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Transformational leadership and absorptive capacity: an analysis of the organisational catalysts for this relationship

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ABSTRACT

Research analysing the antecedents of a firm's absorptive capacity suggests that transformational leadership (TL) is one of its main determinants. However, the few studies focusing on the relationship between these two variables do not explicitly assess why transformational leaders facilitate knowledge acquisition, sharing and retention inside firms. This paper suggests that the reason is that the former contributes to the creation of an organisational context that favours learning processes. We test our research model on a sample of 467 Spanish industrial firms. Findings provide evidence that TL is positively related to the firm's absorptive capacity and that this relationship is mediated by some organisational learning facilitators: experimentation, risk-taking, interacting with external environment and dialogue.

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1. Introduction

Absorptive capacity (AC) is usually conceptualised as a dynamic capability that allows firms to generate competitive advantages from the external sources available in the environment (Zahra and George 2002; Lane, Koka, and Pathak 2006; Flor and Oltra 2013; Flatten, Adams, and Brettel 2015). This explains the increasing interest in research identifying its main antecedents.

According to Cohen and Levinthal (1990), a firm's AC does not simply depend on the organisation's direct interface with the external environment; but also on the transfer of knowledge across and within subunits and on the capacity to apply that knowledge. That is to say, AC is an organisational process (Cohen and Levinthal 1990; Flor and Oltra 2013), which depends on the organisational context and practices. In spite of that, research on the intra-organisational antecedents of AC is scarce (Flatten, Adams, and Brettel 2015). This paper examines the role of leadership as an antecedent of AC.

Literature notes that top management leaders influence each element of the learning system and therefore AC (Bass 1985; Wang et al. 2011) because they are crucial in putting forward the organisational context that fosters the absorption, assimilation and application of knowledge. According to previous research, the leadership style that fosters the most learning processes is transformational leadership (TL) (García-Morales, Llorens-Montes and Verdu-Jover 2008; Sun and Anderson 2012; Flatten, Adams, and Brettel 2015). However, the research on this connection is still scarce and literature on this field highlights the need for additional research in this line (Volberda, Foss, and Lyles 2010; Sun and Anderson 2012). Furthermore, understanding the organisational catalysts by which

TL exerts its influence on AC requires further research (Volberda, Foss, and Lyles 2010; Sun and Anderson 2012; Dinh et al. 2014).

The present paper tries to fill this gap in the literature. Following Jung, Chow, and Wu (2003), we suggest that TL affects AC because the former encourages the employees' behaviours and the organisational practices that organisational learning requires. The objective of this paper is to examine whether different organisational characteristics aimed at facilitating organisational learning mediate the relationship between TL and AC. This study contributes in opening the black box between TL and AC.

This paper is structured as follows. In Sections 2 and 3, we provide a literature review on the relationships among TL, AC and organisational learning facilitators and propose the research hypotheses. In Section 4, we describe the methodology of the empirical study. In Section 5, we present the results obtained through partial least squares analyses. Finally, in Section 6, we discuss conclusions and implications.

2. Transformational leadership and absorptive capacity

The concept of AC was introduced by Cohen and Levinthal (1990) as 'a firm's ability to recognise the value of new, external information, assimilate it, and apply it to commercial ends'. Since its introduction, AC has been continuously developed (Zahra and George 2002; Lane, Koka, and Pathak 2006; Lewin, Massini, and Peeters 2011). Lane, Koka, and Pathak (2006), following a process-based view, define AC as a firm's ability to utilise externally held knowledge through three sequential processes: (1) recognising and understanding potentially valuable new knowledge outside the firm through exploratory learning, (2) combining existing knowledge with externally acquired knowledge through transformative learning and (3) using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning. This paper adopts this approach in the conceptualisation of AC as it integrates the insights generated in previous studies into Cohen and Levinthal's (1990) original definition, and also links AC and organisational learning theoretically.

Most of the definitions of AC usually highlight that it is a dynamic capability, which is linked to the firm's organisational learning processes, and that gives the firm a foundation on which to achieve a competitive advantage (Zahra and George 2002; Lane, Koka, and Pathak 2006; Flor and Oltra 2013; Flatten, Adams, and Brettel 2015). Since AC is a source of competitive advantage for firms, it is important to identify AC's antecedents. This paper focuses on Leadership.

Leadership is usually underscored as an important antecedent of AC, in particular TL (García-Morales, Llorens-Montes and Verdu-Jover 2008). TL is considered to be similar in many aspects to other types of leadership defined from distinct traditions, as charismatic leadership (Vera and Crossan 2004; Wang et al. 2011; Dinh et al. 2014), inspirational leadership or visionary leadership (Vera and Crossan 2004).

According to the literature, transformational leaders motivate their followers to move beyond self-interest and work for the collective good (Bass 1985; Bass et al. 2003) through the four behaviours this leadership style involves: inspirational motivation, idealised influence, intellectual stimulation and individualised consideration (Bass et al. 2003). Inspirational motivation means that leaders create an attractive and clear vision of the future of the organisation and increase the optimism and enthusiasm of its members and their commitment to the organisation. Idealised influence means that leaders emphasise the moral and ethical inferences of their decisions, thus ensuring that they are admired, trusted and respected by their followers. Intellectual stimulation means that leaders encourage their followers to use their imagination, to question long-held assumptions and to view problems from different perspectives. Finally, individualised consideration involves leaders paying attention to each individual's needs and desires, and helping them to achieve their potential by providing new learning opportunities and a climate that supports development and growth.

Previous literature suggests that when TL is displayed by top management leaders (Bass 1985; Bass et al. 2003), it has an influence not only at individual level but also at organisational level.

Wang et al. (2011) summarise the reasons that explain this. First, because leaders at the top of the organisations 'may serve as role models for leaders at lower levels, encouraging (cascading down) transformational leadership through the organization'. Second, because they can motivate employees and align their efforts by communicating the firm's vision. Finally, because leaders at the top of the organisation strongly affect organisational strategy, culture, systems and practices.

Based on this reasoning, TL has been suggested to be a strategic factor that influences knowledge absorption and organisational learning processes (Berson et al. 2006; Camps and Rodríguez 2011; Nemanich and Vera 2009) as AC (Sun and Anderson 2012; Flatten, Adams, and Brettel 2015). In this line, García-Morales, Llorens-Montes and Verdu-Jover (2008) suggest that firms with transformational leaders are able to incorporate and transfer knowledge better than the market and other firms because they enhance the firm's capacity to absorb external knowledge. In addition, Flatten, Adams, and Brettel (2015) argue transformational leaders can foster AC by different ways mainly by articulating a vision that emphasises the importance of knowledge transformation and exploitation and by providing an appropriate model that shows how important is to improve the organisation's knowledge base. Empirical research on the link between TL and AC is scarce but its findings support the idea that TL can foster AC (García-Morales, Llorens-Montes and Verdu-Jover 2008; Sun and Anderson 2012; Flatten, Adams, and Brettel 2015). Based on this, we put forward the following hypothesis:

H₁: TL is positively related to firm's AC

3. The mediating role of organisational learning facilitators in the relationship between TL and AC

Previous research has highlighted the need for more in-depth analysis of the relationship proposed in hypothesis 1, specifically, on the mediators of such a relationship (Sun and Anderson 2012). This paper suggests that TL fosters AC because the former can encourage the employees' behaviours and the organisational practices that learning processes require; in other words, that TL stimulates the development of an organisational context that encourages employees' orientation to learn, thus, facilitating all learning processes (Berson et al. 2006).

This issue has not been explicitly analysed in previous studies on the topic yet, a gap in the literature that the present paper aims to fill. Below, we review previous research on the two relationships that can provide a basis for considering organisational learning facilitators as a mediating variable between TL and AC. First, the relationship between learning facilitators and AC, and second the link between TL and learning facilitators.

3.1. Organisational learning facilitators and AC

This paper focuses on five organisational learning facilitators: experimentation, risk-taking, interaction with the environment, dialogue and participation in decision-making. These factors are included in the integrative conceptualisation of organisational learning capability proposed by Alegre and Chiva (2008) at the firm level and are considered organisational catalysts for the learning processes within organisations.

Experimentation involves being curious about how things work, carrying out changes in work processes and searching for innovative solutions to problems. Risk-taking is defined as 'the tolerance of ambiguity, uncertainty, and errors' (Alegre and Chiva 2008) and involves being tolerant of the possibility that mistakes and failures will occur. Interaction with the external environment is described by Alegre and Chiva (2008) as 'the scope of relationships with the external environment'. Other authors refer to this factor as a firm's external orientation (De Long and Fahey 2000). Dialogue is described as a process of advocating and inquiring (Senge 1990) and implies that communication among employees is encouraged by the firm. Finally, participation in decision-making refers to the degree of influence that employees have in the decision-making process.

Experimentation and risk-taking are two of the factors most frequently suggested in the literature as essential for enhancing AC and organisational learning (Sun and Anderson 2012) because they lead employees to question fundamental beliefs and existing ways of working (De Long and Fahey 2000), to learn from mistakes and, in short, to develop entrepreneurial behaviour. This assumption is associated to firm's capacity to acquire and assimilate information from external sources (Sun and Anderson 2012).

Interaction with the external environment is considered essential for any learning process (Alegre et al. 2012; Clausen 2013). Jansen, Van den Bosch, and Volverda (2005) suggest that exposure to external knowledge sources enables the firm to acquire and assimilate new knowledge and increase the firm's potential AC. In this line, Freiling and Fichtner (2010) suggest that a firm's external orientation is a determinant of learning, and fosters the organisation's intuition and the creation of new insights.

Another factor highlighted as an antecedent of AC is dialogue (Ahmed, Lim, and Zairi 1999; De Long and Fahey 2000). Dialogue and communication familiarise group members with each other and allow them to develop values of honesty and trust. Consequently, they feel more comfortable in sharing sensitive information or ideas that depart from the dominant ideas in the organisation (Sun and Anderson 2012). Dialogue can also be a useful mechanism for building a common understanding and for increasing the firm's ability to combine the new external knowledge with existing knowledge through facilitating 'bisociation' among unit members (Zahra and George 2002).

Finally, participation in decision-making increases the range of prospective 'receptors' to the environment (Cohen and Levinthal 1990), which in turn increases the quantity and quality of new ideas while facilitating new external knowledge acquisition and assimilation (Jansen, Van den Bosch, and Volverda 2005). De Long and Fahey (2000) affirm that higher levels of participation involve individuals gathering information from different sources, which encourages employees to engage in intense interaction to produce new knowledge due to the motivational effects of increased employee involvement.

In sum, we can conclude that experimentation, risk-taking, interaction with the environment, dialogue and participation in decision-making are important enhancers for a firm's AC. Thus, we hypothesise:

H₂: Organizational learning facilitators are positively related to firm's AC. In particular:

H_{2a}: Experimentation is positively related to firm's AC

H_{2b}: Risk taking is positively related to firm's AC

H_{2c}: Interaction with the environment is positively related to firm's AC

H_{2d}: Dialogue is positively related to firm's AC

H_{2e}: Participation in decision-making is positively related to firm's AC

3.2. TL and organisational learning facilitators

Transformational leaders encourage experimentation and risk-taking mainly through idealised influence and intellectual stimulation. Sun and Anderson (2012) suggest that they challenge their followers to question long-held assumptions, reframe problems, approach old situations with novel ways of thinking and be innovative in their approach to problem-solving (Garcia-Morales, Llorens-Montes and Verdu-Jover 2008; Garcia-Morales, Jiménez-Barrionuevo, and Gutierrez-Gutierrez 2012). Furthermore, Birasnav, Rangnekar, and Dalpati (2011) argue that leaders with idealised influence are more willing to involve their followers in risk-taking activities.

Transformational leaders may also encourage firm's interaction with the environment. Previous literature has not examined the relationship between these two variables but research on the link between TL and exploratory learning provides a basis for linking them. According to Sosik, Kahai, and Avolio (1998), the intellectual influence of transformational leaders fosters their followers' exploratory thinking. Thus, it seems reasonable to expect that TL enhances firm's interaction with the environment. In addition, the findings of some studies show that the idealised influence of

transformational leaders encourages followers to emulate their market orientation (Harris and Ogbonna 2001; Menguc, Auh, and Shih 2007). Thus, we argue that transformational leaders, through both their idealised influence and their intellectual stimulation, can foster firm's interaction with external environment.

In addition, the transformational leader's idealised influence and inspirational motivation result in followers desiring to emulate their leader, and in the development of a spirit of trust within the company (Sun and Anderson 2012). This effect has also been connected to the generation of a common vision of the organisation and the reduction of internal barriers to sharing information, which enable communication and dialogue among the employees (Garcia-Morales, Jiménez-Barrionuevo, and Gutierrez-Gutierrez 2012).

Participation in decision-making is another factor that is expected to be enhanced by TL. Garcia-Morales, Llorens-Montes and Verdu-Jover (2008) suggest that TL encourages employee's empowerment and autonomy, which are usually associated to participation in decision-making. Furthermore, Nemanich and Vera (2009) findings show a positive association between TL- and learning-oriented cultures, which they define as being open to diverse opinions and fostering participation in decision-making. Thus, we hypothesise:

H₃: TL is positively related to organizational learning facilitators. In particular:

H_{3a}: TL is positively related to experimentation

H_{3b}: TL is positively related to risk taking

H_{3c}: TL is positively related to interaction with the environment

H_{3d}: TL is positively related to dialogue

H_{3e}: TL is positively related to participation in decision-making

3.3. The mediating role of organisational learning facilitators

As explained above, this paper assumes that the main reason why TL is expected to enhance AC is that TL fosters the development of an organisational context that favours all the organisational learning processes. This organisational context includes some characteristics, which we have named organisational learning facilitators.

In this line, Garcia-Morales, Llorens-Montes and Verdu-Jover (2008) underscore that transformational leaders foster AC by encouraging employee empowerment and autonomy (both related to participation in decision-making), and Garcia-Morales, Jiménez-Barrionuevo, and Gutierrez-Gutierrez (2012) emphasise that TL has an indirect effect on organisational learning through its influence on communication and dialogue. However, the mediating roles of these learning facilitators have not been empirically analysed yet. Volberda, Foss, and Lyles (2010) highlights the importance of examining the organisational antecedents of AC. Therefore, we put forward the following hypothesis:

H₄: Organizational learning facilitators mediate the relationship between TL and AC:

H_{4a}: Experimentation mediates the relationship between TL and AC

H_{4b}: Risk taking mediates the relationship between TL and AC

H_{4c}: Interaction with the environment mediates the relationship between TL and AC

H_{4d}: Dialogue mediates the relationship between TL and AC

H_{4e}: Participation in decision-making mediates the relationship between TL and AC

4. Methodology

4.1. Sample and data collection

The study focuses on Spanish industrial firms. Since innovation and external learning processes might differ substantially from one industry to another, we focused our empirical study in high-tech firms in biotechnology, middle-tech firms in the ceramics industry and low-tech firms in the toys and footwear industries.

Fieldwork was carried out from November 2011 to April 2012. The Head of R&D was the informant for the firm's AC and organisational learning facilitators' measures, and the CEO responded to questions about leadership. To ensure that the questionnaire items were fully understandable, a pre-test was carried out in 16 firms by interviewing four experts in each of the industries comprising our sample.

We used industry directories to identify the firms for the study. From the 1217 firms identified, 474 firms agreed to participate in the study. Personal interviews were carried out in each of them. We obtained 467 completed questionnaires, 104 from biotechnology firms, 107 from ceramic firms, 150 from footwear firms and 106 from toy firms. The sample represents around 17% of the population of the biotechnology industry (ASEBIO 2012), 12% of the ceramic industry (IVEX 2012), 11% of the footwear industry (FICE 2011) and 48% of the toy industry in Spain (IVEX 2012). Both, the number of responses and the response rates (38.37%) of the target population are satisfactory (Spector 1992).

4.2. Measures

4.2.1. Transformational leadership

Previous studies have used different measures of TL. When the focus is on the effect of TL at individual level, various forms of the Multifactor Leadership Questionnaire proposed by Bass and his associates (e.g. Bass and Avolio 1995) are frequently used. When the focus is on the effect of TL at organisational level, as it is the case of this study, previous studies have also based on the Transformational Leadership Inventory by Podsakoff et al. (1990). In this paper, TL was assessed using the scale of Garcia-Morales, Llorens-Montes and Verdu-Jover (2008) based on Podsakoff et al. (1990). As in some previous studies (Garcia-Morales, Llorens-Montes and Verdu-Jover 2008; Garcia-Morales, Jiménez-Barrionuevo, and Gutierrez-Gutierrez 2012; Flatten, Adams, and Brettel 2015), CEOs indicated their perceptions about the extent in which firm's top management displays a TL style.

4.2.2. Organisational learning facilitators

We used the instrument previously used by Alegre and Chiva (2008), which captured the essential mechanisms that enable an organisation to learn: *experimentation, risk-taking, interaction with the external environment, dialogue and participation in decision-making*.

4.2.3. Absorptive capacity

To measure AC, we selected an adapted version of the measurement instrument developed by previous studies (Szulanski 1996; Jansen, Van den Bosch, and Volverda 2005; Arbussa and Coenders 2007), which is consistent with the definition of AC this paper adopted. This capability is associated to three complementary learning processes: exploratory, transformative and exploitative learning (see Ferreras-Méndez et al. 2015 for further details).

All the scales were 8-point Likert scales (1 = total disagreement; 8 = total agreement). See Appendix.

4.2.4. Control variables

Firm size and industry were included as control variables in the study. Previous studies show that firm's size influences its willingness to develop AC. We measure size as the *natural logarithm* of the number of full-time employees in the organisation (Jansen, Van den Bosch, and Volverda 2005). The literature also shows that knowledge strategies differ among industries (e.g. Chen Chen, and Vanhaverbeke 2011). Since our study focuses on four industries (ceramic, biotechnology, shoe and toy), we included a dummy variable for the first three (1 'pertaining to this industry'; 0 'not pertaining to this industry') (Veugelers 1997) to account for any sector effect.

5. Analysis and results

5.1. Psychometric properties of the measurement scales

Table 1 provides mean values, standard deviations and correlations among the variables.

Five criteria were considered to assess the constructs of the research model: content validity, construct dimensionality, composite reliability, average variance extracted (AVE) and discriminant validity (Chin 1998; Henseler, Ringle, and Sinkovics 2009).

Content validity was assessed by selecting measures already validated in previous studies and through personal interviews with experts from the four industries included in the study, which confirmed that items were fully understandable in the context of their industries. *Construct dimensionality* was evaluated through the loadings of the measurement items on their respective factors. All the standardised factor loadings (see Table 2) are significant ($p < .001$) and higher than the recommended minimum of 0.40 (Ford and Schellenberg 1982). *Composite reliability* assesses the level of consistency with which the observable variables measure the latent variable (Fornell and Larcker 1981). This considers that indicators present different loadings and their value should be higher than 0.6. Table 2 shows that the value of this index for each of the constructs exceeds the minimum required level. Finally, *discriminant validity* indicates the level to which a construct is different from others constructs. One common way of checking it is the Fornell–Larcker criterion in which the AVE of each latent variable must be higher than the squared correlation between the constructs (Henseler, Ringle, and Sinkovics 2009). Our findings show that this condition is met.

Additionally, as the measures of the AC and of the organisational learning facilitators were collected from the same informant, we assessed the likelihood of common method variance bias by conducting a Harman's single-factor test and by controlling for the effect of a single unmeasured latent method factor (Podsakoff et al. 2003). Previous studies have followed both approaches to assess the severity of common method bias (see Liang et al. 2007, 71, for a complete description of the followed methodology). The results obtained from these analyses showed that method common bias is unlikely to be a serious problem in the present study.

5.2. Evaluation of the structural model

The essential criteria for the evaluation of the structural model are the coefficient of determination (R^2) of the endogenous latent variables and the strength of the relationships between the constructs (Chin 1998). Bootstrapping was used to generate standard errors and t -statistics. Following Chin's (2001) recommendations, the bootstrap estimation presented here is based on 500 bootstrap samples. Figure 1 shows the results obtained when testing the direct effect model (Model 1), and Figure 2 shows the results for the mediated model (Model 2).

In Figure 2, the R^2 index of the AC variable indicates that the theoretical model explains 57% of the variance of the construct. This index is higher than the 41% of the variance explained by the direct effect model (Figure 1). Therefore, we can therefore conclude that our model has adequate predictive power for AC.

Another assessment of the structural model involves the model's capability to predict. The predominant measure of predictive relevance is Stone–Geisser's Q^2 (Stone 1974; Geisser 1975), which can be measured using blindfolding procedures. If this value for a certain endogenous latent variable is larger than zero, its explanatory variables provide predictive relevance (Henseler, Ringle, and Sinkovics 2009). As the values for the statistics included in Table 3 are higher than zero, we can conclude that our model has predictive relevance.

Table 4 shows the results of testing the model. First, they provide support for hypothesis 1 since TL is found to have a significant effect on AC.

Results for hypothesis 2 show that experimentation, risk-taking, interaction with the external environment and dialogue are positively related with a higher level of AC. This provides support

Table 1. Mean, standard deviations and correlations among study variables.

Variables	Mean	s.d	Min.	Max.	1	2	3	4	5	6	7	8	9	10
1. TL	6.52	1.19	1.80	8.00	1.00									
2. Experimentation	5.77	1.71	1.00	8.00	0.41**	1.00								
3. Risk-taking	5.20	1.88	1.00	8.00	0.27**	0.59**	1.00							
4. Interaction with the external environment	4.87	1.74	1.00	8.00	0.30**	0.57**	0.63**	1.00						
5. Dialogue	6.42	1.34	1.00	8.00	0.60**	0.54**	0.39**	0.45**	1.00					
6. Participation in decision-making	4.91	1.86	1.00	8.00	0.32**	0.56**	0.50**	0.64**	0.49**	1.00				
7. AC	5.83	1.13	1.54	8.00	0.56**	0.55**	0.52**	0.58**	0.57**	0.46**	1.00			
8. Size	2.74	1.38	0.00	7.48	-0.04	-0.004	0.03	-0.02	-0.02	0.04	0.17**	1.00		
9. Ceramic	0.23	0.42	0.00	1.00	-0.06	0.07	-0.05	-0.05	-0.06	0.00	-0.04	0.28**	1.00	
10. Footwear	0.32	0.47	0.00	1.00	0.01	-0.20**	-0.12*	-0.20**	-0.05	-0.27**	-0.11*	-0.11*	-0.38**	1.00
11. Biotechnology	0.22	0.42	0.00	1.00	0.08	0.18**	0.27**	0.30**	0.14**	0.24**	0.25**	-0.01	-0.29**	-0.37**

Note: To calculate the correlation coefficients, we worked with the means of the items that make up each dimension.

* $p \leq .05$.

** $p \leq .01$.

Table 2. Measurement model results.

Factors	Factor loading	SE	t-value	α	CR	AVE
TL				0.86	0.90	0.64
TL01	0.80***	0.02	33.49			
TL02	0.80***	0.03	25.99			
TL03	0.86***	0.02	56.06			
TL04	0.75***	0.04	19.24			
TL05	0.81***	0.03	30.54			
AC				0.85	0.91	0.77
Exploration	0.83***	0.02	48.31			
Transformation	0.93***	0.01	142.11			
Exploitation	0.87***	0.02	50.23			
<i>Experimentation</i>				0.91	0.96	0.92
EXP01	0.96***	0.01	139.94			
EXP02	0.96***	0.01	145.50			
<i>Risk-taking</i>				0.74	0.89	0.80
RIS01	0.89***	0.02	55.15			
RIS02	0.89***	0.02	58.37			
Interaction with the external environment				0.82	0.89	0.73
ENV01	0.87***	0.01	71.74			
ENV02	0.85***	0.02	49.88			
ENV03	0.85***	0.02	42.29			
Dialogue				0.88	0.92	0.74
DIA01	0.87***	0.02	47.56			
DIA02	0.91***	0.01	88.22			
DIA03	0.88***	0.02	48.64			
DIA04	0.78***	0.03	28.74			
Participation in decision-Making				0.90	0.94	0.83
PART01	0.90***	0.01	75.41			
PART02	0.93***	0.01	103.69			
PART03	0.91***	0.01	72.54			
Biotechnology	1.00	0.00	0.00	1.00	1.00	1.00
Footwear	1.00	0.00	0.00	1.00	1.00	1.00
Ceramic	1.00	0.00	0.00	1.00	1.00	1.00
Size	1.00	0.00	0.00	1.00	1.00	1.00

Note: *t*-values for *n* = 500 subsamples. SE: standard error; CR: composite reliability.

†*p* ≤ .1.

**p* ≤ .05.

***p* ≤ .01.

****p* ≤ .001.

for hypotheses 2a–2d. However, the coefficient of participation in decision-making is not significant. Thus, hypothesis 2e is not supported.

For hypothesis 3, as expected, we found that TL is positively and significantly related with experimentation ($p < .001$), risk-taking ($p < .001$), interaction with the external environment ($p < .001$), dialogue ($p < .001$) and participation in decision-making ($p < .001$), which provides support for hypotheses 3a–3e.

Finally, hypothesis 4 proposes that above-mentioned organisational learning facilitators mediate the relationship between TL and AC. In order to test this effect, we should compare the total effect of TL on AC and the indirect effect between them (Preacher and Hayes 2004). As we noted previously, the total effect of TL on AC is significant and different from zero, which means that there is a direct relationship between TL and AC. After controlling for the different learning facilitators promoted in the organisation, the coefficient of the relationship between TL and AC decreases and the bootstrap outputs in the indirect effect model show that, in general terms, the indirect effect of TL on AC through the different learning facilitating factors is statistically significant and different from zero. The results also show that this effect is significant for dialogue, interaction with the external environment, experimentation and risk-taking and not significant for participation in decision-making. Therefore, considering the two conditions established by Preacher and Hayes (2004, 719), our hypothesis of mediation is supported in the case of experimentation, risk-taking, interaction with the external

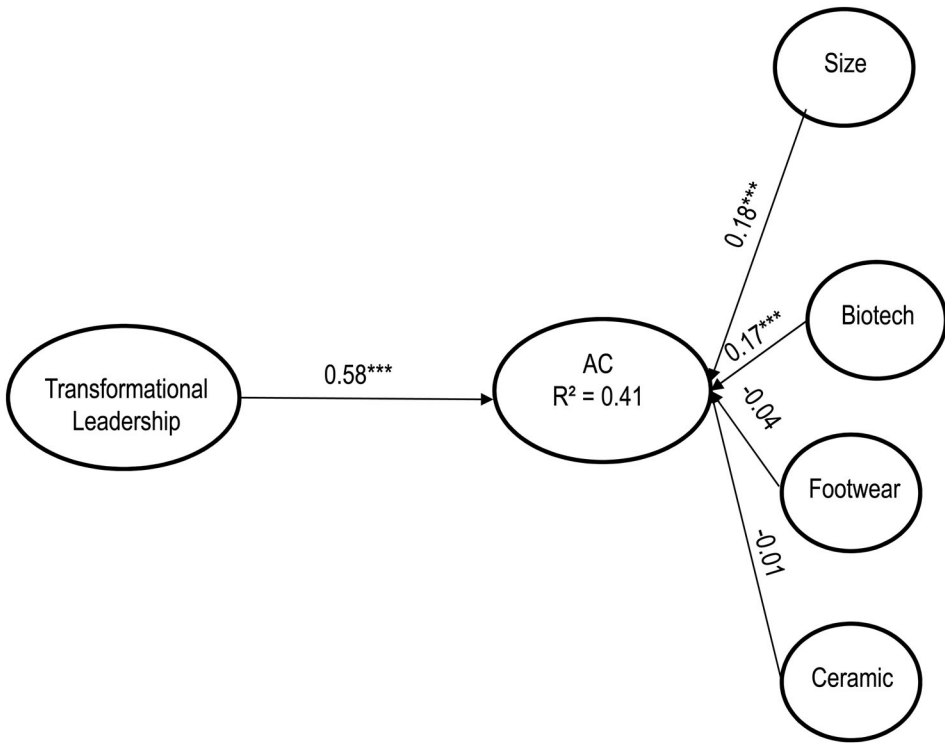


Figure 1. Direct effect model.

Note: † $p \leq .1$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

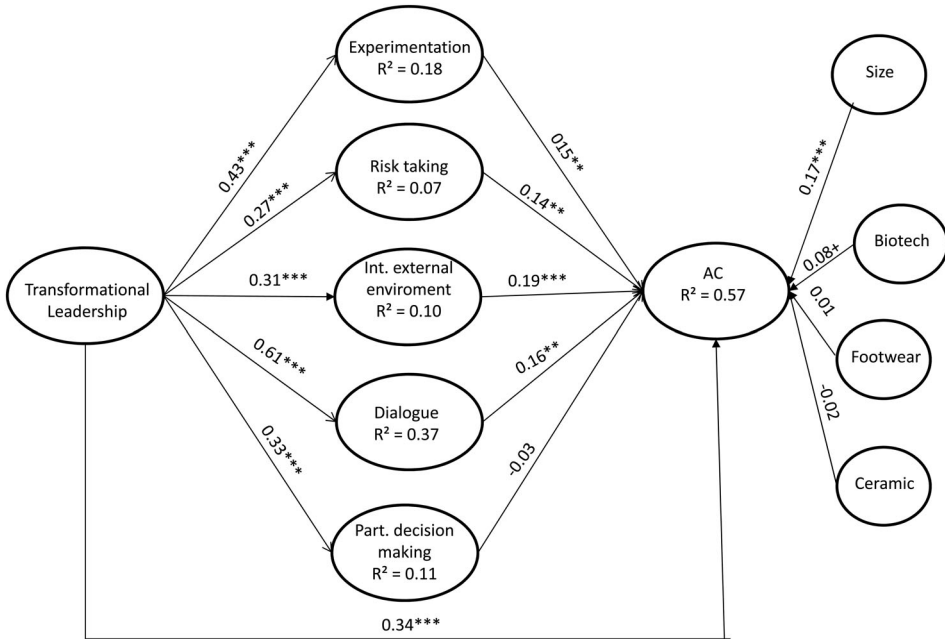


Figure 2. Complete causal model.

Note: † $p \leq .1$, * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 3. Inner model assessment indicators.

Factor	R^2	Q^2
AC	0.57	0.52
Experimentation	0.18	0.60
Risk	0.07	0.79
Interaction with the external environment	0.10	0.45
Dialogue	0.37	0.56
Participation in decision-making	0.11	0.83

Table 4. The effect of TL on AC through organisational learning facilitators.

	Coefficient	t-value	Percentile	
			Lower	Upper
<i>Total effect</i>				
TL → AC	0.58***	143.05		
<i>Direct effect</i>				
TL → AC	0.34***	60.66		
TL → experimentation	0.43***	90.90		
TL → risk-taking	0.27***	58.080		
TL → interaction with the external environment	0.31***	74.18		
TL → dialogue	0.61***	150.76		
TL → participation in decision-making	0.33***	77.04		
Experimentation → AC	0.14***	25.13		
Risk-taking → AC	0.14***	31.77		
Interaction with the external environment → AC	0.19***	40.49		
Dialogue → AC	0.16***	27.65		
Participation in decision-making → AC	-0.04	0.81		
Biotechnology → AC	0.08***	18.20		
Ceramic → AC	-0.02	0.44		
Footwear → AC	0.001	0.03		
<i>Indirect effect</i>				
TL → AC	0.24*	4.47	0.17	0.33
TL → experimentation → AC	0.06*	2.47	0.01	0.11
TL → risk-taking → AC	0.04*	2.26	0.01	0.07
TL → interaction with the external environment → AC	0.06**	2.69	0.03	0.09
TL → dialogue → AC	0.09**	2.74	0.03	0.17
TL → participation in decision-making → AC	-0.013	-0.26	-0.04	0.02

*** $p \leq .001$.** $p \leq .01$.* $p \leq .05$.† $p \leq .1$.

environment and risk-taking (hypotheses 4a to 4d) but not for participation in decision-making (hypothesis 4e).

6. Discussion and conclusions

The purpose of this study was to examine the relationship between TL and AC by considering the role that intra-organisational variables aimed at facilitating organisational learning play in such a relationship. In doing this, this paper responds to the gap detected in the literature about the need of analysing the mechanisms through which TL fosters the organisational learning processes (Sun and Anderson 2012).

Based on the literature review, we proposed that TL foster AC through the positive effect that the former has in promoting experimentation, risk-taking, interaction with the environment, dialogue and participation in decision-making in the firm, that is, in developing an organisational context that supports learning.

Findings provide evidence of a positive relationship between TL and AC. These results are consistent with those obtained in the few previous studies that analyse this relationship (Garcia-Morales,

Llorens-Montes and Verdu-Jover 2008; Sun and Anderson 2012; Flatten, Adams, and Brettel 2015) or the link between TL and other learning processes (Camps and Rodríguez 2011; Nemanich and Vera 2009; Garcia-Morales, Jiménez-Barrionuevo, and Gutierrez-Gutierrez 2012).

More interestingly, our findings show that the positive effect of TL and AC is mediated by four of the five organisational learning facilitators we proposed: experimentation, risk-taking, interaction with the environment and dialogue, and that these organisational learning facilitators foster the firm's AC. Regarding participation in decision making, our study does not find any mediation effect. What the results show is that TL encourages participation in decision-making but that it has no significant effect on AC. A possible explanation may be found in the dilemma of knowledge exploitation and exploration (Jansen, Van den Bosch, and Volberda 2006). Our proposition of a positive relationship between participation in decision-making and AC was based on the idea that participation increases the range of prospective 'receptors' of information and knowledge from different sources as well as their involvement in those processes (Cohen and Levinthal 1990; De Long and Fahey 2000). In other words, participation in decision-making is expected to promote exploration. But this may also be an obstacle to exploitation. In this line, Jiménez-Jiménez and Sanz-Valle (2013) findings show that a job design based on employee autonomy and participation in decision-making has a positive effect on knowledge generation, but a negative effect on the exploitation and storing of knowledge. The measure of AC used in this paper comprises exploratory, transformative and exploitative learning processes. Thus, it may be possible that participation in decision-making has a positive effect on one of the dimensions of AC, but a negative effect on the other dimensions and, as a result, the whole effect of participation in decision-making on AC is not significant. This approach is speculative and requires further research.

Despite the unexpected results for participation in decision-making, our findings as a whole provide support for the model proposed, which implies interesting contributions to the literature.

On the one hand, the evidence that TL displayed by top management leaders is positively related to AC, this paper finds reinforces the conclusions of the few studies that had previously studied the link between these variables (García-Morales, Llorens-Montes and Verdu-Jover 2008; Sun and Anderson 2012; Flatten, Adams, and Brettel 2015) and respond to the call for new research in this line of the literature (Volberda, Foss, and Lyles 2010; Sun and Anderson 2012). On the other, this paper advances in the understanding of that link. This is the main contribution of this paper. Although some previous studies had suggested that the reason why TL fosters AC is that TL helps to create an organisational context that encourages all the learning processes (Berson et al. 2006; Garcia-Morales, Llorens-Montes and Verdu-Jover 2008, 2012), as far as we know, none of these studies have likely mediators in the relationship between TL and AC. This paper shows that transformational leaders might lead firms' to obtain higher levels of AC because they stimulate experimentation, risk-taking, dialogue and interaction with external environment within the organisation.

This paper also provides valuable insights for practitioners. Organisations wishing to enhance their AC should pay attention to their managers' leadership style and should make an effort for developing an organisational context that fosters experimentation, risk-taking, dialogue and interaction with the environment. This study also shows that, in order to promote such learning facilitators, firms need top managers, with a TL style, that is, leaders who are able to gain their followers' respect and trust, provide them with an inspiring mission, give them support and encourage their creativity. This type of leaders at the top of the organisations may encourage (cascading down) TL through the whole organisation and, in addition, may strongly foster the development of a learning-oriented organisational context. Previous research shows that TL style is trainable although it depends also on the individual differences (Wang et al. 2011). Thus, we suggest that organisations should focus on selecting and promoting individuals who can become transformational leaders for upper-level positions and should provide them with the suitable training.

This study has some limitations. First, although two different informants provided information for this research, the data for measuring AC and organisational learning facilitators were obtained from

the same informant. Therefore, the issue of informant bias and common method bias cannot be totally ruled out. However, the confidentiality that was assured for respondents, together with the good indices of reliability, the Harman's one-factor analysis and the control for the effect of a single unmeasured latent method factor provided evidence against the presence of common method bias (Liang et al. 2007). Second, TL measure is based on CEO's perception of top managers' leadership. Previous research has also focused on top management perceptual measures, but having into account information from employees could provide a more thorough assessment on TL. Future research should try to collect information from different informants to measure top managers TL. Third, our data are cross-sectional, which allows us to analyse only a specific situation in time of the organisations studied, not their overall conduct over time. Future research would require longitudinal analyses.

Apart from overtaking the limitations of this paper, other future lines could improve the understanding of the relationship between leadership and AC. It would be interesting to include other leadership styles in the model and study the different processes included in AC separately. Some previous research has suggested that transactional leadership may also foster some components of AC (Vera and Crossan 2004; Sun and Anderson 2012; Flatten, Adams, and Brettel 2015). These studies recommend analysing more deeply the above issue and, furthermore, examining whether leaders combining both, transformational and transactional behaviours, can be considered 'the best leaders' to foster AC.

Finally, future research should also consider how environment conditions affect the relationship between leadership and AC concept. Some studies have suggested that transactional styles may be useful in an environment of stability but ineffective in an environment of change (Vera and Crossan 2004; Jansen, Van den Bosch, and Volverda 2006).

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