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

Accepted manuscript

Ferreras-Méndez, J.L. Sanz-Valle, R., Alegre Vidal, J. (2018), "Transformational leadership and absorptive capacity: an analysis of the organizational catalysts of this relationship", ***Technology Analysis & Strategic Management***, Vol. 30 No. 2, pp. 211-226.
https://doi.org/10.1080/09537325.2017.1299859

Abstract

Research analyzing the antecedents of a firm's absorptive capacity suggests that transformational leadership 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 organizational context that favors learning processes. We test our research model on a sample of 467 Spanish industrial firms. Findings provide evidence that transformational leadership is positively related to the firm's absorptive capacity and that this relationship is mediated by some organizational learning facilitators: experimentation, risk taking, interacting with external environment, and dialogue.

Keywords: transformational leadership; organizational learning; absorptive capacity; organizational learning facilitators.

1. Introduction

Absorptive capacity (AC) is usually conceptualized as a dynamic capability that allows firms to generate competitive advantages from the external sources available in the environment (Zahra and George, 2002; Lane et al., 2006; Flor and Oltra, 2013; Flatten et al., 2015), in research identifying its main antecedents.

According to Cohen and Levinthal (1990), a firm's AC does not simply depend on the organization'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 organizational process (Cohen and Levinthal, 1990; Flor and Oltra, 2013), which depends on the organizational context and practices. In spite of that, research on the intra-organizational antecedents of AC is scarce (Flatten et al. 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 et al. 1985; Wang et al. 2011) because they are crucial in putting forward the organizational 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) (Garcia-Morales et al., 2008; Sun and Anderson, 2012; Flatten et al., 2015). However, the research on this connection is still scarce and literature on this field highlights the need for additional research in this line (Volverda et al. 2010; Sun and Anderson, 2012). Furthermore, understanding the organizational catalysts by which TL exerts its influence on AC requires further research (Volberda et al., 2010; Sun and Anderson, 2012; Dinh et al., 2014).

The present paper tries to fill this gap in the literature. Following Jung et al (2003), we suggest that TL affects AC because the former encourages the employees' behaviors and the organizational practices that organizational learning requires. The objective of this paper is to

examine whether different organizational characteristics aimed at facilitating organizational 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 section 2, we provide a literature review on the relationships among TL, AC and organizational learning facilitators, and propose the research hypotheses. In section 3, we describe the methodology of the empirical study. In section 4, we present the results obtained through partial least squares (PLS) analyses. Finally, in section 5 we discuss conclusions and implications.

2. Transformational leadership and absorptive capacity

The concept of absorptive capacity (AC) was introduced by Cohen and Levinthal (1990) as "a firm's ability to recognize 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 et al. 2006; Lewin et al. 2011). Lane et al. (2006), following a process-based view, define AC as a firm's ability to utilize externally held knowledge through three sequential processes: (1) recognizing 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 conceptualization of AC as it integrates the insights generated in previous studies into Cohen and Levinthal's (1989) original definition, and also links AC and organizational learning theoretically.

Most of the definitions of AC usually highlight that it is a dynamic capability, which is linked to the firm´s organizational learning processes, and that gives the firm a foundation on which to achieve a competitive advantage (Zahra and George, 2002; Lane et al., 2006; Flor

and Oltra, 2013; Flatten et al., 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 (Garcia-Morales et al., 2008). Transformational leadership (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, 2014).

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 behaviors this leadership style involves: inspirational motivation, idealized influence, intellectual stimulation and individualized consideration (Bass et al., 2003). Inspirational motivation means that leaders create an attractive and clear vision of the future of the organization and increase the optimism and enthusiasm of its members and their commitment to the organization. Idealized influence means that leaders emphasize 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, individualized 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 grow.

Previous literature suggests that when TL is displayed by top management leaders (Bass et al. 1985; Bass et al., 2003) it has an influence not only at individual level but also at organizational level. Wang et al. (2011) summarize the reasons that explain this. First, because leaders at the top of the organizations "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 organization strongly affect organizational strategy, culture, systems, and practices.

Based on this reasoning, TL has been suggested to be a strategic factor that influences knowledge absorption and organizational learning processes (Berson et al., 2006; Camps and Rodriguez, 2009; Nemanich and Vera, 2009) as AC (Sun and Anderson, 2012; Flatten et al. 2015). In this line, Garcia-Morales et al. (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 et al (2015) argue transformational leaders can foster AC by different ways mainly by articulating a vision that emphasizes the importance of knowledge transformation and exploitation and by providing an appropriate model that shows how important is to improve the organization´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 et al., 2008; Sun and Anderson, 2012; Flatten et al. 2015). Based on this, we put forward the following hypothesis:

H_1: TL is positively related to firm's AC

3. The mediating role of organizational 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' behaviors and the organizational practices that learning processes require; in

other words, that TL stimulates the development of an organizational context that encourages employees' orientation to learn, thus, facilitating all learning processes (Berson et al 2006).

This issue has not been explicitly analyzed 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 organizational 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 Organizational learning facilitators and AC

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

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 organizational 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 behavior. 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 et al. (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 organization's intuition and the creation of new insights.

Another factor highlighted as an antecedent of AC is dialogue (Ahmed et al., 1999; De Long and Fahey, 2000). Dialogue and communication familiarize 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 organization (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 et al., 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 enhacers for a firm's AC. Thus, we hypothesize:

H_2: 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 organizational learning facilitators

Transformational leaders encourage experimentation and risk taking mainly through idealized 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 et al., 2008; 2012). Furthermore, Birasnav et al. (2011) argue that leaders with idealized 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 et al. (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 idealized influence of transformational leaders encourages followers to emulate their market orientation (Harris and Ogbonna, 2001; Menguc et al., 2007). Thus, we argue that transformational leaders, through both their idealized influence and their intellectual stimulation, can foster firm´s interaction with external environment.

In addition, the transformational leader's idealized 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 organization and the reduction of internal barriers to sharing information, which enable communication and dialogue among the employees (Garcia-Morales et al., 2012).

Participation in decision-making is another factor that is expected to be enhanced by TL. Garcia-Morales et al (2008) suggest that TL encourages employee´s empowerment and autonomy, which are usually associated to participation in decision-making. Furthermore, Nemanich and Dusya (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 hypothesize:

H_3: 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 organizational 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 organizational context that favors all the organizational learning processes. This organizational context includes some characteristics, which we have named organizational learning facilitators.

In this line, Garcia-Morales et al. (2008) underscore that transformational leaders foster AC by encouraging employee empowerment and autonomy (both related to participation in decision-making), and Garcia-Morales (2012) emphasize that TL has an indirect effect on organizational learning through its influence on communication and dialogue. However, the mediating role of these learning facilitators have not been empirically analyzed yet. Volberda et al (2010) highlights the importance of examining the organizational antecedents of AC. Therefore we put forward the following hypothesis:

H_4: 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 organizational 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, 2011), 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 (MLQ) 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 organizational level, as it is the case of this study, previous studies have also based on the Transformational Leadership Inventory (TLI) by Podsakoff et al. (1990). In this paper, TL was assessed using the scale of Garcia-Morales et al. (2008) based on Podsakoff et al. (1990). As in some previous studies (Garcia-Morales et al., 2008; Garcia-Morales et al., 2012; Flatten et al., 2015), CEOs indicated

their perceptions about the extent in which firm´s top management displays a TL style.

4.2.2. Organizational learning facilitators. We used the instrument previously used by Alegre and Chiva (2008), which captured the essential mechanisms that enable an organization 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 et al., 2005; Arbussà 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 organization (Jansen et al., 2005). The literature also shows that knowledge strategies differ among industries (e.g., Chen et al., 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.

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 Ext. Env.	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. Part. 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: *p≤ 0.05 **p≤ 0.01; to calculate the correlation coefficients, we worked with the means of the items that make up each dimension.

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 standardized factor loadings (see Table 2) are significant ($p<0.001$) 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 et al., 2009). Our findings show that this condition is met.

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			
Experimentation				0.91	0.96	0.92
EXP01	0.96***	0.01	139.94			
EXP02	0.96***	0.01	145.50			
Risk Taking				0.74	0.89	0.80
RIS01	0.89***	0.02	55.15			
RIS02	0.89***	0.02	58.37			
Int. External Env.				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			
Part. 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			
Biotechnolgy	1.00	0.00	0.00	1.00	1.00	1.00
Footswear	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

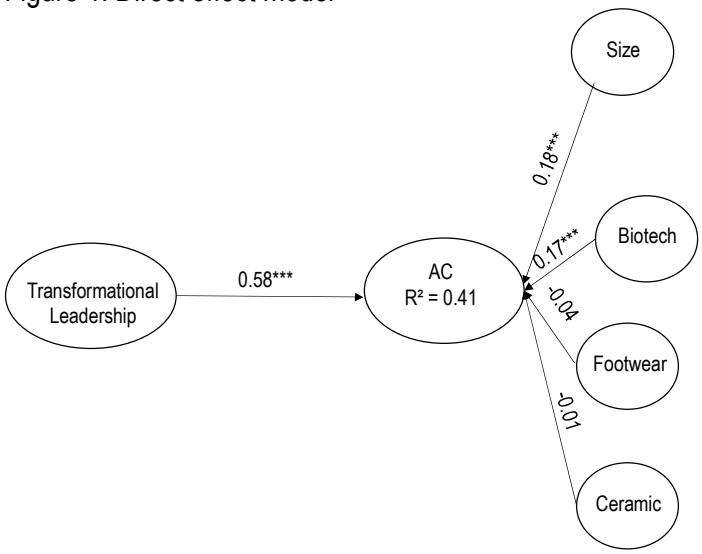
Note: †p ≤0.10 *p≤ 0.05 **p≤ 0.01 ***p≤0.001; t- values for n = 500 subsamples; CR, composite reliability; SE, standard error; AVE, average variance extracted.

Additionally, as the measures of the AC and of the organizational 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, page 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

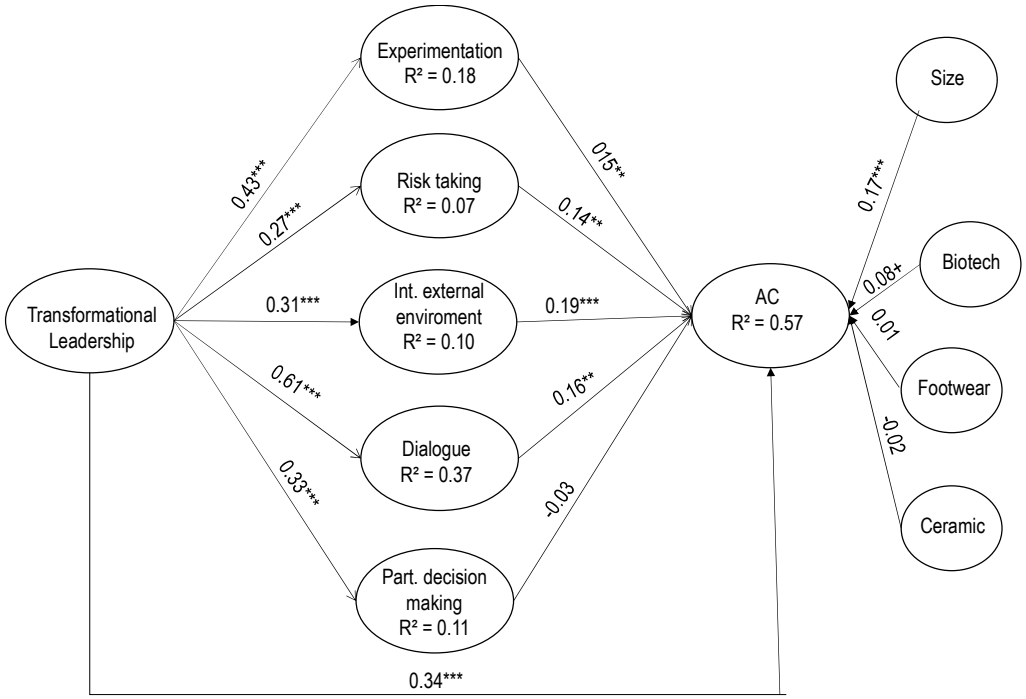
The essential criteria for the evaluation of the structural model are the coefficient of determination (R^2) of the endogenous latent variables and the strength of the relationships between the constructs (Chin, 1998). Bootstrapping was used to generate standard errors and t-statistics. Following Chin's (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 the results for the mediated model (Model 2).

Figure 1. Direct effect model



Note: †p ≤0.1 *p≤ 0.05 **p≤ 0.01 ***p≤0.001

Figure 2. Complete causal model



Note: †p ≤0.1 *p≤ 0.05 **p≤ 0.01 ***p≤0.001

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 Q2 (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 et al., 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 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
Int. External enviroment	0.10	0.45
Dialogue	0.37	0.56
Part. Decision making	0.11	0.83

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 for hypotheses 2a to 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 ($p < 0.001$), risk taking ($p < 0.001$), interaction with the external environment ($p < 0.001$), dialogue ($p < 0.001$) and participation in decision-making ($p < 0.001$), which provides support for hypotheses 3a to3e.

Finally, hypothesis 4 proposes that above-mentioned organizational 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 organization 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 environment and risk taking (hypotheses 4a to 4d) but not for participation in decision-making (hypothesis 4e).

Table 4. Effect of TL on AC through organizational learning facilitators

	Coefficient	t-value	Percentile	
			Lower	Upper
Total effect				
TL -> AC	0.58***	143.05		
Direct effect				
TL -> AC	0.34***	60.66		
TL -> Experimentation	0.43***	90.90		
TL -> Risk taking	0.27***	58.080		
TL -> Int. extenal env.	0.31***	74.18		
TL -> Dialogue	0.61***	150.76		
TL -> Part. decision making	0.33***	77.04		
Experimentation -> AC	0.14***	25.13		
Risk taking -> AC	0.14***	31.77		
Int. external env. -> AC	0.19***	40.49		
Dialogue -> AC	0.16***	27.65		
Part. 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		
Indirect effect				
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 -> Int. extenal env.-> AC	0.06**	2.69	0.03	0.09
TL -> Dialogue -> AC	0.09**	2.74	0.03	0.17
TL -> Part. decision making -> AC	-0.013	-0.26	-0.04	0.02

Note: ***p≤0.001, **p≤ 0.01, *p≤ 0.05, †p ≤0.1

6. Discussion and conclusions

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

Based on 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 organizational 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 analyze this relationship (Garcia-Morales et al., 2008; Sun and Anderson, 2012; Flatten et al. 2015), or the link between TL and other learning processes (Camps and Rodriguez, 2009; Nemanich and Vera, 2009; Garcia-Morales et al., 2012).

More interestingly, our findings show that the positive effect of TL and AC is mediated by four of the five organizational learning facilitators we proposed: experimentation, risk taking, interaction with the environment and dialogue, and that these organizational learning facilitators foster the firm's AC. Regarding the other learning facilitator we propose, our study does not found 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 et al., 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, Jimenez-Jimenez 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 et al., 2008; Sun and Anderson, 2012; Flatten et al. 2015), and respond to the call for new research in this line of the literature (Volverda et al., 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 organizational context that encourages all the learning processes (Berson et al., 2006; Garcia-Morales et al., 2008 and 2012), as far as we known, none study has examined 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 organization.

This paper also provides valuable insights for practitioners. Organizations wishing to enhance their AC should pay attention to their managers' leadership style and should make an effort for developing an organizational 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 organizations may encourage (cascading down) transformational leadership through the whole organization and, in addition, may strongly foster the development of a learning oriented organizational context. Previous research shows that transformational leadership style is trainable although it depends also on the individual differences (Wang et al., 2011). Thus, we suggest that organizations 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 organizational 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 analyze only a specific situation in time of the organizations 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 et al., 2015). These studies recommend analyzing more deeply the above issue and, furthermore, examining whether leaders combining both, transformational and transactional behaviors, 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 et al., 2006).

7. References

Alegre, J., Pla-Barber, J., Chiva, R. and Villar, C. (2012). Organisational learning capability, product innovation performance and export intensity. Technology Analysis & Strategic Management 24 (5): 511-526.

Alegre, J. and R. Chiva. 2008. Assessing the impact of organizational learning capability on product innovation performance: An empirical test. Technovation 28 (6): 315-326.

Arbussà, A. and G. Coenders. 2007. Innovation activities, use of appropriation instruments and absorptive capacity: Evidence from Spanish firms. *Research Policy* 36: 1545-1558.

ASEBIO. 2012. Asociación Española de Bioempresas. www.asebio.com

Bass, B. 1985. *Leadership and performance beyond expectations*, New York: Free Press.

Bass, B.M., and B.J. Avolio, 1995. Multifactor Leadership Questionnaire, Mind Garden, Palo Alto CA.

Bass, B. M., B. J. Avolio, D. I. Jung and Y. Berson. 2003. Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology 882*: 577-594.

Berson, Y., L. A. Nemanich, D. A. Waldmand, B. M. Galvin and R. T. Keller. 2006. Leadership and organizational learning: A multiple levels perspective. *Leadership Quarterly* 176: 577-594.

Birasnav, M., S. Rangnekar and A. Dalpati. 2011. Transformational leadership and human capital benefits: the role of knowledge management. *Leadership & Organization Development Journal* 322: 106-126.

Camps, J. and H. Rodríguez. 2011. Transformational leadership, learning and employability. Effects on performance among faculty members, *Personnel Review* 404: 423-442.

Chen, J., Y. Chen and W. Vanhaverbeke. 2011. The influence of scope, depth, and orientation of external technology sources on the innovative performance of Chinese firms, *Technovation* 31: 362-373.

Chin, W. W. 2001 *PLS-graph User´s Guide*. Version 3.0, University of Houston, TX.

Chin, W. W. 1998. *The partial least squares approach to structural equation modeling*. In: G. A. Marcoulides (Ed.), Modern Methods for Business Research, 295–358. Mahwah, NJ: Lawrence Erlbaum Associates.

Clausen, T. H. 2013. External knowledge sourcing from innovation cooperation and the role of absorptive capacity: empirical evidence from Norway and Sweden. Technology Analysis and Strategic Management 25 (1): 57-70.

Cohen, W. and D. Levinthal. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly* 36 (1): 128-152.

De Long, D. and L. Fahey. 2000. Diagnosing Cultural Barriers to Knowledge Management. *Academy of Management Executive*, 14 (4): 113-127.

Dinh, J. E., R. G. Lord, W. L. Gardner, J. D. Meuser, R. C. Liden and J. Hu. 2014. Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly 15*: 36-62.

Ferreras-Méndez, J. L., Newell, S., Fernández-Mesa, A. and Alegre, J. 2015. Depth and breadth of external knowledge search and performance: the mediating role of absorptive capacity. *Industrial Marketing Management*.47: 86–97.

FICE. 2011. Informe anual de la Federación de Industrias del Calzado Español. www.fice.es

Ford, J. D. and D. A. Schellenberg. 1982. Conceptual Issues of Linkage in the Assessment of Organizational Performance. *Academy of Management Review*, 7 (1): 49-58.

Freiling, J. and H. Fichtner, 2010. Organizational Culture as the Glue between People and Organizational: A Competence-based View on Learning and Competence Building. *German Journal of Research in Human Resource Management* 24(2): 152-172.

Flatten, T., D. Adams and M. Brettel. 2015. Fostering absorptive capacity through leadership: A cross-cultural analysis, *Journal of World Business* 50: 519-534.

Flor, M.L. and Oltra, M.J. 2013. An exploratory analysis of the relationship between absorptive capacity and business strategy. *Technology Analysis & Strategic Management* 25(9): 1103-1117.

Fornell, C. and D. F. Larcker. 1981. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research* 18 (1): 39-50.

Garcia-Morales, V. J., M. M. Jiménez-Barrionuevo and L. Gutierrez-Gutierrez. 2012. Transformational leadership influence on organizational performance through organizational learning and innovation. *Journal of Business Research* 65: 1040-1050.

Garcia-Morales, V. J., F. J. Llorens-Montes and A. J. Verdu-Jover. 2008.The effects of Transformational Leadership on Organizational Performance through Knowledge and Innovation. *British Journal of Management* 19: 299-319.

Geisser, S. 1975. A predictive approach to the random effect model. *Biometrika* 61 (1): 101–107.

Harris, L. C., N. Kim and R. K. Srivastava. 2001. Market orientation and organizational performance: is innovation a missing link? *Journal of Marketing* 62: 30-45.

Henseler, J., C. M. Ringle and R. R, Sinkovics. 2009. The use of partial least squares path modeling in international marketing. *Advances in International Marketing* 20: 277–320.

IVEX. 2012. Instituto Valenciano de la Exportación. www.ivex.es

Jansen, J. J. P., F. A. J. Van den Bosch and H. W. Volverda. 2006. Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Scienc*e 52 (11): 1661-1674.

Jansen, J. J. P., F. A. J. Van den Bosch and H. W. Volverda. 2005. Managing potential and realized absorptive capacity; how do organizational antecedents matter? *Academy of Management Journal* 48 (9): 999-1015.

Jiménez-Jiménez, D. and R. Sanz-Valle. 2013. Studying the effect of HRM practices on the knowledge management processes. *Personnel Review*, 42, 1, 28-49.

Jung, D. I., C. Chow and A. Wu. 2003. The role of transformational leadership in enhancing organizational innovation: hypothesis and some preliminary findings. *The Leadership Quarterly* 14 (4): 525-544.

Lane, P. J., B. R. Koka and S. Pathak. 2006. The Reification of Absorptive Capacity: a Critical Review and Rejuvenation of the Construct. *Academy of Management Review* 31: 833-863.

Lewin, A., S. Massini and C. Peeters. 2011. Microfoundations of internal and external absorptive capacity routines. *Organization Science* 11 (1): 81-98.

Liang, H., N. Saraf, Q. HU and Y. Xue. 2007. Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS Quarterly* 31 (1): 59-87.

Marsh, S. J. and G. N. Stock. 2006. Creating Dynamic Capability: The Role of Intertemporal Integration, Knowledge Retention, and Interpretation. *The Journal of Product Innovation Management* 23 (5): 422-436.

Menguc, B., S. Auh and E. Shih. 2007. Transformational leadership and market orientation: implications for the implementation of competitive strategies and business unit performance. *Journal of Business Research* 60 (4): 314-321.

Nemanich L. A. and D. Vera. 2009. Transformational leadership and ambidexterity in the context of an acquisition. *Leadership Quarterly* 20 (1): 19–33.

Podsakoff, P. M., S. B. Mackenzie, R. Moorman and R. Fetter. 1990. Transformational leader behaviors and their effects on followers´trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly* 1 (2): 107-142.

Podsakoff, P. M., S. B. Mackenzie, J. Y. Lee and N. P. Podsakoff. 2003. Common method biases in behavioral: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88: 879-903.

Preacher, K. J. and A. F. Hayes. 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers* 36 (4): 717-731.

Senge, P. M. 1990. *The fifth discipline: The art and practice of the learning organization*. Random House, London.

Sosik, J., Kahai, S. and Avolio, B., (1998) Transformational leadership and dimensions of creativity: motivating idea generation in computer-mediated groups. Creativity Research Journal, 11, 2, 111-121.

Spector, P.E. 1992. *Summated Rating Scale Construction: an Introduction*. Sage University, CA.

Stone, M. 1974. Cross-validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society* 36 (2): 111–147.

Sun, P., and M. Anderson. 2012. The combined influence of top and middle management leadership styles on absorptive capacity. *Management Learning* 43 (1): 25-51.

Szulanski, G. 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal* 17: 27- 43.

Vera, D, and M. Crossan. 2004. Strategic leadership and organizational learning. *Academy of Management Review* 29 (2): 222-240.

Veugelers, R. 1997. Internal R&D expenditures and external technology sourcing. *Research Policy*, 26 (3): 303-315.

Volberda, H., N. Foss and M. Lyles. 2010. Absorbing the Concept of Absorptive Capacity: How to Realize Its Potential in the Organization Field. *Organization Science* 21 (4): 931-951.

Wang, G., I Oh, S. H. Courtright, and A. E. Colbert. 2011. Transformational Leadership and Performance across Criteria and Levels: A Meta-Analytic Review of 25 years of research. *Group & Organizational Management* 36 (2): 223-270.

Zahra, S. A. and G. George. 2002. Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review* 27 (2): 185-203.

Appendix

Transformational Leadership

Dimension	Item	Literature source
Transformational leadership	1. The firm's management is always on the lookout for new opportunities for the unit/department/organization. 2. The firm's management has a clear common view of its final . 3. The firm's management succeeds in motivating the rest of the company. 4. The firm's management always acts as the organization's leading force. 5. The organization has leaders who are capable of motivating and guiding their colleagues on the job (masters).	Garcia-Morales et al. (2008)

Organizational Learning facilitators

Dimensions	Item	Literature source
Experimentation	1. People here receive support and encouragement when presenting new ideas. 2. Initiative often receives a favorable response here, so people feel encouraged to generate new ideas.	Alegre y Chiva, 2008
Risk taking	3. People are encouraged to take risks in this organization. 4. People here often venture into unknown territory.	
Interaction with the external enviroment	5. It is part of the work of all staff to collect, bring back, and report information about what is going on outside the company. 6. There are systems and procedures for receiving, collating and sharing information from outside the company. 7. People are encouraged to interact with the environment: competitors, customers, technological institutes, universities, suppliers etc.	
Dialogue	8. Employees are encouraged to communicate. 9. There is a free and open communication within my work group. 10. Managers facilitate communication. 11. Cross-functional teamwork is a common practice here.	
Participation in decision making	12. Managers in this organization frequently involve employees in important decisions 13. Policies are significantly influenced by the employees' views, 14. People feel involved in main company decisions	

Absorptive capacity

Dimension	Item	Literature source
Recognize	1. We frequently scan the environment for new technologies. 2. We thoroughly observe technological trends. 3. We observe in detail external sources of new technologies.	Szulanski, (1996); Jansen et al., (2005); Arbussà and Coenders, (2007)
Assimilate	4. We periodically organize special meetings with external partners to acquire new technologies. 5. Employees regularly approach external institutions to acquire technological knowledge. 6. We often transfer technological knowledge to our firm in response to technology acquisition opportunities.	
Maintain	7. We thoroughly maintain relevant knowledge over time. 8. Employees store technological knowledge for future reference. 9. We communicate relevant knowledge across the units of our firm.	Jansen et al., (2005); Smith et al., (2005); Marsh and Stock, (2006)
Reactivate	10. When recognizing a business opportunity, we can quickly rely on our existing technological knowledge. 11. We quickly analyze and interpret changing market demands for our technologies. 12. New opportunities to serve our customers with existing technologies are quickly understood.	Garud and Nayyar, (1994); Jansen et al., (2005); Marsh and Stock, (2006)
Transmute	13. We are proficient in transforming technological knowledge into new products. 14. We regularly match new technologies with ideas for new products. 15. We quickly recognize the usefulness of new technological knowledge for existing knowledge.	Jansen et al., (2005); Smith et al., (2005); Todorova and Durisin, (2007)
Apply	16. We regularly apply technologies in new products. 17.We constantly consider how to better exploit technologies. 18. It is well known who can best exploit new technologies inside our firm.	Szulanski, (1996); Jansen et al., (2005); Smith et al., (2005)