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The role of CEO transformational leadership and innovation climate in exploration and exploitation

Innovation
climate in
exploration and
exploitation

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Abstract

Purpose – The purpose of this paper is to investigate the relationship among CEO transformational leadership, innovation climate and organizational innovation through exploration and exploitation.

Design/methodology/approach – A questionnaire, designed as a self-reported survey, was distributed to individuals working in teams in US-based corporations, with a collected sample size of 215 organizations.

Findings – Results show that CEO transformational leadership has a direct positive effect on organizational innovation and an indirect effect through innovation climate. CEO leadership is more impactful for exploitation, compared to innovation climate, which has more influence on exploration.

Research limitations/implications – This study is the first to integrate CEO transformational leadership and innovation climate with exploration and exploitation outcomes. A research limitation is that there is a higher percentage of female than male respondents and a lower percentage of female CEOs in this study. A further limitation is self-report which can lead to common method bias.

Practical implications – The close connection among CEO transformational leadership, innovation climate and organizational innovation suggests that evaluating, supporting and training CEO transformational leadership becomes a vital activity for boards, investors and managers. If management wants to increase exploration, they should pay particular attention to creating a climate that is supportive of innovation. Organizations should recruit and train CEOs for transformational leadership and regularly assess climate to ensure innovation results.

Originality/value – The main contribution of this study is highlighting the role of innovation climate as a mediator between CEO transformational leadership and the outcome of organizational innovation which is measured by exploration and exploitation activities.

Keywords Innovation, Exploration, Exploitation, Transformational leadership, Ambidextrous organization, Innovation climate

Paper type Research paper

Managing innovation is challenging and the drivers often remain elusive (Berends *et al.*, 2016; Denton, 1999; Mele *et al.*, 2010). There are many obstacles to achieving innovation success (MacVaugh and Schiavone, 2010). Empirical research on innovation leadership is still in its nascent stage and offers a rich and fertile field for investigation by scholars to study leadership and innovation (Mitchell *et al.*, 2007). An area which needs to be explored further is how the upper echelon characteristics of CEO transformational leadership and climate influence innovation outcomes (Schmitt, 2012).

CEO leadership and climate

There is a gap in the literature to explain how CEO transformational leadership and climate interact and have an impact on innovation (Bledow *et al.*, 2011). Scholars argue that innovation requires a supportive environment to generate better innovation performance; however, it is not clear how transformational leadership and climate are related (Brettel and Cleven, 2011).



Jansen *et al.* (2009) clarify that transformational leadership behaviors influence the adopting of generative thinking and pursuing organizational innovation. A recurrent theme in the literature is that other internal factors beyond CEO leadership, such as organizational culture and structure, may also impact organizational innovation (Johannessen, 2009; Waite, 2013). It has been suggested that more research is needed that investigates transformational leadership of CEO and its impact on innovation climate.

Stages of innovation

A useful framework for understanding innovation is looking at innovation in phases, and furthermore, exploration and exploitation activities occur across these innovation phases (Stefan and Bengtsson, 2017). Each step in innovation, the ideation and exploitation phases require transformational leadership, and an innovation climate behavior (Hsu and Fan, 2010; Lueneburger and Goleman, 2010).

During these stages, organizational innovation requires an integration of the dual elements of both instability and stability. The difficulty is that innovation requires a commitment to simultaneously, and sometimes sequentially, maintaining high levels of both innovation and control. There are many challenges associated with creating a high level of agility and responsiveness and at the same time ensuring that stable structures and processes deliver consistent results. Inherently, exploration and exploitation can encompass potentially conflicting activities (Melkas *et al.*, 2017). This challenging balancing of organizational energy between these two dimensions is demanding for the organization, and it is in through this ambidexterity that innovation and control co-exist (Cembrero and Sáenz, 2018; Smith *et al.*, 2017).

CEO transformational leadership

The CEO transformational leadership plays a significant role in leading, driving and executing innovation strategies (Jung *et al.*, 2008). In an innovative company, CEO leadership and climate can operate as an integrated system in which everyone is accountable for the company's innovation outcomes (Stevenson, 2012).

Transformational leaders have a positive influence on enhancing organizational innovation (Gumusluoglu and Ilsev, 2009; Jung *et al.*, 2003). These transformational leaders move the employees past the employee's self-interests into the state of motivation to vigorously pursue an organizational vision (Bass and Avolio, 1994). This effect is achieved through intellectual stimulation, emotional appeal and inspiration from the leader (Bass and Avolio, 1995) and innovation goals seem vibrant, alive, engaging and even tangible (Gardner *et al.*, 2005).

CEOs who exhibit transformational leadership communicate a compelling and inspiring picture of what the future will be like if their organization's goals are achieved (Morgan, 1997).

Research shows that CEO transformational leadership can support exploring new business concepts for achieving breakthroughs in organizational innovation (Giesen *et al.*, 2010). CEO transformational leadership facilitates innovation advances at the organizational level by focusing on exploration, fostering a learning climate, promoting safety, being open to divergent thinking, allowing for mistakes and empowering employees (Nemanich and Vera, 2009).

Innovation through exploration and exploitation

Researchers have coined the term of an ambidextrous organization to designate combined attention to both exploration and exploitation that leads to innovation (Tushman and O'Reilly 1996). The term ambidextrous describes organizational strategies that allow top management to balance short- and long-term objectives simultaneously. Short-term

goals focus on current business performance, whereas long-term objectives center on exploring new opportunities (O'Reilly and Tushman, 2004). The balancing of this incremental innovation with the pursuit of disruptive innovation can be a useful innovation strategy (Chesbrough, 2010). When management focuses equally on both exploration and exploitation activities, organizations arrive at better decisions and sustain innovation from their organizational ambidexterity (Bledow *et al.*, 2009; Good and Michel, 2013). However, it should be noted that it has proven to be challenging for the same organization to work simultaneously with both exploration and exploitation (Laureiro-Martinez *et al.*, 2015).

Organizations view exploration and exploitation as complementary learning behaviors that support innovation (Bledow *et al.*, 2009; Turner *et al.*, 2013). Exploration is associated with openness to learning and connecting insights to find new opportunities. Exploitation includes activities such as the refinement of a given technology, process improvement, increases in efficiency and most innovation implementation and execution (March, 1991). Balancing exploration and exploitation can lead to the achievement of the ideation and implementation outcomes necessary for successful innovation (Tushman and Euchner, 2015). This combination is a new way of assessing organizational innovation performance, suggesting that performance is highest when both exploration and exploitation are present (Zacher *et al.*, 2016).

CEOs with transformational leadership behaviors can contribute to an organization's ambidexterity (Jansen *et al.*, 2008) and thereby result in higher organizational innovation (Samad, 2012). However, organizations often struggle to use exploration and exploitation simultaneously (Andriopoulos and Lewis, 2009; Simsek *et al.*, 2009). Therefore, to drive innovation, CEOs need to foster exploration and exploitation activities. Our present research suggests that CEO transformational leadership can help to manage the tensions between these two activities (O'Reilly and Tushman, 2004):

H1. The transformational leadership style of CEOs will have a positive relationship with organizational innovation.

Organizational climate and a climate that supports innovation

Organizations need to be more adaptable, versatile, entrepreneurial and imaginative in responding to the ever-shifting dynamics of a global, competitive marketplace. The connection between transformational leadership and organizational innovation is explored in the previous section, and there is a consistent argument for a strong, positive relationship between these two organizational dimensions. There is another organizational dimension that may play a part in the development and support of innovation—and that is climate. Previous research (Sarros *et al.*, 2011) has established the relationship of transformational leadership, and organizational culture and organizational innovation. This research adds a further dimension to this literature, namely the role of climate in the innovation process.

Organizational climate refers to the characteristics of the work environment which are perceived directly or indirectly by the employees as influencing their motivation and work behavior (Ostroff *et al.*, 2003). Our present research argues that organizational climate is an essential element of innovation and a strategic influencer (Ashforth, 1985; Zheng, 2009). A climate that supports and rewards creativity and allows for mistakes generates innovative results (Martins and Terblanche, 2003). Research suggests that CEOs can combine strategies, structure and climate to support innovation (Jiang and Chen, 2018). Organizational climate is more changeable and subject to the immediate effects of CEO leadership (Schneider *et al.*, 2013). It is easier and faster to improve organizational climate than to change the organizational culture (Schneider *et al.*, 2013). Whereas organizational culture is built over time and requires substantial time to evolve or change, organizational

climate is more changeable and subject to the immediate effects of CEO leadership (Schneider *et al.*, 2013).

The quality of communication, the infusing of trust, just rewards, organizational structure, employee involvement, accountability and the controlling systems are the primary attributes of the organizational climate for innovation (Schneider *et al.*, 2013). CEOs influence organizational climate for innovation and can thereby strengthen the relationship between CEO leadership and innovation performance.

Focusing on innovation policies and processes but neglecting to create a supportive organizational climate for innovation can cause unwanted results (Apekey *et al.*, 2011; Martins and Terblanche, 2003). Consequently, CEO's transformational leadership can balance their efforts in building the innovation competency by using climate (Leavy, 2005) and opportunities, building cross-functional teams, empowering people and adding frameworks and tools to develop creative business concepts (DeCusatis, 2008; Zerfass, 2005).

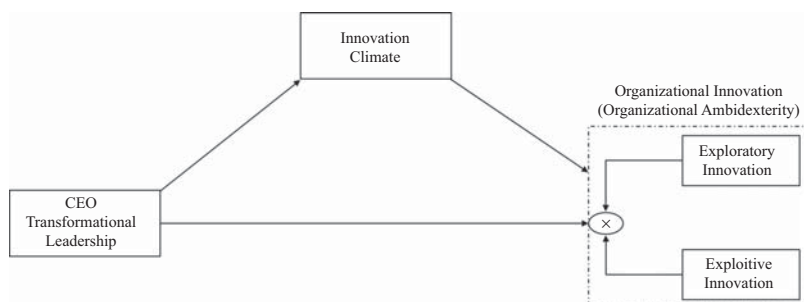
CEO transformational leadership, through vision, moral clarity and motivation, can help create an organizational climate that fosters innovation by opening communication channels and making it easier to advance new ideas (Birkinshaw *et al.*, 2011). In addition to rewarding innovative ideas and behaviors, transformational leadership can help create an innovative organizational climate that supports open communication and multilevel collaboration across functional teams (Holtzman, 2014). This type of communication and collaboration is closely aligned with transformational leadership and helps to create a climate supportive of innovation that helps to empower teams. Furthermore, such a climate, and transformational leadership, encourages risk-taking, feedback and collaboration with stakeholders (Soken and Barnes, 2014). This review of the literature on transformational leadership and organizational climate for innovation suggests that such climate mediates the relationship between transformational leadership and organizational innovation (Garcia-Morales *et al.*, 2008) (Figure 1):

H2. Innovation climate mediates the relationship between the transformational leadership style of CEOs and organizational innovation.

Research method

A quantitative approach was used for gathering all data needed for hypothesis testing. The primary goal of this study was to test whether a transformational leadership style of the CEO can have a significant influence on organizational exploratory and exploitative innovation—ambidextrous innovation performance—and if the impact of this leadership style is mediated by innovation climate. A self-report survey was designed to obtain data from team members and was used to assess the employees' perception of the CEO's selection of transformational leadership behaviors, and organizational exploratory and exploitative innovation—ambidextrous innovation performance. Participants also answered questions

Figure 1. The proposed conceptual model for the direct and indirect effect of CEO transformational leadership on exploratory and exploitative innovation



assessing the organization's climate and measuring the level of innovation support in the company. The Appendix outlines the survey questionnaires used. The data were subjected to correlation, regression, confirmatory factor analysis (CFA) and a mediation analysis using the bootstrapping method to determine the strength, direction, validity and significance of the relationships among those variables.

Qualtrics LLC, a private research company based in Utah, was used to distribute the survey questionnaires, and collect data from a diverse demographic of the target sample on behalf of the researchers. Participants from US companies in various industries were approached through e-mail and asked to participate in this study.

The selection of participants was based on specific criteria. First, participants had to be full-time employees. Second, they had to be working in companies that have been in operation for more than three years with more than 100 employees. This size of the businesses is classified as is the starting size for the firm to be considered as medium-sized in the USA (Small Business Administration, 2016).

A total of 327 surveys from nine industries and seven departments were collected using a Qualtrics research panel over a 30-day period during November and December of 2016. All the surveys that were received met the selection criteria. However, some surveys showed questionable validity (i.e. straight lining and random answers). These surveys were removed from the statistical analysis. After removing the invalid surveys, the overall sample size was 215.

As shown in the descriptive table (Table I), Participants ranged from 18 to 64 years old. The majority of the respondents (45.2 percent) were millennials (18–34 years old); the second largest group (38.7 percent) was generation X (35–54 years old); the least represented group (11.2 percent) was baby boomers (55–65 years old). The size of the companies represented in this study ranged from medium- to large-sized companies. The majority of respondents were working in large organizations. Specifically, 42 percent of the sample was working in businesses that had more than 5,000 employees, whereas only 23 percent were working in medium-sized companies. The gender representation at the different organizational levels of the sample varied. Most of the sample's CEOs were male ($n = 197$), while most of the respondents who were team members were female ($n = 166$). Female employees tend to participate in surveys more and express their feelings about their work compared to males employees do, which can justify the dominance of female participation in this collected sample.

Measures

CEO transformational leadership was measured using employee ratings on the 20 transformational leadership items from the Multifactor Leadership Questionnaire (MLQ), specifically the Form 5X-Short for which followers rate their leaders. The MLQ Form 5X-Short (copyright 1995, 2000, 2004 by Bernard M. Bass and Bruce J. Avolio) was used with the permission of Mind Garden (Menlo Park, CA). The items were answered on five-point Likert scales ranging from 1 (not at all) to 5 (frequently, if not always).

The MLQ is one of the most commonly used instruments in the leadership literature and considered to be highly reliable and well validated. Cronbach's α for the MLQ is 0.96 (Avolio *et al.*, 1999; Hartog *et al.*, 1997). The MLQ is associated with five specific items: idealized influence (attributes) (IA); idealized influence (behavior) (IB); inspirational motivation (IM); intellectual stimulation (IS); and individualized consideration (IC). A sample item from MLQ instrument that measures the leader's position as a role model (idealized influence (attributes)) is "The CEO goes beyond self-interest for the good of the group," and as idealized influence (behavior) is "The CEO Talks about his/her most important values and beliefs," while the transformational leader's inspirational motivation role is gauged with items such as the "CEO expresses confidence that goals will be achieved." An item relating to the intellectual

	<i>n</i>	%
<i>Age of the participants</i>		
<i>Age</i>		
18–24	10	4.7
25–34	87	40.5
35–44	61	28.4
45–54	33	15.3
55–64	24	11.2
<i>Age of the companies</i>		
<i>Years in business</i>		
3–5	7	3.3
5–10	15	7.0
> 10	193	89.8
<i>Size of the companies</i>		
<i>Number of employees</i>		
100–500	49	22.8
501–5,000	75	34.9
> 5,000	91	42.3
<i>Gender of participants</i>		
Male	49	22.8
Female	166	77.2
<i>Gender of CEOs</i>		
<i>Group</i>		
Male	197	91.6
Female	18	8.4
<i>Industries of the participants</i>		
Education	6	2.8
Fast-moving consumer goods (FMCG)	24	11.2
Finance/insurance	25	11.6
Health care	32	14.9
Technology/communication	25	11.6
Transportation	4	1.9
Professional services	15	7.0
Manufacturing	21	9.8
Utilities	7	3.3
Other	56	26.0
<i>Departments of the participants</i>		
Sales/marketing	24	11.2
Finance/accounting	19	8.8
Human resources	8	3.7
Management/administration	37	17.2
Manufacturing	7	3.3
Operations	55	25.6
Research and development (R&D)	7	3.3
Other	58	27.0

Table I.
Descriptive table of
the control variables

Note: *n* = 215

stimulation role of the CEO is “The CEO suggests new ways of looking at how to complete assignments.” Finally, items such as the “CEO considers me as having different needs, abilities, and aspirations from others” were used to tap the individualized consideration aspect of transformational leadership.

In this research, the innovation climate was measured using 16-item scale developed by Scott and Bruce (1994). It measures the degree to which individuals view the organization they work for as being open to change, and the level of support for innovation. In general, the innovation climate scale measures the shared expectations and perceptions of the employees of policies and practices that support employees taking initiative and exploring innovative approaches (Ostroff *et al.*, 2003). It includes two main sets of items. The first set contains items that show support for creativity. Some examples are: "Our ability to function creatively is respected by the leadership," "This organization publicly recognizes those who are innovative." The second set consists of tolerance of differences. Some examples are: "The reward system here benefits mainly those who don't rock the boat," "The best way to get along in this organization is to think the way the rest of the group does." Each item is rated on a scale from 1 (strongly disagree) to 5 (strongly agree). Cronbach's α coefficient for the supportive innovation climate is 0.92.

Organizational innovation is defined in this research as exploratory and exploitative innovation. Respondents were asked about exploratory and exploitative innovation at the organization level. To do this, we used the exploratory and exploitative innovation scales adapted from Jansen *et al.* (2006). Cronbach's α of the exploratory innovation scale is 0.91. It includes six items that capture the extent to which organizations renew their existing knowledge so that they can tackle future opportunities by pursuing potential innovations in emerging customer markets. Often this can result in radical innovation. Samples of exploratory innovation items include: "Our organization accepts demands that go beyond existing products and services," "We frequently utilize new opportunities in new markets" and "Our organization regularly uses new distribution channels." For the exploitative innovation scale, Cronbach's α was 0.88. The scale also includes six items to capture the extent to which organizations build upon existing capabilities and improve their current business performance by pursuing incremental enhancements that meet the needs of existing offerings available to current customers and markets. Incremental innovation could result in the organization being more adaptive to the current market dynamic. Samples of exploitative innovation items include: "We regularly implement small adaptations to existing products and services," "We introduce improved, but existing products and services for our local market" and "We increase economies of scales in existing markets." All items for these two scales are measured on a seven-point scale, 1 = strongly disagree, 7 = strongly agree (Gibson and Birkinshaw, 2004). Therefore, the multiplicative interaction of these two capacities can indicate the level of organizational ambidexterity, thus organizational innovation. Organizational innovation performance is highest when both explorative and exploitative innovation are high compared to low levels of one or both dimensions (He and Wong, 2004; Simsek *et al.*, 2009).

The organizational ambidexterity measure was used as a proxy for organizational innovation performance in this study (Jansen *et al.*, 2006). The scale measures organizational ambidexterity conceptualized as a multidimensional construct comprised of a combination of adaptability (explorative innovation) and alignment (exploitative innovation). The multiplicative interaction between exploratory and exploitative innovation was used, based on the argument that both are interdependent dimensions and cannot substitute for each other (Gibson and Birkinshaw, 2004).

Researchers emphasize the use of control variables to help avoid coming up with misleading findings (Bernerth and Aguinis, 2016). The control variables included the demographic characteristics of a CEO which may influence participants' responses.

Results

Study instruments were subjected to a CFA statistical technique to determine their validity and to verify the factor structure of the observed variables. Variables means, standard deviations and the reliability of instruments are presented in Table II.

<i>IV—CEO transformational leadership</i>		Cronbach's $\alpha = 0.95$	
Sample of items (copyrighted survey)	<i>M</i>	<i>SD</i>	
The CEO of my company			
1. Re-examines critical assumptions to question whether they are appropriate	3.41	1.09	
2. Talks about his/her most important values and beliefs	3.64	1.14	
3. Seeks differing perspectives when solving problems	3.45	1.17	
4. Talks optimistically about the future	4.16	1.03	
5. Instills pride in me for being associated with him/her	3.39	1.31	
Sub-dimension idealized attributes (IA) (4 items)	Cronbach's $\alpha = 0.83, M: 14.31, SD: 3.97$		
Sub-dimension idealized behaviors (IB) (4 items)	Cronbach's $\alpha = 0.79, M: 15.12, SD: 3.60$		
Sub-dimension inspirational motivation (IM) (4 items)	Cronbach's $\alpha = 0.88, M: 16.25, SD: 3.73$		
Sub-dimension intellectual stimulation (IS) (4 items)	Cronbach's $\alpha = 0.85, M: 12.98, SD: 4.02$		
Sub-dimension individual consideration (IC) (4 items)	Cronbach's $\alpha = 0.92, M: 11.25, SD: 5.00$		
<i>MI—innovation climate</i>		Cronbach's $\alpha = 0.94$	
All items	<i>M</i>	<i>SD</i>	
How do you rate the innovation performance of your organization?			
1. Creativity is encouraged here	3.93	1.16	
2. Our ability to function creatively is respected by the leadership	3.87	1.13	
3. Around here, people are allowed to try to solve the same problems in different ways	3.87	1.15	
4. The main function of members in this organization is to follow orders which come down through channels	2.40	1.15	
5. Around here, a person can get in a lot of trouble by being different	3.72	1.26	
6. This organization can be described as flexible and continually adapting to change	3.96	1.04	
7. A person cannot do things that are too different around here without provoking anger	3.63	1.30	
8. The best way to get along in this organization is to think the way the rest of the group does	3.30	1.28	
9. People around here are expected to deal with problems in the same way	3.41	1.25	
10. This organization is open and responsive to change	3.94	1.13	
11. The people in charge around here usually get credit for others' ideas	3.18	1.38	
12. In this organization, we tend to stick to tried and true ways	2.71	1.14	
13. This place seems to be more concerned with the status quo than with change	3.55	1.16	
14. The reward system here encourages innovation	3.48	1.26	
15. This organization publicly recognizes those who are innovative	3.58	1.23	
16. The reward system here benefits mainly those who do not rock the boat	3.28	1.28	
Sub-dimension support for creativity (8 items)	Cronbach's $\alpha = 0.92, M: 29.91, SD: 7.60$		
Sub-dimension tolerance of differences (8 items)	Cronbach's $\alpha = 0.87, M: 25.89, SD: 7.18$		
<i>DV—explorative innovation</i>		Cronbach's $\alpha = 0.85$	
Items	<i>M</i>	<i>SD</i>	
How do you rate the explorative innovation of your organization?			
1. Our organization accepts demands that go beyond existing products and services	5.30	1.45	
2. We invent new products and services	4.95	1.84	
3. We experiment with new products and services in our local market	5.15	1.52	
4. We commercialize products and services that are completely new to our organization	4.79	1.75	
5. We frequently utilize new opportunities in new markets	5.30	1.34	
6. Our organization regularly uses new distribution channels	4.64	1.60	

Table II.
Variable means,
standard deviations
and the reliability
of instruments

(continued)

<i>DV—exploitative innovation</i>		Cronbach's $\alpha = 0.84$		Innovation climate in exploration and exploitation
Items		<i>M</i>	<i>SD</i>	
How do you rate the exploitative innovation of your organization?				
1. We frequently refine the provision of existing products and services		5.35	1.33	
2. We regularly implement small adaptations to existing products and services		5.58	1.28	
3. We introduce improved, but existing products and services for our local market		5.31	1.34	
4. We improve our provision's efficiency of products and services		5.45	1.29	
5. We increase economies of scales in existing markets		5.13	1.42	
6. Our organization expands services for existing clients		5.53	1.31	

Note: $n = 215$

Table II.

The study instruments were subjected to a CFA statistical technique using SPSS/AMOS statistical software to determine their validity and to verify the factor structure of the observed variables. According to Marsh *et al.* (1998, 2004), the following CFA values are considered acceptable ranges: C_{\min}/df is good when lower than 3; and comparative fit index (CFI) is great when more than 0.95 and considered permissible when lower than 0.80. However, Byrne (1994) considered the CFI to be a great fit when it is equal to or more than 0.93. The root-mean-square error of approximation (RMSEA) is good when lower than 0.05 and considered moderate when it is 0.05–0.10. Browne and Cudeck (1993) found RMSEA to be a good fit when it is equal to or less than 0.08, especially with a large sample size.

Cronbach's α value for the MLQ was 0.95, which is higher than the minimum reliability threshold. In contrast, an integrated CFA on the items of all scales, where each item constrained to load only on the factor for which it was the proposed indicator, yielded an acceptable data fit, $\chi^2 = 365$, $\chi^2/df = 2.4$, $p < 0.001$, CFI = 0.934, RMSEA = 0.08.

Cronbach's α value for the explorative innovation was 0.85, which is higher than minimum reliability threshold. In contrast, an integrated CFA on the items of all scales, where each item constrained to load only on the factor for which it is the proposed indicator, yielded an acceptable data fit ($\chi^2 = 7.58$, $\chi^2/df = 1.083$, $p = 0.371$, CFI = 0.99, RMSEA = 0.02). Therefore, CFA model fit statistics meet the accepted thresholds, and the factor structure is confirmed. Cronbach's α value for exploitative innovation was 0.84, which is higher than the minimum reliability threshold. The integrated CFA on the items of all scales, where each item constrained to load only on the factor for which it is the proposed indicator, were confirmed and yielded an acceptable fit to the data ($\chi^2 = 11.89$, $\chi^2/df = 1.694$, $p = 0.104$, CFI = 0.98, RMSEA = 0.05). Therefore, CFA model fit statistics meet the accepted thresholds, and the factor structure is confirmed (CFI = 0.95, RMSEA = 0.08). The factor structure is confirmed as a proxy for organizational innovation performance.

For the multiplicative product term exploratory and exploitative innovation, Cronbach's α value was 0.91, which is higher than the minimum reliability threshold. The CFA model fit statistics also meet the accepted thresholds ($\chi^2 = 104$, $\chi^2/df = 2.376$, $p < 0.001$, CFI = 0.95, RMSEA = 0.08). The factor structure is confirmed as a proxy for organizational innovation performance.

Cronbach's α value for innovation climate was 0.94, which is higher than minimum reliability threshold. In contrast, an integrated CFA on the items of all scales, where each item constrained to load only on the factor for which it is the proposed indicator, yielded an acceptable fit to the data ($\chi^2 = 181$, $\chi^2/df = 2.06$, $p < 0.001$, CFI = 0.96, RMSEA = 0.07). Therefore, CFA model fit statistics meet the accepted thresholds, and the factor structure is confirmed.

Hypotheses testing

A regression analysis was used to test whether the transformational leadership behaviors of the CEOs and the organizational climate that supports innovation predicted organizational innovation performance (explorative innovation \times exploitative innovation).

Table III presents the correlations among the study variables. Table IV shows the results of the multiple regression analyses for organizational innovation performance. The predictors entered into the hierarchical regression analysis were CEO gender, transformational leadership and organizational climate. Baseline Models 1 and 2 contained the control variable (CEO gender). Models 2 present the effects of the transformational leadership behaviors of the CEO, and the effects of an organizational climate that supports innovation.

According to the standardized regression coefficients in Table IV, the findings in Model 2 showed that the gender of the CEO had no significant influence on innovation performance at organizational level ($\beta = -0.03$, $p > 0.05$). Moreover, the results showed that CEO had a significant influence on exploration ($\beta = 0.31$, $p < 0.001$) and exploitation ($\beta = 0.45$, $p < 0.001$). In contrast, organizational climate that supports innovation also had a significant influence on exploration ($\beta = 0.36$, $p < 0.001$) and exploitation ($\beta = 0.26$, $p < 0.001$). These statistical results emphasized that CEO transformational leadership had a greater impact on exploitation than exploration. Moreover, it also confirmed that innovation climate for innovation had a greater effect on exploration than exploitation. On the other hand, the proposed positive relationship between the transformational leadership behaviors of the CEO and organizational innovation (*HI*) was statistically supported ($\beta = 0.40$, $p < 0.001$). In addition, organizational climate that supports innovation also had a significant positive relationship with organizational innovation performance ($\beta = 0.31$, $p < 0.001$).

Table III.
Correlations,
means and standard
deviations

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. CEO gender ^a	1.08	0.28	–					
2. Transformational CEO	3.50	0.89	0.03	–				
3. Innovation climate	3.49	0.87	0.09	0.67**	–			
4. Exploration	5.02	1.20	0.01	0.55**	0.57**	–		
5. Exploitation	5.39	1.00	0.03	0.62**	0.55**	0.76**	–	
6. Organizational innovation	28.00	10.48	0.00	0.61**	0.58**	0.94**	0.92**	–

Notes: $n = 215$. ^a1 = male; 2 = female. ** $p < 0.01$

Table IV.
Results of hierarchical
regression analyses:
effects of
transformational
leadership and
innovation climate
on exploration,
exploitation and
organizational
innovation

	Exploration		Exploitation		Organizational innovation (exploration \times exploitation)	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
<i>Control variables</i>						
CEO gender ^a	0.01	-0.03	0.03	0.00	0.00	-0.03
<i>Main predictors</i>						
Transformational CEO		0.31***		0.45***		0.40***
Innovation climate		0.36***		0.26***		0.31***
R^2	0.00	0.38***	0.00	0.42***	0.00	0.42***

Notes: $n = 215$. Standardized regression coefficients are reported. ^a1 = male; 2 = female. *** $p < 0.001$

To test the mediation effect of the innovation climate, a mediation analysis was conducted using the bootstrapping method with bias-corrected confidence estimates to assess each component of the final model (MacKinnon *et al.*, 2004; Preacher and Hayes, 2004). Table V shows the results of the mediation analysis for organizational innovation performance.

According to the unstandardized mediation coefficients in Table V, it was also found that transformational leadership behaviors of the CEO were positively related to innovation climate (Path A), $B = 0.65$, $t(213) = 13$, $p < 0.001$. Second, the results confirmed that the innovation climate was positively associated with organizational innovation performance (Path B), $B = 3.75$, $t(213) = 4.42$, $p < 0.001$. Third, it was confirmed that transformational leadership behaviors of the CEO were positively associated with organizational innovation (Path C), $B = 7.18$, $t(213) = 11.14$, $p < 0.001$. Because both Path A and Path B were significant, the 95% confidence interval of the direct effect was obtained using the bootstrapping method with 5,000 bootstrap resamples (Preacher and Hayes, 2008). These findings confirmed the mediating role of the innovation climate in the relationship between the transformational leadership of the CEO and the organizational innovation performance; thus, $H2$ was supported, $B = 2.42$, CI [1.32, 3.71]. Results also indicated that the direct effect of the transformational leadership of the CEO on organizational innovation was still significant when controlling for climate, $B = 4.74$, $t(213) = 5.73$, $p < 0.001$, thus suggesting partial mediation (see Figure 2).

The final effect size of the total model was large and significant, $R^2 = 0.42$, $p < 0.001$. The effect size indicates that 42 percent of the variance in organizational innovation performance was explained by the main predictors, the transformational leadership behaviors of the CEO and the mediator, an organizational climate that supports innovation.

Discussion

This study demonstrates the impact of CEO transformational leadership on innovation directly and indirectly through climate. The influence of the CEO is more marked on exploitation than on exploration. Exploitation is typically more short term with lower risk and uncertainty than exploration.

This CEO impact on exploitation is perhaps understandable because exploitation is more concrete, measurable and profitable in the short term than exploration which has this higher element of risk. However, the CEO transformational leadership can impact climate for innovation, and the innovation climate itself can foster the exploration. This research has two different results, two different set of influences, between exploration and exploitation and the impact of CEO transformational leadership.

In this model, the CEO plays the most crucial role. The CEO's transformational leadership has the greatest impact. This research shows that CEO transformational leadership has both a direct influence and indirect influence on innovation. The direct effect through exploitation and the indirect mediating influence on exploration. However, the CEO often focuses on exploitation.

So if a company wants to have the goal of "get the job done," to produce exploitation innovation results in the short term, they can focus on training for transformational leadership at the CEO level. So this would mean hiring and training CEOs for their transformational leadership skills. However, if the company would like to have more long-term innovation based on exploration, this model suggests that they would have to focus on creating a climate that supports innovation as well as developing the transformation leadership of the CEO.

This research validates a model of an organizational approach to innovation that focuses on the role of the CEO as a prime mover of a systematic innovation process. By considering the direct leadership role of CEO in driving innovation, and the indirect effect of the CEO's leadership's influence on creating and sustaining an organizational

Run MATRIX procedure:

 Preacher and Hayes (2008) SPSS Macro for Multiple Mediation
 Written by Andrew F. Hayes, The Ohio State University
 www.afhayes.com
 For details, see Preacher, K. J., & Hayes, A. F. (2008). Asymptotic
 and resampling strategies for assessing and comparing indirect effects
 in multiple mediator models. Behavior Research Methods, 40, 879-891.
 Also see Chapter 5 of Introduction to Mediation, Moderation, and Conditional
 Analysis. New York: The Guilford Press. <http://www.guilford.com/p/hayes3>

Dependent, Independent, and Proposed Mediator Variables:

DV = Orgnizat
 IV = Transfor
 MEDES = Climate

Sample size
 215

IV to Mediators (a paths)

	Coeff	se	t	p
Climate	0.6500	0.0500	13.0097	0.0000

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
Climate	3.7501	0.8472	4.4267	0.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
Transfor	7.1807	0.6441	11.1477	0.0000

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
Transfor	4.7431	0.8275	5.7316	0.0000

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
0.4219	0.4164	77.3578	2.0000	212.0000	0.0000

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	2.4376	2.4324	-0.0052	0.6136
Climate	2.4376	2.4324	-0.0052	0.6136

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	1.3261	3.7366
Climate	1.3261	3.7366

Level of Confidence for Confidence Intervals:

95

Number of Bootstrap Resamples:

5000

***** NOTES *****

----- END MATRIX -----

Table V.
 Mediation analysis
 results using the
 bootstrapping
 technique

climate that supports innovation, we can account for a significant portion (42 percent) of the organizational innovation. This research is a meaningful contribution because it suggests that CEO transformational leadership style, and its effect on the climate, can drive close to half of the organizational innovation outcomes.

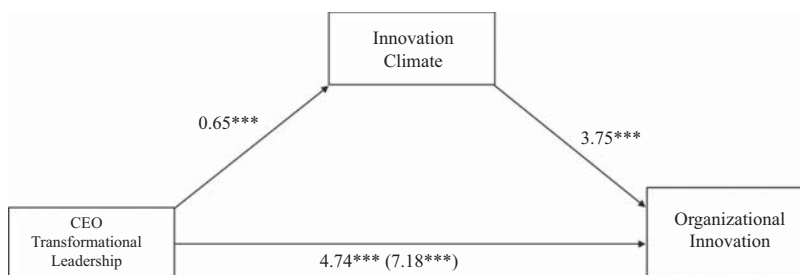
Other studies have looked at innovation activities throughout the organization (Lawton and Weaver, 2010) and leadership throughout the organization, though not necessarily transformational leadership (Carneiro, 2008), and role of leadership at the middle manager level (not transformational) in Waite (2013). There is only one study that looks at the role of the CEO's leadership and innovation, and in that study, they contrast creative and operational leadership and its effect on innovation (Makri and Scandura, 2010). By using CEO transformational leadership, we are linking this research to an extensive literature on transformational leadership, to the research on innovation. This joins two essential research streams, that of transformational leadership and innovation research. This research adds to the work of Prasad and Junni (2016) by adding the dimension of climate for innovation.

Another new contribution of this study is that it also focuses on the exploration and exploitation together. In previous literature, studies linked leadership at lower managerial levels, lower than the CEO, mainly concentrated on exploitation (Nemanich and Vera, 2009). A few focused on exploration (Makri and Scandura, 2010) but none linked CEO leadership to both. The concept of ambidexterity is defined as both exploration and exploitation (He and Wong, 2004) and it has not been linked to CEO transformational leadership and climate. There is theory that suggests that the organizational climate is a significant driver of organizational performance outcomes. However, this study is one of the few to examine its effect on innovation performance (Denti and Hemlin, 2012; Martins and Terblanche, 2003; Zheng, 2009).

The significant contribution of this study is that it systematically demonstrates that CEOs who adopt a transformational leadership style can significantly boost innovation performance. A further finding is that CEOs foster innovation directly at the organizational and indirectly by promoting a climate for innovation. CEO transformational leadership has more impact on exploitation, while a climate supportive of innovation has more implications for exploration.

Implications of study findings

Results of this study contribute to both the theories of leadership and innovation. This study confirmed that transformational leadership and a supportive climate for innovation work together to create a new strategic model to foster innovation performance. Explicitly, it confirms the direct relationship between transformational leadership and organizational innovation outcomes.



Note: *** $p < 0.001$

Innovation
climate in
exploration and
exploitation

Figure 2.
Indirect effect of
transformational
leadership behaviors
of the CEO on
organizational
innovation through
organizational climate

For executives, there is a clear reaffirmation of the primacy of CEO transformational leadership, which acts as a driver of innovation outcomes for the whole organization. Furthermore, the results of this research suggest that CEOs need to spend considerable effort ensuring that the climate is supportive of innovation, especially if the organization is pursuing exploration innovation. A CEO practicing transformational leadership should positively impact innovation. Moreover, if the CEO pays close attention to the climate—seeking to promote a climate that is supportive of innovation and that allows people to explore and make mistakes—this will support further innovation. A significant finding of this research is that innovation climate is a major strategic lever to ensure exploration innovation outcomes.

The findings of this study argue for the fundamental importance of CEO leadership coaching and training programs to develop transformational leadership. This study also makes a convincing case that a supportive organizational climate for innovation can promote and foster innovation performance at organizations.

Limitations and recommendations for future research

One limitation of this research is that the gender representation of participants in this study was imbalanced. Most of the participants were female, whereas most of the CEOs were male. This unequal representation could limit the generalizability of findings. Second, the statistical analyses were based on self-report surveys. These self-reported data are a common limitation of survey-based studies and may lead to inflated correlations due to shared variance. Finally, this study is based solely on samples from different industries and departments located only in the USA. Using participants from one country can reduce the generalizability of the results. Another opportunity for future research would be to look at the longitudinal effect—how a change in transformational leadership style or innovation climate affects innovation outcomes over time.

Recognition of this phenomenon as described in the study's research model raises the possibility that team dynamics may play a role in innovation outcomes. An integrated model that looks at CEO transformational leadership, climate and team innovation performance could provide further insight. A more detailed analysis of individual factors such as gender may also impact innovation and innovation climate.

Also, it would be helpful to see if there are any differences in low-tech and service industries as compared to high-tech industries (Agnete Alsos *et al.*, 2013). Much of the research on innovation tends to focus primarily on radical or disruptive product-driven innovation and give less attention to process and incremental innovation.

Regarding individual differences, some interesting individual dimensions might be measured using the five-factor model of personality traits. A critical next step would study whether the personality dimensions of the CEO, the team leader or the individual employee can lead to better innovation outcomes. This next study would have many practical implications for team development, executive recruitment and human resource policies that support innovation.

Conclusion

This study provides insight on the role of CEO transformational leadership in enabling innovation in their organizations through direct and indirect means. CEO transformational leadership is linked to increased exploration and exploitation activities that drive organizational innovation. CEO transformational leadership has a direct effect, and an indirect effect through creating a climate that is supportive of innovation. Thus, organizations that would like to pursue organizational innovation would do well to ensure that CEO leadership is transformational and that the organizational climate is supportive of innovation.

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Appendix. Scales used in study

- (1) Transformational leadership is measured with 20 items from the Multifactor Leadership Questionnaire (MLQ Form 5X-Short, where followers rate their leaders). The MLQ Form 5X-Short (copyright 1995, 2000, 2004 by Bernard M. Bass and Bruce J. Avolio). Sample of items used are as follows.

The CEO of my company:

 - Seeks differing perspectives when solving problems
 - Specifies the importance of having a strong sense of purpose
 - Considers the moral and ethical consequences of decisions
 - Displays a sense of power and confidence
 - Articulates a compelling vision of the future
 - Emphasizes the importance of having a collective sense of mission
- (2) Both exploratory and exploitative innovation (six items each) scales are adapted from Jansen *et al.* (2006). Items used are as follows.

How do you rate the innovation performance of your organization?

Explorative activities:

 - Our organization accepts demands that go beyond existing products and services
 - We invent new products and services

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- We experiment with new products and services in our local market
 - We commercialize products and services that are completely new to our organization
 - We frequently utilize new opportunities in new markets
 - Our organization regularly uses new distribution channels
- Exploitative activities:
- We frequently refine the provision of existing products and services
 - We regularly implement small adaptations to existing products and services
 - We introduce improved but existing products and services for our local market
 - We improve our provision's efficiency of products and services
 - We increase economies of scales in existing markets
 - Our organization expands services for existing clients
- (3) The supportive climate of innovation is measured with 16 items. It was developed by Scott and Bruce (1994). Items used are as follows.
- How do you rate your organization's support of innovation?
- Creativity is encouraged here
 - Our ability to function creatively is respected by the leadership
 - Around here, people are allowed to try to solve the same problems in different ways
 - The main function of members in this organization is to follow orders which come down through channels
 - Around here, a person can get in a lot of trouble by being different
 - This organization can be described as flexible and continually adapting to change
 - A person cannot do things that are too different around here without provoking anger
 - The best way to get along in this organization is to think the way the rest of the group does
 - People around here are expected to deal with problems in the same way
 - This organization is open and responsive to change
 - The people in charge around here usually get credit for others' ideas
 - In this organization, we tend to stick to tried and true ways
 - This place seems to be more concerned with the status quo than with change
 - The reward system here encourages innovation
 - This organization publicly recognizes those who are innovative
 - The reward system here benefits mainly those who do not rock the boat

About the authors

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