

## Creative Climate: A Leadership Lever for Innovation

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### ABSTRACT

The working atmosphere within an organization has an important influence on its level of innovative productivity. Organizational leaders influence innovative productivity as well as the climate for creativity and innovation. This exploratory study included 140 respondents from 103 different organizations, 31 industries, and 10 countries, all of whom completed an online survey focused on examining the intervening nature of the climate for creativity and innovation. First, those who perceived more leadership support for innovation had significantly better creative climate scores. Second, those who perceived higher levels of innovative productivity also had better climate scores. Finally, organizational climate as an intervening variable between leadership behavior and innovation was confirmed through partial correlation and mediation analysis. The findings of this study support the pivotal role that creative climate plays between leadership behavior and innovative productivity.

*Keywords:* Leadership behavior, organizational climate, creativity, innovation

### INTRODUCTION

The interest in leading and managing for creativity and innovation is growing among practitioners and academics (Byrne, Mumford, Barrett, & Vessey, 2009; Gilson, 2008; Zhou & Shalley, 2008). The purpose of this study was to focus on how leaders and managers affect innovation and creativity through their efforts to deliberately foster a work climate that supports creative thinking. This study also explored the mediating role that climate plays between leadership as an antecedent factor influencing the intervening variable of climate, which, in turn, affects innovation.

Innovation is a key factor for growth and economic development. In fact, some see organizational innovation as the most important avenue to growth (Drucker, 1985; Kelley & Littman, 2005; Tushman & O'Reilly, 1997). The

Advisory Committee on Measuring Innovation in the 21st Century Economy (2008), comprised of both leading academics and organizational leaders, collaborated on developing a definition of innovation. This committee defined innovation as “The design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm” (p. 3).

If innovation acts as a key driver for growth, then it would not be surprising that we would see a concomitant increasing interest in creativity. Although creativity and innovation are distinct constructs (Shalley & Gilson, 2004), there is an emerging consensus that creativity has to do with the generating and communicating of meaningful new ideas and connections, and innovation has more to do with the use and implementation of them (Isaksen & Treffinger, 2004). Designing, inventing, developing and/or implementing new ideas would have its foundation in the creative process (Isaksen & Tidd, 2006; Woodman, Sawyer, & Griffin, 1993), and some would assert that creativity precedes innovation (West, 2002).

Creativity is also a key focal point for global and regional economic development (Florida, 2002). The United Nations (2008) outlined the new and emerging paradigm of economic development, and the empirical finding that creative industries were among the most dynamic emerging sectors in world trade by stating:

Central to the new paradigm is the fact that creativity, knowledge, and access to information are increasingly recognized as powerful engines driving economic growth and promoting development in a globalizing world. ‘Creativity’ in this context refers to the formulation of new ideas and to the application of these ideas to produce original works of art and cultural products, functional creations, scientific inventions and technological innovations. There is thus an economic aspect to creativity, observable in the way it contributes to entrepreneurship, fosters innovation, enhances productivity and promotes economic growth. (p. 11)

Despite some well-founded concerns about the general state of the empirical literature (Tidd, 2001), overall organizational performance has been linked to organizational innovation and creativity (Capron, 1999; Irwin, Hoffman, & Lamont, 1998). Gopalakrishnan (2000), for example, found a direct link between both speed and magnitude of innovation and different measures of performance. Vincent, Bharadwaj, and Challagalla (2004) found support for the role of innovation as a mediator between competition, age, organizational resources, and financial performance. Their meta-analytic study included 134 independent samples from 83 studies conducted from 1980 through 2003. They found that innovation is significantly and positively related to superior performance and that it was a significant driver of a variety of types of organizational performance. Jansen, Van Den Bosch, and Volberda (2006) studied the effects of exploratory and exploitative innovation of 283 units within a large European financial

services firm. They found a significant relationship between exploratory innovation and organizational unit profitability.

Garcia-Morales, Llorens-Montes and Verdú-Jover (2006) studied the antecedents and consequences of organizational innovation and learning in entrepreneurship with 408 Spanish CEOs. They used multiple measures of organizational innovation that included self-report assessments by the CEOs as well as more objective financial performance data. They assessed overall organizational performance through an eight-item scale with high levels of reported validity. They tested various multiple regression models and found that both organizational innovation and learning were positively related to organizational performance. They indicated:

“This study demonstrates that the need to innovate is an essential requisite for improving organizations and making them more competitive.” (p. 34)

From a practical perspective, management surveys consistently find that most senior managers (70%) identify innovation as a key strategic priority for their organizations (Andrew, Manget, Michael, Taylor & Zabit, 2010; Barsh, Capozzi, & Davidson, 2008). Given the daunting global challenges of change, competition, and complexity, senior managers also identify creativity as the most important leadership quality in producing innovation and improving organizational performance (IBM, 2010). Given that innovation and creativity are such important issues for organizational growth and survival, it is also important to understand the role that leaders play in addressing them.

### LEADERS INFLUENCE INNOVATION

Much of the literature points to the important role that leaders play in supporting innovation. Leaders of innovation are those who exert influence and motivate others to work together collaboratively to accomplish new and useful outcomes (Vroom & Jago, 2007). Those who lead organizations influence decision-making, set priorities, and have both the power and responsibility for organizational performance. Leaders exert influence through direct decision-making and also through how their behavior is perceived and observed by others.

The literature supports the notion that leaders' behavior affects a wide variety of organizational performance outcomes (Howell & Boies, 2004; West, Borrill, Dawson, Brodbeck, Shapiro, & Howard, 2003). Studies by Thamain (1990, 1996) and McDonough (1993) found that innovative performance is strongly influenced by leadership and professional attitude. The importance of leadership's role in helping or hindering innovation and creativity has also been investigated. Shalley & Gilson (2004) reviewed the literature and identified numerous contextual factors that leaders influence at the individual, job, group, and organizational level. They concluded their review by indicating that we need to learn more about the types of contextual factors that help and hinder creative behavior. Based on another review of literature and in-depth interviews de Jong & Den Hartog (2007) identified 13 leader behaviors that encouraged both idea generation and application of those ideas in producing innovation. Some examples include: innovative

role modeling, stimulating knowledge diffusion, providing vision, showing support for innovation, and providing resources. All the leader behaviors they identified included an implicit link to the leader's role in creating a climate for creativity and organizational innovation.

Reiter-Palmon and Illies (2004) found it was unlikely that creative outcomes could be achieved without a large amount of support from organizations and organizational leaders. Thamain (2003) achieved similar results that showed a significant impact of managerial style on creativity that ultimately affected organizational innovation. The quality and nature of leader-member exchange (LMX) has also been found to influence the creativity of subordinates. Scott and Bruce (1994) studied 238 knowledge workers from 26 project teams in high-technology firms. They found a number of positive aspects of LMX including monitoring, clarifying, and consulting, but also found that the frequency of negative LMX were as high as the positive. They concluded that LMX could either enhance or undermine subordinates' sense of competence and self-determination. The critical factor determining if a behavior was perceived as positive or negative was *how* something was done, rather than *what* was done. Their findings point to the importance of leader behavior in creating the context for creativity in that how leaders' behavior is perceived is key.

Extraordinary leadership behaviors, whether examined as transformational leadership or through outstanding leadership practices (Kouzes and Posner, 1987), have been shown to affect the level of organizational innovation. Gumusluoglu and Ilsev (2007) studied 163 employees in 43 Turkish entrepreneurial software development companies to determine the effects of transformational leadership on employee creativity and organizational innovation. They found a significant positive relationship between transformational leadership and creativity. They also determined that transformational leadership had a significant effect on organizational innovation.

Bossink (2007) examined the effects of leadership style on sustainable innovation processes. He used a case study approach within the Dutch building industry and closely studied four building projects. He found that leadership style and active coordination of knowledge exchange supported innovation in building environmentally friendly projects.

Elenkov and Manev (2009) studied 153 senior managers and 695 subordinates from 27 countries within the European Union in order to examine the effects of the extraordinary leadership practices outlined by Kouzes and Posner (1987) on the adoption rates of product-market and organizational innovation. They found that these leadership practices explained a sizeable amount of the variance in the rate of adoption for both types of innovation.

Leadership behavior is clearly one of the key influencing factors affecting organizational creativity and innovation. Much of the literature points to the kinds of leadership behavior that is more likely to positively effect these types of organizational outcomes (Andriopoulos, 2001; Amabile, Schatzel, Moneta, & Kramer, 2004; Mumford & Licuanan, 2004). One of the ways leaders influence innovation

is through creating a climate that encourages creativity and the implementation of creative ideas.

### THE ROLE OF CLIMATE IN INNOVATION

For the purposes of this study, the context for our examination was the climate for innovation and leadership's role in affecting that climate. Leading for innovation and creativity is more distinct than considering leadership in a more general sense (Mumford & Licuanan, 2004).

Many different definitions have been put forward trying to capture the essence of such terms as organizational culture and climate (Schein, 2004). Denison (1996) evaluated ten years of organizational climate and culture research in order to assess and summarize the differences. As a result, he defined organizational culture as the deep structure of an organization that is rooted in the values, beliefs, and assumptions held by its members. Denison (1996) saw organizational culture as a longer-term, stable, and deep construct, whereas, he defined organizational climate as something that was more changeable, subject to direct control by leaders, and including aspects of the social environment that were consciously perceived by organizational members.

Similar to other organizational psychologists (Glisson & James, 2002; Pettigrew, 1990; Schneider & Gunnarson, 1991), Ekvall has differentiated the concepts of climate and culture. Ekvall (1991) defined climate as the observed and recurring patterns of behavior, attitudes, and feelings that characterize life in the organization. Culture reflects the deeper foundations of the organization and includes values, beliefs, deeply held assumptions, history, traditions, symbols and rituals. According to this distinction, culture provides the foundation for patterns of behavior that are more readily observed, described, and changed. These patterns of observed behavior along with many other variables help to establish the climate within the organization. Climate is what members of the organization experience, while culture reflects what the organization values.

The climate construct can be approached by different theoretical perspectives (Ekvall, 1987; Kuenzi & Schminke, 2009) and on different levels, depending on the unit of analysis and the aggregation of individual perceptions utilized (James, Choi, Ko, McNeil, Minton, Wright, & Kim, 2007; James, James, & Ashe, 1990). Psychological climate is the cognitive appraisal by an individual of environmental attributes in terms of their acquired meaning and personal value to the individual. When individual appraisals are aggregated, based on the belief that individuals in an organization have a sense of shared meaning, the results are often referred to as either team (at the group level) or organizational climate (at the social system level). As an attribute of an organization, organizational climate for innovation has been identified as a productive construct to utilize in preliminary and sustained organizational diagnosis for development or improvement efforts (Ekvall, 1987; 1996; Isaksen & Ekvall, 2007; 2010).

Organizational innovation depends on a climate that supports innovation. Ekvall (1983; 1987; 1997; 2002) has found that measures of creative climate have

significantly differentiated innovative from stagnated organizations (number of patents obtained, technical and market originality, business strategy, success in developing and launching new products and services). Mumford and Gustafson (1988) argued that even when individuals have the capability to innovate, their willingness to do so depends on the climate. In their rather extensive literature review on creativity and innovation, they summarized the importance of setting an appropriate climate and stated:

Taken as a whole, these studies suggest that a climate that facilitates innovation is one that provides a cognitive basis for idea generation and encourages the actions required for implementing these ideas while it demonstrates acceptance and recognition for the individual's creative efforts. (p. 37)

Anderson and West (1998) examined the climate for innovation at a more proximal level of analysis due to their assertion that the work group or team provides for more regular interaction and development of shared perceptions of climate. Using reports of implemented innovations in 27 hospitals over 6 months, they presented evidence that support for innovation at a team level was a significant predictor of overall innovation at the organizational level, accounting for 46% of the variance. Support for innovation was also a predictor of the relative novelty of the innovation.

Climate is influenced by numerous antecedent factors and can be conceived as an intervening variable that affects organizational and psychological processes that, in turn, affect the overall productivity and well-being of an organization (Kuenzi & Schminke, 2009). As such, climate is an important variable in understanding organizational performance and change (Koene, Vogelaar & Soeters, 2002; Schneider, Brief, & Guzzo, 1996).

Some previous research has examined the intervening nature of the climate for innovation. Hosseini, Azar, and Rostamy (2003) studied the role that workplace climate played between organizational structure, strategic posture, and external environment, as antecedent factors and middle managers' technological innovation (both process and product) as a dependent variable in 90 Iranian organizations. They applied structural equation modeling and path analysis and found that although there were significant relationships among structure, strategic posture and environment, it was the innovative climate that provided the main impetus for innovation. Although this study supported the intervening nature of climate, it did not directly address the role of leadership as a key antecedent variable.

Hsu and Fan (2010) studied 1830 Taiwanese national research center employees in order to explore the moderating role of time pressure as a climate variable. They assessed the creative environment by applying KEYS (Amabile, Conti, Coon, Lazenby, & Herron, 1996) and measured the degree of creative and innovative productivity through the use of two additional scales. They found that the organizational work environment was significantly and positively related to creative and innovative productivity. They confirmed the important roles of leadership and

work-group encouragement, availability of sufficient resources, presence of challenging work, and autonomy as stimulants; and the absence of obstacles such as organizational impediments, in creating conditions for creativity and innovation. When they tested for moderation effects of time pressure they found that creative outcomes increased when employees perceived low time pressure in a work environment that was highly supportive of creativity. When employees perceived a low level of work environment support, time pressure enhanced creative outcomes. This study confirmed that workplace environment was important in influencing the level of creativity at an individual and organizational level, and that perceptions of time pressure as a pure climate variable moderated the influence of environment on creativity and innovation. Many of the work environment stimulants and obstacles identified within KEYS are within the control of, or influenced by, leaders.

#### LEADERS INFLUENCE CLIMATE

Lewin, Lippitt and White (1939) and Litwin and Stringer (1968) were among the first to establish that leadership styles directly influence organizational climate. In these studies three simulated organizations were formed and each was appointed a leader with a different leadership style. Over time, the researchers observed that the climate in each of the three organizations changed to match the leadership style from that organization.

Leadership behavior has been shown to impact the climate for innovation within an organization (Amabile, et. al., 1996; Mumford & Gustafson, 1988; Mumford, Scott, Gaddis & Strange, 2002). In describing what senior leaders can do to manage for creativity and innovation at Pixar, Catmull (2008) asserted, "What we can do is construct an environment that nurtures trusting and respectful relationships and unleashes everyone's creativity" (p. 66).

Scott and Bruce (1994) showed that leader's behavior predicted climate for innovation within organizations. Their study showed that the higher the level of interaction between leaders and subordinates (LMX) the higher the perceived climate for innovation. Kazama, Foster, Hebl, West and Dawson (2002) confirmed these results. They studied the effects of reflexive senior leaders (those CEOs who engage in higher levels of reflection, planning, and action) within UK manufacturing companies. They found that the reflexivity of CEOs was a potent predictor of perceived climate for innovation, how non-traditional employees felt their organizations were, and the extent of changes made to organizational structure.

Ekvall and Arvonen (1984) found strong multiple correlations (ranging from .66 to .89) between leadership style variables and creative climate scales. Research done by Nyström (1990), for example, confirmed that the actions of leaders do, indeed, have an affect on the climate for innovation. Sarros, Cooper and Santora (2008) applied latent variable structural equation modeling on a sample of 1,158 Australian managers using the same measure of climate for organizational innovation as Scott and Bruce (1994). They reported that articulating vision and providing individual support, as two facets of transformational

leadership, were strongly related to organizational climate for innovation. Jung (2001) and Mumford and Gustafson (1988) have shown that leadership is one of the most important, if not *the* most important influencing factor for employee creativity and innovative performance.

In summary, innovation and creativity are important organizational outcomes. It has been shown that both leadership and climate influence organizational innovation, and that leadership influences climate. Climate was identified as an intervening variable. A few studies have examined how climate intervenes between leadership behavior and innovative outcomes. Ekvall and Ryhammer (1998; 1999) found evidence for the intervening role of organizational climate when investigating leadership style and organizational outcomes in a Swedish university. They studied the responses from 130 faculty members on a multi-dimensional measure of leadership, the Creative Climate Questionnaire (the precursor to the assessment used in this study) and two scales to assess creative productivity. After controlling for climate in their study, the direct relationship between leadership behavior and innovation approached zero for this homogeneous sample.

Jung, Chow, and Wu (2003) studied the effects of transformational leadership, empowerment, and support for innovation on multiple measures of organizational innovation. They applied structural equation modeling to the results from 32 electronics and telecommunications companies from Taiwan. They found that transformational leadership was significantly and positively related to organizational innovation and support for innovation. Both climate variables of empowerment and support for innovation were found to moderate the effects of transformational leadership on organizational innovation. They concluded:

Prior research has suggested that top managers' leadership styles can significantly impact an organization's creativity and innovative ability. A major avenue whereby this positive impact arises is held to be the establishment of an organizational climate that empowers employees and provides support for innovation. (p. 538)

Jung, Wu and Chow (2008) also reported support for the moderating effect of climate. They found that the path coefficient from CEO transformational leadership to firm innovation was higher in the high climate for innovation group of organizations than in the low climate group of 50 Taiwanese electronics and telecommunications companies.

Since leadership behavior has such an influence on climate, and climate influences innovation, this study focused on exploring the intervening nature of creative climate between leadership behavior and innovative productivity. The studies that have been conducted thus far have either focused on a single institution or industry. This study sought to explore the existence on climate's intervening nature across organizations. Previous studies have used a variety of climate assessments some of which measured broad constructs like work environment, thus including potential antecedent variables within the climate construct. This study focused on the intervening nature of climate across a variety of organiza-

tions and industries to discover whether or not the same sort of relationship could be found, and was the first to use the Situational Outlook Questionnaire as the creative climate assessment. The specific questions to be addressed included:

1. To what extent would differences in the perceived level of leadership support for innovation affect the collective assessment of the creative climate? We would hypothesize that as the level of leadership support for innovation increased, there would be a corresponding increase in the positive aspects of creative climate.
2. To what extent would differences in the perceived level of innovation within specific work units affect the collective assessment of the creative climate? We hypothesize, as the perceived level of proximal innovation increased there would be a corresponding increase in the positive aspects of creative climate.
3. To what extent would differences in the perceived level of innovative productivity within organizations affect the collective assessment of the creative climate? We would hypothesize that, as the perceived level of omnibus innovation increased there would be a corresponding increase in the positive aspects of creative climate.
4. To what extent does climate, as an intervening variable, moderate or mediate the relationship between leadership behavior and innovative productivity? We would hypothesize that creative climate should both moderate and mediate the relationship between leadership and innovation.

## METHOD

### SAMPLE

The complete data set resulted from an online questionnaire, which was made available to those who work within a variety of organizations. A database, collected by The Creative Problem Solving Group (CPSB), was used to send out 759 invitation emails informing the recipients about this study. The database of over 6,000 people was used for purposeful sampling of professionals who play various roles in managing innovation and creativity. Invitations were sent to professionals who had received training in creativity and whose job titles indicated that they held positions for which innovation was among their responsibilities. From those invited, 140 participated, which resulted in a response rate of 18.45%. This was an acceptable response rate for an e-mail survey (Sheehan, 2006). Within this sample of convenience, 103 different organizations are represented, from 31 different industries and ten different countries (Belgium, Canada, Denmark, France, Germany, The Netherlands, Spain, Tunisia, United Kingdom and United States). More than 70% of the sample had a Masters Degree (49.3%) or a Doctorate (22.9%) and approximately 25% had worked for the same company for more than 20 years. In addition, 66% had been in the same position for more than two years. The sample was also represented by many different professions; 14% of the respondents fell into the category "President/CEO/Owner", 30% were vice-

president/director/ partner, 4% were involved in other senior management roles, 17% were part of the middle management, 21% lower level management, 10% were faculty members, teachers, or professors, and 4% “other professions.” In order to help control for common method bias, participants were assured of anonymity in dealing with their results (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

## MEASURES

There are a variety of measures available to assess the climate for creativity and innovation. Mathisen and Einarsen (2004) provided a review of instruments that assess environments for creativity and innovation within organizations. Based on their criteria of focus on environments for creativity and innovation, availability of psychometric characteristics, having both commercial and research applications, and publication support, they identified The Situational Outlook Questionnaire (SOQ) to be among the five instruments that met their criteria. Hunter, Bedell and Mumford (2007) conducted a meta-analytic review of 42 published studies and concluded that standardized climate assessments evidenced sizable, non-trivial relationships with creative achievement across a number of contexts and criteria. Those studies based on well-developed, standardized measures produced substantially stronger effects than those based on locally developed measures. The SOQ was identified as one such measure.

The SOQ is the result of over 50 years of research and development, which was started by Göran Ekvall in the 1950's (Isaksen & Ekvall, 2007). Ekvall had been studying the impact of suggestion systems, training in new ways of working, and numerous other change and improvement efforts within organizations. He believed that the climate for innovation affected the impact and implementation of new procedures, skills, and ways of working. As a result he developed one of the first assessments of the creative climate. The SOQ is a translation and modification of his original work. The SOQ is an online questionnaire consisting of 53 closed-ended questions on a four-point Likert scale and three open-ended questions that were, for the purpose of this study, replaced by two open-ended questions aimed at measuring specific leadership behaviors that help and hinder in the creation of an organizational climate that supports innovation. A description and definition of each of the nine SOQ dimensions is presented in Table 1 below (along with Cronbach's alphas from the technical manual and for this sample, as well as the inter-rater reliability results).

The SOQ has been shown to have adequate levels of internal reliability and stability over time (Isaksen & Ekvall, 2007; Isaksen, Lauer & Ekvall, 1999). The SOQ has also shown a coherent internal factor structure reflecting the nine dimensions it is designed to measure (Isaksen, 2007a; Porter, 2010; Sample, 2010).

The SOQ has evidence regarding its relationship to other variables and measures. For example, the dimensions of the SOQ correlate significantly, and in expected directions, with the Survey of Creative and Innovative Performance (Puccio, Treffinger, & Talbot, 1995), an earlier version of KEYS – the Work Environment Inventory (Ryhammer, 1996), and to predict higher perceived levels of support for organizational creativity and innovation (Rasulzada & Dackert, 2009).

TABLE 1. The Creative Climate Dimensions: Description and Reliabilities.

Dimension	Definition	Cronbach's Alpha Isaksen & Ekvall (2007)	Cronbach's Alpha/ $r_{wg}$ This Sample
<b>Challenge/ Involvement</b>	The degree to which people are involved in daily operations, long-term goals, and visions. High Challenge/Involvement implies better levels of engagement, commitment, and motivation.	.86	.85 .91
<b>Freedom</b>	The degree of independence shown by the people in the organization. High levels of Freedom imply more perceived autonomy and ability for individual discretion.	.83	.90 .81
<b>Trust/ Openness</b>	The emotional safety in relationships. In high Trust/Openness situations people feel more comfortable sharing ideas and being frank and honest with each other.	.69	.77 .80
<b>Idea-Time</b>	The amount of time people can, and do, use for elaborating new ideas. When Idea-Time is high people can explore and develop new ideas that may not have been included in the original task.	.87	.92 .76
<b>Playfulness/ Humor</b>	The spontaneity and ease displayed within the workplace. Good-natured joking and laughter and a relaxed atmosphere (lower stress) are indicators of higher levels of Playfulness and Humor.	.88	.89 .84
<b>Conflict</b>	The presence of personal and emotional tensions (a negative dimension – in contrast to the debate dimension). When Conflict is high people engage in interpersonal warfare, slander and gossip, and even plot against each other.	.86	.89 .78
<b>Idea-Support</b>	The way new ideas are treated. In a high Idea-Support situation people receive ideas and suggestions in an attentive and professional manner. People listen generously to each other.	.89	.91 .82
<b>Debate</b>	The occurrence and open disagreement between viewpoints, ideas, experiences, and knowledge. In the Debating situation many different voices and points of view are exchanged and encouraged.	.88	.88 .89
<b>Risk-Taking</b>	The tolerance of uncertainty and ambiguity. In a high Risk-Taking climate people can make decisions even when they do not have certainty and all the information desired. People can and do “go out on a limb” to put new ideas forward.	.79	.86 .81

The SOQ has shown positive relationships to a number of outcome variables including: higher sales volume, market share, productivity and profitability, reported greater impact from implementing new social and technical systems (like self-managed teams), and improved ability to implement more complex work designs (Firenze, 1998). Davis (2000) conducted a global innovation survey including 500 companies from seven countries. He examined the factors that separated the top and bottom 20% in terms of turnover from new products and services introduced within the previous five years. He found that those organizations with better climates assessed by the SOQ had higher levels of growth in market capitalization, revenues, and profitability.

The dimensions of the SOQ have been able to discriminate between best and worst-case work environments (Isaksen, Lauer, Ekvall, & Britz, 2001), most and least creative teams (Isaksen & Lauer, 2002), and levels of perceived support for innovation (Isaksen & Lauer, 2001). The SOQ has also been shown to discriminate climates that are more stress free and have higher levels of job satisfaction (Ślusarczyk, 2005; Talbot, Cooper & Barrow, 1992; Turnipseed, 1994).

The SOQ has also been linked to improved well-being within the healthcare industry. Brink and Embretsson (2002) examined the construct of psychological well-being and mental health and found clear evidence that those in more creative climates had greater feelings of enthusiasm and contentment as opposed to anxiety and depression. Along similar lines, Norbergh, Sandman, and Asplun (2002) found that patients spent more and better quality time with staff in those geriatric residential facilities with more creative climates leading to improved well-being. Finally, Erickson (2010) studied differences in climate for creativity between magnet and non-magnet VA hospitals. The magnet hospital had earned the designation allowing greater empowerment and autonomy within the larger system. She found significant differences in favor of the magnet hospital on numerous dimensions of creative climate.

For the purposes of this study, the SOQ was modified to include three additional questions to assess leadership and innovation. Proximal Innovation was assessed by a closed-ended question: *We are successful in implementing new ideas to obtain results in my work unit* (labeled as “Proximal Innovation – PI” in this study). The aim of this question was to assess the level of success with innovation within the more immediate working climate.

Omnibus Innovation was assessed by a closed-ended question: *In general, my organization has been successful at innovation* (labeled as “Omnibus Innovation – OI” in this study). The aim of this question was to anchor the distal perceptions of the respondents regarding the overall level of innovation success of their organization.

Leadership in support of innovation was assessed by a closed-ended question: *Leaders and managers I observe are effective in creating an environment that supports innovation* (labeled as “Leadership in support of innovation – LSI” in this study). The purpose of this question was to anchor the degree to which respondents believed the leaders they were directly able to observe were effective in their climate creation for innovation efforts.

These types of questions have been successfully applied as sorting variables in earlier research (Isaksen & Lauer, 2001). Responses were scored on a four point Likert-type scale, in a manner consistent with the other 53 closed-ended questions. When respondents completed the online survey, the data were compiled and subjected to a variety of statistical techniques.

## RESULTS

The descriptive statistics for this sample are presented below in Table 2. Correlations were also computed amongst all variables and these are also presented below. Finally, correlations were computed for overall climate (by aggregating all dimensional scores and reversing the scores for the Conflict dimension) with each of the three additional questions. Overall climate scores significantly correlate with Leadership for Support of Innovation ( $r = .69, p < .01$ ), Proximal Innovation ( $r = .61, p < .01$ ), and Omnibus (distal) Innovation ( $r = .60, p < .01$ ). These correlations illustrate quite clearly the relationship among climate, leadership, and innovative productivity at the proximal (work unit) and distal (organizational) levels.

TABLE 2. Descriptive Statistics and Correlations (N = 140).

SOQ Dimensions	Mean	Range	SD	<i>r</i> with LSI	<i>r</i> with PI	<i>r</i> with OI
Challenge/Involvement	228.33	71-300	51.06	.55*	.58*	.48*
Freedom	197.84	0-300	69.50	.41*	.39*	.44*
Trust/Openness	191.43	40-300	60.08	.52*	.48*	.45*
Idea-Time	167.15	0-300	75.94	.49*	.45*	.50*
Playfulness/Humor	193.22	17-300	65.65	.51*	.52*	.45*
Conflict	87.53	0-300	70.87	-.52*	-.43*	-.34*
Idea-Support	196.57	20-300	69.61	.69*	.58*	.58*
Debate	213.80	33-300	57.42	.37*	.32*	.39*
Risk-Taking	167.71	20-300	65.90	.59*	.50*	.58*
Leadership in Support of Innovation	1.79	0-3	0.92	1.00	.58*	.63*
Proximal Innovation	2.00	0-3	0.82		1.00	.71*
Omnibus Innovation	1.93	0-3	0.84			1.00

\* $p < .01$

In order to investigate if the perceived effectiveness of leaders' ability to support innovation (LSI) had a significant interaction effect on the perceived organizational climate, a one-way analysis of variance (ANOVA), presented in Table 3, was computed using the LSI-question as the sorting factor, and the nine SOQ dimensions as dependent factors. This analysis was conducted by using the four-point scale to categorize the results and create four groupings of aggregated climate perceptions thereby also assessing the discriminating power of the SOQ.

Before conducting the one-way ANOVA, a nine (number of SOQ dimensions) by four (number of response possibilities for LSI) MANOVA was applied in order to reduce the likelihood of a Type I error when examining the differences in the means. For this sample, there was a significant interaction, Wilks'  $\Lambda = .401$ ,  $F(27, 374.47) = 5.103$ ,  $p < .0001$ . The means, standard deviations,  $r_{wg}$  values, and  $F$ -values, are presented in Table 3 below.

TABLE 3. Analysis of Variance — SOQ dimensions and Leadership in Support of Innovation.

SOQ Dimensions	ANOVA	Leadership In Support of Innovation								
		Not at all effective (n = 12)		Effective to some extent (n = 40)		Fairly effective (n = 53)		Effective to a high degree (n = 35)		Power
	F Value	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	$\eta^2$
Challenge/Involvement	20.382**	165	.812 (60)	205	.910 (50)	239	.943 (39)	260	.964 (32)	.074
Freedom	9.439**	144	.718 (91)	171	.817 (69)	206	.889 (58)	235	.922 (54)	.076
Trust/Openness	17.179**	130	.845 (41)	166	.818 (53)	197	.844 (54)	234	.866 (50)	.090
Idea-Time	14.333**	100	.805 (67)	135	.818 (67)	172	.862 (61)	220	.787 (74)	.126
Playfulness/Humor	16.290**	136	.823 (56)	161	.842 (68)	199	.877 (55)	240	.925 (46)	.104
Conflict	18.333**	174	.704 (76)	120	.792 (67)	69	.840 (60)	50	.927 (45)	.132
Idea-Support	41.767**	100	.844 (53)	151	.879 (58)	216	.912 (51)	252	.941 (41)	.212
Debate	7.335**	178	.770 (69)	193	.907 (56)	218	.912 (50)	243	.921 (52)	.042
Risk-Taking	25.992**	95	.868 (33)	127	.884 (60)	185	.885 (52)	213	.879 (53)	.144

\*\*  $p < .001$

The univariate  $F$  test (ANOVA) was then conducted between all four LSI response categories. All nine SOQ dimensions showed significant differences across and between the four categories, and in the expected directions. The SOQ means of the people who indicated that their leader was “*not at all effective*”, “*effective to some extent*”, “*fairly effective*” and “*effective to a high degree*” in creating a climate that supports innovation are significantly different from each other; and the more effective the leader, the better the climate scores.

Since the data were aggregated from a wide variety of organizations, and across different industries and levels of hierarchy, a test of inter-rater reliability (IRR) was conducted to assess the degree to which climate could be considered a meaningful and shared socio-psychological variable (Patterson, Payne & West, 1996). This was done to ensure that the measure consistently tapped shared climate perceptions within each category of response, rather than aggregating radically different individual perceptions. IRR was computed based on the formula of James, Demaree and Wolf (1993) in order to determine the level of agreement was sufficient amongst the different respondents. According to James, et. al. (1993) it is helpful to have an index of IRR when scores on a variable consist of means taken over items that are indicators of the same construct. The term IRR is used here to refer to the degree to which judges are “*interchangeable*”, which is to say the extent to which judges “*agree*” on a set of judgments (Schrouf & Fleiss, 1979). Examining the level of agreement allows for improved validity of aggregated climate scores (Joyce & Slocum, 1984).

Initially, James, Demaree and Wolf (1984) described this statistic as a reliability measure. After several critiques and debates (Schmidt & Hunter, 1989; James et al., 1993), it has been accepted that  $r_{wg}$  is a measure of agreement (Kozlowski & Hattrup, 1992). It is also generally agreed that  $r_{wg}$  at or above 0.70 represents an acceptable convergence (George, 1990; Judge & de Bono, 2000). Zohar (2000) cited  $r_{wg}$  values in the .70’s and mid .80’s as support for judgments being sufficiently homogeneous for within-group aggregation. All 108 values were computed to include each comparison and 105 were sufficiently homogeneous for aggregation. The three that failed to meet the standard had very small sample sizes. All IRR values ( $r_{wg}$ ) computed on the ANOVA results are included in Tables 3, 4, and 5. Further, the  $r_{wg}$  values for the entire sample were computed and included in Table 1. All the IRR values for the nine dimensions were well above .70, providing support for aggregation.

In addition to reporting test of significance, and due to the nature and size of the sample power statistics were computed (Ellis, 2010). Eta squared ( $\eta^2$ ) was computed according to guidelines provided by Pierce, Block and Aguinis (2004) and Olejnik and Algina (2003) to test for power and size of effect. For Leadership in Support of Innovation, most of the estimates of effect size have a moderate ( $\geq .06$ ) effect. Idea-Support had a strong effect ( $\geq .15$ ) and Debate resulted in a weak effect size (Cohen, 1992).

The same statistical procedure was used for investigating the difference in SOQ’s dimensional means across the four different response categories for

Proximal Innovation (innovation at the work-unit level measured by the PI-question). As presented in Table 4, the means indicated that the scores on all the positive SOQ dimensions increased (and decreased for the negative dimension *conflict*) as respondents perceived their work-unit to be more innovative (Proximal Innovation). To determine if the differences were statistically significant between the four response groups, first a one-way multivariate analysis of variance (MANOVA) was carried out (Wilks'  $\Lambda = .458, F(27, 374.47) = 4.247, p < .0001$ ). The subsequent one-way analysis of variance (ANOVA) showed that the effects were statistically significant for all nine SOQ dimensions, meaning that respondents who reported higher levels of innovative productivity at the work-unit level had significantly better scores on all the SOQ dimensions.

For Proximal Innovation, most of the estimates of effect size have a moderate ( $\geq .06$ ) effect. Idea-Support had a strong effect ( $\geq .15$ ) and Debate resulted in a relatively weak effect size.

TABLE 4. Analysis of Variance – SOQ dimensions and Proximal Innovation.

SOQ Dimensions	ANOVA	Proximal Innovation								
		Not at all successful (n = 4)		Successful to some extent (n = 35)		Fairly successful (n = 58)		Successful to a high degree (n = 43)		Power
		F Value	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)
Challenge/Involvement	24.253**	146	.770 (69)	201	.905 (48)	221	.928 (44)	269	.970 (28)	.099
Freedom	10.054**	188	.828 (80)	153	.865 (64)	200	.835 (66)	233	.904 (59)	.095
Trust/Openness	14.844**	130	.904 (20)	164	.836 (49)	181	.812 (57)	233	.859 (51)	.096
Idea-Time	11.853**	88	.776 (80)	130	.836 (58)	162	.817 (70)	213	.792 (73)	.129
Playfulness/Humor	17.630**	113	.896 (9)	156	.862 (62)	187	.851 (61)	239	.920 (46)	.131
Conflict	10.925**	175	.0* (117)	116	.814 (68)	95	.740 (70)	46	.925 (44)	.106
Idea-Support	23.064**	95	.864 (44)	148	.880 (56)	197	.857 (63)	246	.917 (50)	.117
Debate	6.529**	209	.923 (42)	190	.896 (53)	207	.897 (59)	243	.917 (49)	.045
Risk-Taking	15.976**	110	.894 (26)	129	.881 (50)	162	.813 (65)	213	.873 (54)	.122

\* James et al. (1984) recommended replacing a negative value by zero.

\*\*  $p < .001$

Finally, the same statistical techniques were applied to investigating the difference in SOQ mean across the four different response possibilities for Omnibus Innovation (innovation at the organizational level, measured by the OI-question). After computing a one-way multivariate analysis of variance (MANOVA), Wilks'  $\Lambda = .513$ ,  $F(27, 374.47) = 3.565$ ,  $p < .0001$ , a one-way ANOVA was carried out using the OI-question as the sorting factor, and the nine SOQ dimensions as dependent factors.

TABLE 5. Analysis of Variance — SOQ dimensions and Omnibus Innovation.

SOQ Dimensions	ANOVA	Omnibus Innovation								
		Not at all successful (n = 4)		Successful to some extent (n = 42)		Fairly successful (n = 54)		Successful to a high degree (n = 40)		Power
	F Value	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	Mean	$r_{wg}$ (SD)	$\eta^2$
Challenge/Involvement	14.774**	204	.697 (79)	200	.898 (54)	226	.926 (43)	264	.964 (31)	.071
Freedom	11.671**	171	.0* (120)	158	.901 (49)	201	.846 (69)	238	.894 (60)	.109
Trust/Openness	13.663**	130	.797 (60)	169	.840 (51)	182	.808 (56)	235	.858 (50)	.092
Idea-Time	15.197**	59	.730 (75)	128	.892 (52)	170	.819 (67)	215	.761 (77)	.160
Playfulness/Humor	11.717**	154	.0* (97)	159	.871 (60)	192	.855 (62)	235	.903 (50)	.098
Conflict	6.257**	167	.632 (83)	108	.803 (69)	90	.752 (74)	55	.881 (52)	.067
Idea-Support	23.514**	110	.759 (62)	150	.885 (57)	201	.878 (58)	248	.901 (55)	.183
Debate	8.548**	175	.120 (101)	190	.902 (57)	210	.922 (45)	247	.905 (54)	.058
Risk-Taking	22.900**	100	.914 (33)	124	.881 (52)	169	.862 (57)	219	.852 (54)	.161

\* James et al. (1984) recommended replacing a negative value by zero.

\*\*  $p < .001$

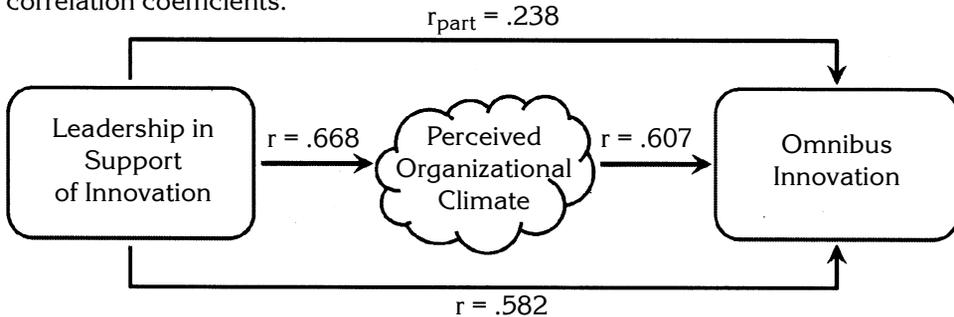
As presented in Table 5, the ANOVA showed that the effect of perceived Omnibus Innovation on organizational climate was statistically significant, meaning that respondents who perceived higher levels of innovative productivity at the organizational level had significantly better scores on all SOQ dimensions. For Omnibus Innovation, most of the estimates of effect size have a moderate ( $\geq .06$ ) effect. Idea-Support and Risk-Taking had a strong effect size ( $\geq .15$ ).

By examining the differences in shared perceptions of the creative climate using the three sorting variables of Leadership Support for Innovation, level of Proximal Innovation, and level of Omnibus Innovation, we did find significant differences and interaction. Consistent with previous research using other measures and samples, organizational climate is playing a clear role and is influenced by both leadership and innovation. Further, since the minimum evidence for differences across groups is an *F* ratio from an ANOVA greater than 1.00 (Hays, 1981), and all such ratios across all three dependent measures clearly exceeded that number, the results support the relationships among leadership, climate, and innovation and the ability of the SOQ to discriminate these differences.

Since a single self-report measure was used for all variables, Harmon’s Single Factor Test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) was performed to assess the extent to which the results were affected by common method variance (CMV). A principal component analysis was performed using Promax with Kaiser Normalization as the rotation method. This resulted in 10 factors with Eigenvalues over 1.0 accounting for 70.98% of the total variance. The first factor had an Eigenvalue of 21.53 and explained 39.14% of the variance. It contained 11 items, 6 of which were derived from the Idea-Time scale of the SOQ, and loaded most heavily on that factor. The remaining five items were drawn from two other climate dimensions that co-loaded on their respective factors. Since a single dominant factor was not found, the evidence supported a lack of CMV (Malhotra, Kim, & Patil, 2006). Further, the three additional questions added to the SOQ coalesced on the ninth factor, providing additional support that the results were not impacted by CMV.

**Partial Correlation Analysis**

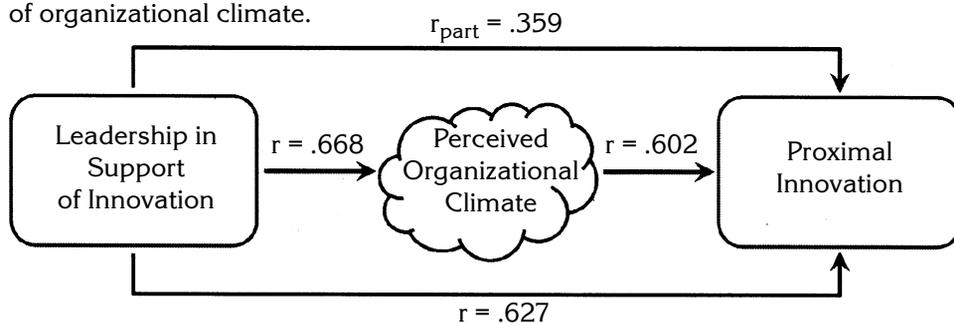
In order to determine if organizational climate plays an intervening role between leadership behavior and innovative productivity, partial correlations were computed. Correlations between Leadership in Support of Innovation (LSI), organizational climate and Proximal Innovation (PI) established the linear relationship among all three constructs. Partial correlations ( $r_{part}$ ) between LSI and PI, with organizational climate constant, were then calculated in order to establish pure relations between LSI and PI. Figures 1 and 2 graphically present the correlation coefficients.



All correlations are significant at  $p < .01$  (2-tailed)

FIGURE 1. Correlations and partial correlation between LSI, Climate and PI.

Figure 1 shows that there is a significant and meaningful correlation between LSI and PI. However, when the influence of organizational climate is removed, a decrease in the strength of the relationship occurred. These results indicate that leadership effectiveness influences innovative productivity, in part, through organizational climate. This finding supports the moderating and intervening nature of organizational climate.



All correlations are significant at  $p < .01$  (2-tailed)

FIGURE 2. Correlations and partial correlation between LSI, Climate and OI.

Overall, the same finding was observed from the results displayed in Figure 2. The correlation analysis revealed that there is a significant relationship between LSI and Omnibus Innovation (OI). However, when the influence of organizational climate was removed, a decrease in the strength of the relationship occurred (from .627 to .359). These results also indicate that LSI influences innovative productivity through organizational climate, which again underscores the moderating character of organizational climate.

Although the direct correlation between LSI and OI appeared to be stronger than the direct relationship between LSI and PI, the moderating effect of climate was stronger for proximal innovation. This was consistent with the findings of Kozlowski and Doherty (1989) who pointed out that decisions made at higher levels are likely to be mediated by local leadership behavior. These outcomes clearly support the proposition that organizational climate is a moderating variable between leadership behavior and innovative productivity (at the work unit level and the organizational level).

### Mediation Analysis

A mediation analysis was also carried out using the methodology recommended by Eckenrode, Rowe, Laird, and Brathwaite (1995) in order to assess if organizational climate mediates the relationship between LSI and PI, and LSI and OI. Baron and Kenny (1986) suggested that since most areas of psychology have multiple causes, a more realistic goal is to seek mediators that significantly reduce the relationship between the predictor and dependent measure. In the event of partial mediation, both MacKinnon and Dwyer (1993) and Schrouf and Bolger (2002) recommended estimating the extent of mediation by calculating the percentage of the total effect that is mediated. The level of statistical significance of the mediation was calculated using the Sobel test (Preacher & Leonardelli, 2001).

The analysis indicated that organizational climate partially mediates the relationship between LSI and PI (from  $\beta = 36.811$  to  $\beta = 0.006$ ; Sobel test,  $z = 4.16$ ,  $p < 0.001$ ), and the relationship between LSI and OI (from  $\beta = 36.811$  to  $\beta = 0.005$ ; Sobel test,  $z = 3.66$ ,  $p < 0.001$ ). In terms of the total effect mediated, 45.28% of the relationship between LSI and PI was mediated by organizational climate, and 35.20% of the relationship between LSI and OI.

Mathisen, Mykletun, and Einarsen (2007) conducted a mediation analysis within the food service industry. They examined the creativity and personality of leaders, the creative climate using West's Team Climate Inventory (Anderson & West, 1998), and both internal and external evaluations of creativity from 39 Norwegian restaurants including 175 employees and their supervisors. They found strong relationships between leader creativity level and all creative climate variables, but not organizational creativity. They applied hierarchical regression and found that climate fully or partially mediated between leader creativity level and organizational creativity. The present study examined multiple organizations across a variety of industries and obtained somewhat similar results using an assessment of organizational, rather than team-level, climate.

## DISCUSSION

One of the main questions guiding this study was examining the extent to which differences in the perceived level of leadership support for innovation would affect the climate. Consistent with previous findings in the literature, clear evidence was found to support this relationship. Not only were leadership and climate correlated, significant and meaningful differences were observed across all four categories of the responses for different levels of leadership support.

Another major question for this study was whether or not differences in perceived level of innovation within the proximal work unit would affect the perceptions of the climate for innovation and creativity. Again, consistent with earlier findings in the literature, clear evidence was found to support this relationship. Significant and meaningful climate differences were observed across the categories reflecting different levels of innovation at the proximal level.

A related question was whether or not differences in perceived levels of innovation at the omnibus or organizational level would affect the perceptions of climate for innovation and creativity. Clear evidence was found to support this relationship through correlation analysis and through examination of the four aggregated differences in the degree of distal innovation.

Although the levels of innovation at the proximal and omnibus levels were able to significantly discriminate the creative climate, it was still unclear if innovation affected the climate, or if the differences in climate affected the level of innovation.

The final question guiding this inquiry related to deepening our understanding of climate as an intervening variable between leadership and innovation. Partial correlation analysis revealed that when climate results were controlled, the direct relationship between leadership and innovation decreased for both proximal and

omnibus innovation. Climate also partially mediates the relationship between Leadership in Support of Innovation and both Proximal and Omnibus Innovation.

The results from this study confirmed that leadership does, in fact, play a very important role in creating an organizational climate that supports innovation. Those who work within organizations and see their leaders as more effective perceive a better climate for innovation. Those who report higher degrees of innovative productivity, at both a proximal and distal level, also see their climates more positively. These results are consistent with the findings of Tierney and Farmer (2004) who concluded that when employees see that their leaders are supportive of creativity, there is a corresponding positive effect on creative behavior. A conclusion that can be drawn from the partial correlations and mediation analysis is that leaders affect innovation, in part, by creating the climate for it. These results confirm that climate intervenes as a moderator and partial mediator between leadership behavior and innovation.

A practical implication of these findings is that leaders who need to obtain innovative results should include a focus on deliberately creating a climate for innovation, in addition to many of the other factors identified in the literature. Of course, this implication raises an issue that must be addressed by future research. Since leadership is such an influential factor in creating the climate for innovation, future inquiry should focus on identifying specific leadership behaviors that help and hinder climate creation. Numerous case studies provide some indication regarding the types of leader behavior that support innovation (Isaksen, 2007b). Following the advice from Hunter, Bedell-Avers, and Mumford (2007), this examination should include both positive and negative leadership behaviors. Perhaps this can be best accomplished by taking a more qualitative and exploratory approach at first, along the lines of Amabile, Schatzel, Moneta, and Kramer (2004).

The nature of this study required the use of a self-report survey approach (Brannick, Chan, Conway, Lance, & Spector, 2010) and some measures were taken to reduce the likelihood of method bias. Further research into this line of inquiry needs to include multiple objective measures of leadership behavior and innovative productivity from independent sources. Longitudinal approaches that move beyond the “snapshot” of a single point in time should also be pursued.

Additional research should be conducted considering improved sample size and construction. This study included a sample of convenience and there was uneven spread across cells of the analysis. Further research should include larger and more representative samples, and focus either on a series of within-industry samples, or sufficient samples across industries.

Those who choose to lead for innovation would do well to consider that they obtain innovative results, in large part, through climate creation. People being led toward innovation pay close attention to leader behavior — both *what* they do and *how* they do it. Those who lead and manage organizations can benefit from the insight that the climate for creativity serves as a key lever in obtaining innovative results.

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#### ACKNOWLEDGEMENTS

The authors would like to thank Wouter Aerts and Erik Isaksen for their assistance with this study.