to the point in time when the information was reported (2002). Likewise, the information requested on innovation performance refers to 2002.

A panel of ten academic experts confirmed the validity of content of the parts of the questionnaire not validated in previous studies. Suggestions made by the panel were incorporated in the final questionnaire, which was first pilot-tested in ten companies. To guarantee that each manager who completed the questionnaire had participated in the TMT, the manager's actual and active involvement in the strategic decision-making process of his or her company was corroborated by telephone follow-up.

Measures

Average educational level. TMT educational level was defined as the average educational level of the TMT. We categorized managers into four educational levels: 4: doctor/master; 3: graduate/engineer; 2: diploma holder/technical engineer; and 1: non-university studies. These categories relate to the categories used by the Spanish educational system and are similar to the categories found in the literature (Bantel and Jackson, 1989; Tihanyi *et al.*, 2000; Wally and Becerra, 2001).

Demographic diversity. TMT tenure refers to the number of years an individual was a member in the TMT. Tenure diversity was computed as the coefficient of variation in the length of time managers spent in the TMT (Bantel and Jackson, 1989; Wiersema and Bantel, 1992). This coefficient has been defined as the standard deviation divided by the mean. For category variables such as functional diversity, the Blau (1977) index was calculated ($H = (1 - \Sigma i^2)$, where i is the percentage of individuals in the management team in the ith category). The profiles considered were the positions of maximum responsibility reached during an individual's professional career; respondents could include these under the categories general manager, manager of marketing, finance, production, R&D, and human resources.

Strategic consensus. This variable is designed to determine the degree to which the TMT members share a common strategic vision on matters of innovation. For this, we used 13 items measured using a five-point Likert scale (1 = totally in disagreement; 5 = totally in agreement) extracted from the 48-item questionnaire used by Knight *et al.* (1999). These 13 items were chosen because they refer to the value managers attributed to strategic attitudes and actions geared toward innovation, proactivity, risk tolerance, etc. (Appendix). Each member of the TMT, individually, indicated his/her degree of agreement with the questions relating to innovation strategy. High values mean a high degree of support for an innovation strategy among the members of the TMT. The computation of the final variable, "strategic consensus," was consistent with the previous works of Knight *et al.* (1999), Dess (1987), and Bourgeois (1980) and was done as follows: the standard deviations of the responses given to each of the 13 items were calculated; this produced 13 standard deviations that were summed for each management team. This variable is intended to reflect the degree of consensus or agreement in the team; therefore, we invert the direction of the scoring by multiplying it by (−1). Cronbach's alpha was 0.771. To analyze whether the measurement of consensus reflected agreement regarding the importance the top managers gave to the strategy of innovation for their companies, the mean and the standard deviation of the 13 items utilized for each of the teams were considered. The first step was to calculate the mean values obtained for each team for each of the 13 items. Next, the mean of these 13 values was obtained. The object of these calculations is to determine if the data revealed a high degree of support by the TMT of the companies in the sample for an innovation strategy. The mean values obtained were very high for each company. The majority of responses were clustered around the value of four on a five-point scale. This means that the importance of innovation in each company, in mean terms, is high. In addition, the items of the questionnaire were formulated in terms that are positive for innovation.

Nevertheless, these high values may be present without a concurrent high degree of consensus. To evaluate the existence of agreement or consensus with respect to the importance of innovation, the standard deviation with respect to those mean values

was considered. This was found to be less than 1 in the great majority of teams. The high mean values given to each of the 13 items by each team and the low standard deviations suggest that TMT members show a high degree of support for innovation strategies and a high level of consensus regarding the importance of the innovation strategy for their company.

The $r(\mathrm{WG}(J))$ index (James *et al.*, 1984) was also calculated ($r(\mathrm{WG}(J)) = 0.72$), and this confirms that the aggregation was adequate. This measure constitutes a direct estimator of the degree to which the TMT shares an innovative strategic vision. This measure is not an objective evaluation of the firm's current strategy, but rather a proxy that attempts to measure the TMT's perception of the degree to which the organization's strategic stance is innovative (Knight *et al.*, 1999).

Innovation performance. Two indicators directly related to innovation performance function here as dependent variables: the number of new products and the number of improved products. Numerous studies have utilized both variables as indicators of company innovation, and the positive correlation between them has been sufficiently demonstrated (Cordero, 1989; Ministry of Industry and Energy, 1994; Schoenecker and Swanson, 2002). One of the best measures of innovation may be the firm's ability to introduce new products and upgrade its current products (Schoenecker and Swanson, 2002). In fact, researchers such as Damanpour (1991), Coombs *et al.* (1996), and Wu (2008) consider the number of new and improved products as a robust measure of innovation outputs. Furthermore, in the Oslo Manual, the number of new products and of improved products are recognized as good indicators of technological innovation (OECE, 2005).

We consider that both indicators of innovation can offer a more complete picture of innovation performance and capture the multidimensional nature of technological change. However, these indicators do not share similar means and distributions; therefore, separate regression models for these two indicators of innovation performance have been proposed.

Control variables. We have controlled for company size, industry, and past performance. Several previous studies demonstrate that company size may be associated with a higher or lower propensity to innovate (Ettlie *et al.*, 1984; Bantel and Jackson, 1989). By introducing company size as a control variable, it should be easier to analyze the influence of the TMT on the innovation performance by isolating their effects. The size of the organization has been measured as a function of the number of employees – in this sample, ranging between 50 and 2,250 employees. Because of this wide distribution, a logarithmic transformation reduced the scale effect. The industry in which the company operates could explain a significant part of the variability of innovation. Furthermore, the validity of innovation indicators across industries may vary (Schoenecker and Swanson, 2002). Industry effects were captured using dummy variables. Two dummy variables were created for Sector 1 "manufacture of industrial and agricultural machinery" and for Sector 2 "electrical and electronic machinery and material." Finally, past performance was considered because resources become abundant when a company performs well, and this might encourage further innovative activity. This was measured using the lagged two-year average of the returns on assets.

4. Data analysis and results

Table I shows the principal magnitudes of descriptive statistics and correlations between dependent and independent variables. As can be seen, serious symptoms of multicolinearity were not evident in the model.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. No. of new products	24.32	32.28	1									
2. No. of improved products	31.59	36.13	0.568**	1								
3. Functional diversity	0.46	0.13	−0.060	−0.095	1							
4. Diversity in TMT tenure	0.54	0.37	−0.215*	−0.233*	0.203	1						
5. Average educational level	2.28	0.42	−0.027	0.131	−0.105	0.070	1					
6. Strategic consensus	−10.46	4.36	−0.038	0.069	−0.259*	−0.180	0.152	1				
7. Firm size	4.97	0.84	0.012	0.049	−0.086	0.007	−0.052	0.079	1			
8. Dummy for sector 1	0.32	0.47	0.041	−0.029	0.216	−0.029	−0.060	0.052	−0.015	1		
9. Dummy for sector 2	0.47	0.50	−0.118	−0.028	−0.038	0.037	0.348**	0.166	−0.014	−0.451**	1	
10. Past performance	4.02	20.29	0.050	0.012	0.196	0.015	0.031	0.020	−0.003	0.010	−0.008	1

Note: Correlation significant to the level of *0.05 (bilateral) and **0.01 (bilateral), respectively

Table I.
Descriptive statistics and matrix of correlations of the independent variables of the TMT

Given that the two dependent variables are count variables that have a Poisson distribution, two separate Poisson regression analyses were performed to test *H1* and *H2*. These analyses are shown in Table II.

The results obtained demonstrate that the control variables, apart from past performance, have a significant effect on the innovation performance. The influence of the size of the company on the number of improved products is positive and significant, whereas the company's sector affects both indicators of innovation negatively. A positive direct effect has been found for the average educational level on both indicators of innovation performance ($\beta = 0.151$, $p < 0.001$ in model 1; $\beta = 0.274$, $p < 0.001$ in model 2); and a negative direct effect has been found for the diversity in TMT tenure ($\beta = -0.230, p < 0.001$ in model 1; $\beta = -0.436, p < 0.001$ in model 2) and for functional diversity ($\beta = -0.226$, $p < 0.001$ in model 1; $\beta = -0.061$, $p < 0.05$ in model 2). Also, the results confirm a positive effect of strategic consensus on the number of new products ($\beta = 0.059$, $p < 0.1$ in model 1). Finally, only one interaction term was found to be significant, and this is the term reflecting the moderating effect of strategic consensus on the relationship between functional diversity and innovation performance ($\beta = 0.774, p < 0.001$ in model 1; $\beta = 0.210, p < 0.001$ in model 2). This finding means that functional diversity improves innovation performance in a situation of high strategic consensus. On the other hand, when strategic consensus is low, more functional diversity would be damaging for innovation.

The overall significance of the independent variable coefficients was supported in the two models. As indicated, we have performed an independent regression analysis for each indicator of innovation. The results obtained in each of these analyses are similar

Variables	Model 1 (number of new products)	Model 2 (number of improved products)
Constant	3.123***	3.422***
Firm size	0.011	0.047****
Dummy for sector 1	−0.102*	−0.146***
Dummy for sector 2	−0.321***	−0.224***
Past performance	0.045	−0.081
Functional diversity	−0.226***	−0.061*
Diversity in TMT tenure	−0.230***	−0.436***
Average educational level	0.151***	0.274***
Strategic consensus	0.059****	−0.021
Term of interaction: consensus with functional diversity	0.774***	0.210***
Term of interaction: consensus with diversity in TMT tenure	0.015	−0.179
Log likelihood	−753.11	−977.49
LR χ^2	493.48	467.75
Prob $>\chi^2$	0.000	0.000
Pseudo R^2	0.247	0.193

Notes: Significance at *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, ****$p<0.1$; term of interaction: consensus with functional diversity was calculated through the cross-product of strategic consensus in the TMT and functional diversity. Term of interaction: consensus with diversity in TMT tenure was calculated through the cross-product of consensus in the TMT and diversity in TMT tenure

Table II.
Poisson regression analysis of *H1* and *H2*

and lead to the following generalized conclusions for both indicators of innovation performance.

5. Discussion and conclusions

The aim of this study is to advance knowledge regarding the effects of TMT composition on innovation performance. Following the line of critical thinking of upper echelon theory, we have considered the moderating effect of strategic consensus.

The results of *H1*, which postulates a direct relationship between the TMT's average educational level and the company's innovation results, demonstrate that a higher educational level in the TMT has a positive effect on the firm's innovation performance. This positive effect is fully supported by previous research (Bantel and Jackson, 1989; Wiersema and Bantel, 1992; Schoeneker *et al.*, 1995; Camelo *et al.*, 2005; Herrmann and Datta, 2005).

H2 argues that strategic consensus can reinforce the benefits of a rich variety of views and perspectives derived from functional diversity and diversity in TMT tenure. The findings indicate that strategic consensus in the TMT affects functional diversity such that it has a positive influence on innovation performance. However, strategic consensus does not appear to have a similar reinforcing effect on diversity in TMT tenure. Most research studies have established a direct relationship between consensus and some measures of company performance (Priem, 1990; Dess and Priem, 1995; Rapert *et al.*, 2002), or a mediated relationship between diversity as antecedent and company performance (Smith *et al.*, 1994; Knight *et al.*, 1999). Several authors have suggested the moderating relationship proposed here but few have analyzed it empirically (Simons, 1995; Camelo *et al.*, 2005).

The results obtained in this study confirm the thesis of Simons (1995) regarding the need for TMT compositional diversity to be supported by processes within the TMT, such as debating on issues and other forms of personal interaction, that bring the TMT to the high degree of consensus necessary for a positive impact on performance. Some diverse groups are capable of communicating well, debating, and reaching a shared view, but others are not. "Because both debate and intragroup difference carry a potential for detrimental as well as constructive impact, performance is better predicted by the fit between differences and debate than it is by a mediated causal model" (Simons, 1995, p. 65). The finding in this study supports these arguments because both kinds of diversity have a negative effect on innovation performance if the influence of the degree of TMT consensus is not taken into account. In fact, our study has found that strategic consensus in the TMT converts the negative effects of the two kinds of diversity analyzed into one positive effect for functional diversity, and a null effect for diversity in TMT tenure.

Some studies in the literature demonstrate a negative or non-significant relationship between diversity in TMT tenure and the innovation results or other performance indicators associated with strategies of change (Bantel and Jackson, 1989; Wiersema and Bantel, 1992; Elenkov *et al.*, 2005). From the findings of this and other studies we can also question the arguments claiming that diversity in TMT tenure may be associated with task conflict in the team (Amason, 1996; Pelled, 1996, p. 1). In fact, some studies indicate that extreme degrees of this diversity can generate dysfunctional effects that prejudice the adoption of the types of strategic choices that give priority to innovation (Bantel and Jackson, 1989). Diversity in TMT tenure does not seem to produce the

expected heterogeneity of viewpoints, which would explain why strategic consensus is not necessarily a variable that can extract a positive effect from this diversity.

The reasoning that can be applied to functional diversity is different. The benefits of this kind of diversity will appear when diverse perspectives are reconciled and integrated in the decision-making process (Simons, 1995); in other words, when the TMT reaches a strategic consensus.

This study leads to three main conclusions. First, all kinds of diversity related to the membership of the TMT, which are supposed to generate task conflict, do not seem to have a positive influence on innovation performance in companies. Second, the educational level of the TMT has a positive effect on innovation performance in companies independently of the processes that may take place within the team. Finally, the results have confirmed, in line with critical thinking in upper echelon theory, the need to introduce and analyze, jointly with the demographic variables, other situations or processes that affect the TMT's decision-making processes.

By way of practical recommendations from the study, strategic consensus in the TMT emerges as a fundamental variable. Company leaders should foster appropriate processes at top management level, including systems for good informal communication, debate, and other agreement-seeking processes (Amason and Sapienza, 1997; Knight *et al.*, 1999). Some authors have discovered that teams engaging in agreement-seeking behavior achieve higher levels of consensus; put another way, they mitigate affective conflict within the team (Schweiger *et al.*, 1986; Knight *et al.*, 1999). Furthermore, with a high level of informal communication, a greater and deeper interaction between team members is achieved, permitting greater proximity and trust between the members and favoring team cohesion (Smith *et al.*, 1994).

Finally, as a limitation of this study, it should be stated that there may be a relationship between consensus and innovation performance that would be of interest to research more deeply. But equally, an inverse causal relationship could be put forward since the innovation performance that the company has obtained in the past could affect the degree of consensus regarding innovation strategies. However, it was not an objective of this research to analyze the nature of the direct relationship between consensus and firm performance; rather, the objective is to show that consensus should be considered a moderating factor that affects the relationship between TMT's diversity and the company's innovation performance. It is, therefore, proposed that consensus can constructively channel the rich variety of perspectives of a cognitively diverse TMT. The analysis of the causal relationship between consensus and innovation could constitute a fruitful line for future research.

References

Amason, A.C. (1996), "Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: resolving a paradox for top management teams", *Academy of Management Journal*, Vol. 39 No. 1, pp. 123-48.

Amason, A.C. and Mooney, A.C. (1999), "The effects of past performance on top management team conflict in strategic decision making", *The International Journal of Conflict Management*, Vol. 10 No. 4, pp. 340-59.

Amason, A.C. and Sapienza, H.J. (1997), "The effects of top management team size and interaction norms on cognitive and affective conflict", *Journal of Management*, Vol. 23 No. 4, pp. 495-517.

Bantel, K. (1993), "Strategic planning openness: the role of top team demography", *Group & Organization Management*, Vol. 19 No. 4, pp. 406-25.

Bantel, K. and Jackson, S. (1989), "Top management innovation in banking: does the composition of the top team make a difference?", *Strategic Management Journal*, Vol. 10, pp. 107-24.

Barkema, H.G. and Shvyrkov, O. (2007), "Does top management team diversity promote or hamper foreign expansion?", *Strategic Management Journal*, Vol. 28 No. 7, pp. 663-80.

Blau, P.M. (1977), *Inequality and Heterogeneity*, The Free Press, New York, NY.

Boeker, W. (1997), "Executive migration and strategic change: the effect of top manager movement on product-market entry", *Administrative Science Quarterly*, Vol. 42 No. 2, pp. 213-36.

Bourgeois, L.J. (1980), "Performance and consensus", *Strategic Management Journal*, Vol. 1 No. 3, pp. 227-48.

Bunderson, J.S. and Sutcliffe, K.M. (2002), "Comparing alternative conceptualizations of functional diversity in management teams: process and performance effects", *Academy of Management Journal*, Vol. 45 No. 5, pp. 875-90.

Camelo, M.C., Hernandez, A.B. and Valle, R. (2005), "The relationship between top management teams and innovative capacity in companies", *Journal of Management Development*, Vol. 24 Nos 7/8, pp. 683-706.

Cannella, A.A. and Holcomb, T.R. (2005), "A multilevel analysis of the upper-echelons model", in Dansereau, A. and Yammarino, F.J. (Eds), *Research in Multilevel Issues*, Vol. 4, Elsevier, Oxford, pp. 197-237.

Cannella, A.A., Park, J.H. and Lee, H.U. (2008), "Top management team functional background diversity and firm performance: examining the roles of team member collocation and environmental uncertainty", *Academy of Management Journal*, Vol. 51 No. 4, pp. 768-84.

Carpenter, M.A. (2002), "The implications of strategy and social context for the relationship between top management team heterogeneity and firm performance", *Strategic Management Journal*, Vol. 23 No. 3, pp. 275-84.

Chen, G., Tjosvold, D. and Liu, C. (2006), "Cooperative goals, leader people and productivity values: their contribution to top management teams in China", *Journal of Management Studies*, Vol. 43 No. 5, pp. 1177-200.

Clark, E. and Soulsby, A. (2007), "Understanding top management and organizational change through demographic and processual analysis", *Journal of Management Studies*, Vol. 44 No. 6, pp. 932-54.

Coombs, R., Narandren, P. and Richards, A. (1996), "A literature-based innovation output indicator", *Research Policy*, Vol. 25 No. 3, pp. 403-13.

Cordero, R. (1989), "The measurement of innovation performance in the firm: an overview", *Research Policy*, Vol. 19 No. 2, pp. 185-92.

Daellenbach, U.S., McCarthy, A.M. and Shoeneker, T.S. (1999), "Commitment to innovation: the impact of top management team characteristics", *R&D Management*, Vol. 29 No. 3, pp. 199-209.

Damanpour, F. (1991), "Organizational innovation: a meta-analysis of effects of determinants and moderators", *Academy of Management Journal*, Vol. 34 No. 3, pp. 555-90.

Datta, D. and Rajagopalan, N. (1998), "Industry structure and CEO characteristics: an empirical study of succession events", *Strategic Management Journal*, Vol. 19 No. 9, pp. 833-52.

Dess, G.G. (1987), "Consensus on strategy formulation and organizational performance: competitors in a fragmented industry", *Strategic Management Journal*, Vol. 8 No. 3, pp. 259-77.

Dess, G.G. and Priem, R.L. (1995), "Consensus-performance research: theoretical and empirical extensions", *Journal of Management Studies*, Vol. 32 No. 4, pp. 401-17.

Eisenhardt, K., Kahwajy, J. and Bourgeois, L. (1997), "Conflict and strategic choice: how top management teams disagree", *California Management Review*, Vol. 39 No. 2, pp. 42-62.

Elenkov, D.S., Judge, W. and Wright, P. (2005), "Strategic leadership and executive innovation influence: an international multi-cluster comparative study", *Strategic Management Journal*, Vol. 26 No. 7, pp. 665-82.

Ettlie, J., William, P. and O'Keefe, R. (1984), "Organization strategy and structural differences for radical versus incremental innovation", *Management Science*, Vol. 30 No. 6, pp. 682-95.

Ginsberg, A. (1990), "Connecting diversification to performance: a sociocognitive approach", *Academy of Management Review*, Vol. 15, pp. 514-35.

Grimm, C.M. and Smith, K.G. (1991), "Management and organizational change: a note on the railroad industry", *Strategic Management Journal*, Vol. 12 No. 7, pp. 557-62.

Hambrick, D.C. (1994), "Top management groups: a conceptual integration and reconsideration of the team label", in Staw, B.M. and Cummings, L.L. (Eds), *Research in Organizational Behaviour*, Vol. 16, JAI Press, Greenwich, CT, pp. 171-213.

Hambrick, D.C. and Mason, P. (1984), "Upper echelons: the organization as a reflection of its top managers", *Academy of Management Review*, Vol. 9 No. 2, pp. 193-206.

Hambrick, D.C., Cho, T. and Chen, M.J. (1996), "The influence of top management team heterogeneity on firms' competitive moves", *Administrative Science Quarterly*, Vol. 41 No. 4, pp. 659-84.

Hambrick, D.C., Li, J., Xin, K. and Tsui, A. (2001), "Compositional gaps and downward spirals in international joint venture management groups", *Strategic Management Journal*, Vol. 22 No. 11, pp. 1033-53.

Hayes, R. and Abernathy, W. (1980), "Managing our way to economic decline", *Harvard Business Review*, Vol. 58 No. 4, pp. 67-77.

Herrmann, D. and Datta, K. (2005), "Relationships between top management team characteristics and international diversification: an empirical investigation", *British Journal of Management*, Vol. 16, pp. 69-78.

Hoffman, R.C. and Hegarty, W.H. (1993), "Top management influence on innovations: effects of executive characteristics and social culture", *Journal of Management*, Vol. 19 No. 3, pp. 549-74.

Jackson, S. (1992), "Consequences of group composition for the interpersonal dynamics of strategic issue processing", *Advances in Strategic Management*, Vol. 88, pp. 345-82.

James, L.R., Damaree, R.G. and Wolf, G. (1984), "Estimating within-group interrater reliability with and without response bias", *Journal of Applied Psychology*, Vol. 69 No. 1, pp. 85-98.

Katz, R. (1982), "The effects of group longevity on project communication and performance", *Administrative Science Quarterly*, Vol. 27 No. 1, pp. 81-104.

Kauer, D., Waldeck, T.C. and Schäffer, U. (2007), "Effects of top management team characteristics on strategic decision making: shifting attention to team member personalities and mediating processes", *Management Decision*, Vol. 45 No. 6, pp. 942-67.

Kellermanns, F.W., Walter, J., Lechner, C. and Floyd, S.W. (2005), "The lack of consensus about strategic consensus: advancing theory and research", *Journal of Management*, Vol. 31 No. 5, pp. 719-37.

Knight, D., Pearce, C.L., Smith, K.G., Olian, J.D., Sims, H.P., Smith, K.A. and Flood, P. (1999), "Top management team diversity, group process and strategic consensus", *Strategic Management Journal*, Vol. 20 No. 5, pp. 445-65.

Kor, Y.Y. (2006), "Direct and interaction effects of top management team and board compositions on R&D investment strategy", *Strategic Management Journal*, Vol. 27 No. 11, pp. 1081-99.

Li, J. and Hambrick, D.C. (2005), "Factional groups: a new vantage on demographic faultlines, conflict, and disintegration in work teams", *Academy of Management Journal*, Vol. 48 No. 5, pp. 794-813.

Lyon, D.W. and Ferrier, W.J. (2002), "Enhancing performance with product-market innovation: the influence of the top management team", *Journal of Managerial Issues*, Vol. 14 No. 4, pp. 452-69.

Michel, J.G. and Hambrick, D.C. (1992), "Diversification posture and top management team characteristics", *Academy of Management Journal*, Vol. 35 No. 1, pp. 9-37.

Miller, C.C., Burke, L.M. and Glick, W.H. (1998), "Cognitive diversity among upper echelon executives: implications for strategic decision processes", *Strategic Management Journal*, Vol. 19 No. 1, pp. 39-58.

Ministry of Industry and Energy (1994), *Survey of Managerial Strategies*, Ministry of Industry and Energy, Madrid.

Mooney, A.C., Holahan, P.J. and Amason, A.C. (2007), "Don't take it personally: exploring cognitive conflict as a mediator of affective conflict", *Journal of Management Studies*, Vol. 44 No. 5, pp. 733-58.

OECE (2005), *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, European Commission, Oslo.

Olson, B.J. and Parayitam, S. (2006), "Mediating role of strategic choice between top management team diversity and firm performance: upper echelons theory revised", *Journal of Business and Management*, Vol. 12 No. 2, pp. 111-26.

Pelled, C.H. (1996), "Demographic diversity, conflict, and work group outcomes: an intervening process theory", *Organization Science*, Vol. 7 No. 6, pp. 615-31.

Pelled, L.H., Eisenhardt, K. and Xin, K. (1999), "Exploring the black box: an analysis of work group diversity, conflict and performance", *Administrative Science Quarterly*, Vol. 44 No. 1, pp. 1-29.

Pitcher, P. and Smith, A.D. (2001), "Top management team heterogeneity: personality, power and proxies", *Organization Science*, Vol. 12 No. 1, pp. 1-18.

Priem, R.L. (1990), "Top management team group factors, consensus, and firm performance", *Strategic Management Journal*, Vol. 11 No. 6, pp. 469-78.

Rapert, M.I., Velliquette, A. and Garretson, J.A. (2002), "The strategic implementation process: evoking strategic consensus through communication", *Journal of Business Research*, Vol. 55 No. 4, pp. 301-10.

Schoenecker, T. and Swanson, L. (2002), "Indicators of firm technological capability: validity and performance implications", *IEEE Transactions on Engineering Management*, Vol. 49 No. 1, pp. 36-44.

Schoenecker, T.S., Daellenbach, U.S. and McCarthy, A.M. (1995), "Factors affecting a firm's commitment to innovation", in Moore, D. (Ed.), *Proceedings of the 1995 Annual Meeting of the Academy of Management, Vancouver, BC*, pp. 52-6.

Schweiger, D.M., Sandberg, W.R. and Ragan, J.W. (1986), "Group approaches for improving strategic decision making: a comparative analysis of dialectical inquiry, devil's advocacy, and consensus approaches to strategic decision making", *Academy of Management Journal*, Vol. 29 No. 1, pp. 51-71.

Simons, T. (1995), "Top management team consensus, heterogeneity and debate as contingent predictors of company performance: the complementarity of group structure and process", *Academy of Management Journal, Best Papers Proceedings, 55th Annual Meeting, Vancouver, British Columbia, Canada*, pp. 62-6.

Simsek, Z., Lubattkin, M.H. and Dino, R.N. (2005), "Modeling the multilevel determinants of top management team behavioral integration", *Academy of Management Journal*, Vol. 48 No. 1, pp. 69-84.

Smith, K., Smith, K., Olian, J., Sims, H., O'Bannon, D. and Scully, J. (1994), "Top management team demography and process: the role of social integration and communication", *Administrative Science Quarterly*, Vol. 39 No. 3, pp. 412-38.

Tihanyi, L., Ellstrand, A.E., Daily, C.M. and Dalton, D.R. (2000), "Composition of the top management team and firm international diversification", *Journal of Management*, Vol. 26 No. 6, pp. 1157-77.

van de Ven, A.H. and Poole, M.S. (1995), "Explaining development and change in organizations", *Academy of Management Review*, Vol. 20 No. 3, pp. 510-40.

Wally, S. and Becerra, M. (2001), "Top management team characteristics and strategic changes in international diversification", *Group & Organization Management*, Vol. 26 No. 2, pp. 165-88.

Wiersema, M.F. and Bantel, K.A. (1992), "Top management team demography and corporate strategic change", *Academy of Management Journal*, Vol. 35, pp. 91-121.

Wu, H.L. (2008), "When does internal governance make firms innovative?", *Journal of Business Research*, Vol. 61 No. 2, pp. 141-53.

Zahra, S.A., Neubaum, D.O. and Huse, M. (2000), "Entrepreneurship in medium-size companies: exploring the effects of ownership and governance systems", *Journal of Management*, Vol. 26 No. 5, pp. 947-76.

Zhou, K.Z. (2006), "Innovation, imitation, and new product performance: the case of China", *Industrial Marketing Management*, Vol. 35 No. 3, pp. 394-402.

Appendix. Strategic consensus

- We believe that unstable and fast-changing business conditions provide more opportunities than threats.
- Our competitive priority is to develop new products.
- Speed in the development of products in relation to our competitors is a priority for us.
- The sector in which the company operates is characterized by rapid changes in the technology of production.
- The sector in which the company operates is characterized by rapid changes in products.
- We put great emphasis on R&D, technological leadership, and innovation.
- We define our strategic objectives in the long term (over five years).
- We introduce completely new products rather than products that simply incorporate modifications to those already existing.
- We evaluate in the long term the implications that technological changes may hold for our products and services.
- We seek advantages from all the functional areas when we make important strategic decisions.
- We frequently get ideas for new products and processes from customers and suppliers.
- When we see a business opportunity we can evaluate it faster than our competitors.
- We evaluate the potential of our strategic resources for competing in the future.

About the authors

Carmen Camelo is an Associate Professor at the Faculty of Business and Administration at the University of Cadiz, Spain. Her principal research areas are the application of the resource-based view and knowledge creation theory to the diversification and innovation strategy of organizations, and the effects of top management teams characteristics on innovative performance. She has published several papers related to innovation, resources development and knowledge. She teaches mainly in the areas of strategic management. She is the supervisor of a Spanish research projects based on the analysis of joint ventures.

Mariluz Fernández-Alles is an Assistant Professor at the Faculty of Business and Administration at the University of Cadiz, Spain. Her research interests include human resource management, innovation, and neo-institutional theory. She teaches mainly in the areas of strategic human resource management, organizational behavior and innovation management. She is a researcher in several Spanish research projects including one on cultural firms and other on joint ventures. Mariluz Fernández-Alles is the corresponding author and can be contacted at: mariluz.fernández@uca.es

Ana B. Hernández is in the Department of Business Management at Rovira i Virgili University, Spain. Her research interests include a wide range of aspects of corporate governance and innovation strategy. She is currently interested in corporate governance, international joint ventures, and climate change.