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Impact of leadership style on innovation: a study of retired military senior officers in executive-level supervisory roles within the high-technology engineering defense industry

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IMPACT OF LEADERSHIP STYLE ON INNOVATION: A STUDY OF RETIRED MILITARY SENIOR OFFICERS IN EXECUTIVE-LEVEL SUPERVISORY ROLES WITHIN THE HIGH-TECHNOLOGY ENGINEERING DEFENSE INDUSTRY

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VITA

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ABSTRACT

This study examined the relationship between leadership style and past military rank, and how these might impact an organization's innovation climate. The sample consisted of (a) retired U.S. Army senior officers currently employed as executive-level supervisors in the high-technology engineering defense industry and (b) those working under such supervisors. Two leadership styles investigated in this study are transactional and transformational, the former defined by incentive structures based on pay and promotion according to performance, and the latter defined by charisma, inspiration, intellectual stimulation, and individualized consideration. Although these are not mutually exclusive styles, they are conceptually distinct operating modes. The former emphasizes hierarchy, while the latter emphasizes egalitarian relations. The hypothesis was that leaders with military background might habitually operate in transactional style, characteristic of hierarchical organizations where functionality benefits from conformity and lack of dissent as fundamental elements that enhance a high level of coordination. Conversely, research suggests that for-profit engineering-related businesses should benefit from innovation-enhancing characteristics linked with transformational leadership.

Quantitative data was gathered through self-report Likert-scale measures accessed online: the Multifactor Leadership Questionnaire (MLQ) with subscales as independent variables and the Workplace Innovation Scale's innovation climate subscale as a dependent variable. Rank as an independent variable was defined by dividing supervisor-group respondents into two comparison groups, an upper and lower tier. Supervisors and subordinates reported on their own or their supervisor's leadership style, respectively, and innovation climate. The study aimed primarily to detect correlations between (a) MLQ scores and innovation climate and (b) past rank of supervisors and innovation climate.

Chapter 1: Introduction

Background

It is a common practice for high-technology defense contracting firms to hire high-ranking U.S. Army retirees. According to T. DiRienzo (personal communication, March 30, 2013), many retired army officers have a significant amount of institutional knowledge regarding critical national security defense systems. They also have established relationships with the key program personnel associated with these systems. The intent in hiring a retired senior army officer who has spent his or her final years in military service, as a key player in a significant defense program, is to better position the defense contractor to leverage the officer's program familiarity, institutional knowledge, and relationship network to gain a competitive advantage (T. DiRienzo, personal communication, March 30, 2013).

Ordinarily, higher-ranking retired officers enjoy a continued fraternal respect from the organizations and people whom they used to command while in the military, despite their departure from military service. Generally, the rank of the retiree positively correlates with his or her level of continued acceptance as a military insider, even after retirement (R. Amos, personal communication, March 30, 2013). This information was received from the deputy commander of the army Aviation and

Missile Command who served in the U.S. Army's Civilian Senior Leader Management Office. As a result of the acceptance of these persons as military insiders, for defense contracting organizations, high-ranking senior military officers are particularly attractive as potential executive-level hires immediately after they retire from military service (Clark, 2011).

Due to this demand, the Department of Defense restricts, by regulation, a recently retired senior officer from functioning in any role that provides a defense contractor undue advantages. Additionally, this cooling off period is intended to diminish the possibility of senior military officers from setting up self-benefitting arrangements prior to their departure from military service. This constraint takes effect immediately after the senior army officer’s retirement and varies in length, depending on the case. However, regardless of the regulatory mandates that prevent retired senior army officers from immediately capitalizing on their institutional knowledge, relationship network, and perceived residual authority, their capacity to leverage these strengths remains intact (although to a lesser degree as time elapses), even after the legal so-called cooling off period expires (Clark, 2011).

While this constraint, as intended, does diminish the retired senior army officer’s transferable value to the defense

contracting organization, it does not totally eliminate the applicable value of a retired senior military officer. Particularly in business development roles, the executive compensation associated with having a retired senior army officer on staff remains a strong value proposition (Clark, 2011). At first glance, as a human asset their relatively high cost to the organization is substantially offset by the additional revenues they are able to generate as a result of their role in the organization as business developers. On the other hand, there are some potential downsides, as discussed in Chapter 2.

In brief, one downside is that the emphasis in military training has typically been authoritarian leadership, which typically has a transactional incentive structure, such as pay and promotion based on exact adherence to command (Rudner, 2007, para. 7). The benefits of and the need for transformational leadership are becoming a more frequent topic of discussion within the military (Grothe, 2009; Huse, 2003; Rickard, 2013; Roseman, 2014; Rudnick, 2007). The interest in promoting a shift of leadership style leads to the problem addressed in the present study.

Statement of the Problem

While in service, senior military officers hold a disproportionate amount of power in relation to the balance of

the people in the organizations they command. They are accustomed to receiving immediate response from large masses of people without their judgment being questioned (Amos, 2013). There is an operant conditioning effect that reinforces their expectation of having progressively larger amounts of immediate and uncontested support for virtually any initiative they pursue (Komaki, Minnich, Grotto, Weinshank, & Kern, 2011). Many of these senior army officers increasingly develop confidence in their own thinking and judgment to the exclusion of seeking additional inputs. Additionally, according to Ulmer, the commonly accepted authoritative (i.e., hierarchical) leadership style used on the battlefield receives broad support as widely applicable and the most appropriate leadership style for military operations (Ulmer, 1998), and some of the military leadership style transfers to subsequent civilian work, as was found in a case study of two retired leaders in the field of education (Riegling, 2008).

According to Ulmer (1998), many years of contemplating and exercising authoritative leadership, as it pertains to battle scenarios, reinforces the military commander's reliance on his own thinking, often to the exclusion of inputs from the balance of the people in his organization. It is suspected that after 20 to 40 years of reinforced military-specific leadership, the authoritative leadership style remains as the military officer's

predominant leadership style. While this assertion seems blatantly obvious to some, it rests in the realm of conjecture with opportunities for confirmation through a disciplined study. These unconfirmed notions extend to beliefs that retired army senior officers who function with a predominant authoritative and transactional leadership style decrease the contributing factors that enable an organizational innovation climate to flourish and moves the level of employees' engagement in the innovation process to a diminished state (T. DiRienzo, personal communication, March 30, 2013). (This information was received from a retired army colonel who was the project manager for the installation of the X-Band Radar at Kwajalein Island Missile Range in the Pacific.)

According to Somech (2006), this transactional leadership style can degrade the innovation that might otherwise stem from the organization's workforce and consequently degrade the organization's competitive posture.

Despite these commonly accepted notions, prior to the present study, research remained to be conducted to substantiate whether there is a predominance of a common set of leadership characteristics among retired senior army officers who serve or have served in supervisor roles within high-technology engineering defense contracting firms. In addition, the

literature unequivocally points to leadership as a factor that impacts the organizational climate of innovation.

Purpose of the Study

The purposes of this quantitative study were to examine (a) the relationship between the leadership characteristics of retired senior army officers functioning (or who have functioned) in executive-level supervisor roles within the high-technology engineering defense industry and (b) the characteristics required to optimize an organizational climate of innovation, as revealed in the theoretical framework established by the preeminent innovation and leadership literature.

The present study used the definition of innovative climate provided by Charbonnier et al. (2010), where an organization provides followers an environment in which they are encouraged to independently develop ideas and collaborate with team members to synthesize multiple perspectives for larger collective creativity, a place where employees are exposed to "norms and practices that encourage flexibility and the expression of ideas and learning" (p. 701).

The study quantitatively examined--through the steps of surveying, data collecting, and statistical analysis--the impact of applied leadership on the organizational innovation climate. The study examined the predominant leadership style of the

subjects revealed through the Multifactor Leadership Questionnaire (assessing only for transactional and transformational styles).

The study also surveyed the perceptions of the studied leader-group by sampling followers who work or have worked within organizations that were led by retired army senior officers who are serving or have served in the high-technology engineering defense industry. The results revealed in both modified MLQs (leader-group and follower-group) were examined for congruency and used to infer the degree of alignment that the studied leader-group has with the characteristics identified in the literature which support an innovation climate.

Research Questions

Hypothesis testing was used to determine whether there was adequate statistical significance to justify rejection of the null hypotheses associated with each of the research questions. The null and alternative hypotheses are detailed in Chapter 3 for the study's research questions (RQ).

RQ 1. What are the demographic characteristics of the sample of retired military senior officers in executive-level supervisory roles within the high-technology engineering defense industry?

RQ 2. According to the retired army senior officers' self-report, is there a predominant leadership style (either

transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

RQ 3. According to the retired army senior officers' self-report, when this sample is divided into higher and lower rank at the time of army retirement, is there a difference between the upper and lower rank subgroups in predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

RQ 4. According to the subordinate group, is there a predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

RQ 5. According to the retired army senior officers' self-report, what is the relationship between the leadership style and innovation climate? This question was answered by responses to the MLQ and the innovation climate subscale of the Workplace Innovation Scale.

RQ 6. According to the subordinates' report, what is the relationship between the leadership style and innovation climate? This question was answered by responses to the MLQ and

the innovation climate subscale of the Workplace Innovation Scale.

RQ 7. Is there a difference between the supervisors' responses and subordinates' responses regarding innovation climate? This question was answered comparing the groups' responses to the innovation climate subscale of the Workplace Innovation Scale.

RQ 8. Is there a difference between the supervisors' self-ratings and the subordinates' ratings of their supervisors on the MLQ?

Importance of Topic

Within the construct of classical economics and Adam Smith's (2010) theory supporting rational self-interest, which drives mutual value exchange in a free market, is a tenet that supports organizational survival of the fittest. Organizations survive and thrive in a free market to the degree that they find new ways to achieve competitive advantage. In many cases, there is certainly critical value in protecting the long-term traditional state of a product, where variance from its original state is intentionally minimized throughout its lifecycle, such as for brand name food and beverages. However, the practice of actively seeking competitive advantage through innovation is more the rule than the exception in technology-oriented organizations. If organizational leadership confines the

potential of the organization to innovate to the extent of an executive-level supervisor's limitations—-or conversely, if organizational leadership can propel innovation to new heights—-then an organized, structured, and disciplined study of the leadership characteristics of retired army senior officers in the high-technology engineering defense industry becomes a study of paramount importance for those organizations that are committed to function, as an ongoing concern, within the high-technology engineering defense industry. In addition, the military itself has seen the need to adapt to global economic and technology changes by including in its training transformational leadership (Huse, 2003). The results of this study have potential to aid in confirming or dispelling this position.

Innovation can help organizations, including those in the national defense industry, as constantly changing environments impose unprecedented challenges that demand innovation as a core competency for the sake of survival and organizational growth (Choi & Chang, 2009; Frese, Anderson, Erez, & Farr 2009; Hansen & Levine, 2009).

Although the need for adaptation is increasingly recognized, the military is steeped in tradition and slow to change. Much research is needed to convince policy-makers to

favor leadership strategies that counter the traditional hierarchical and largely transactional approach.

Limitations

This study was limited in its focus to the examination of retired senior army officers functioning in executive-level supervisor roles within the high-technology engineering defense industry. It sought to identify, through the use of inferential statistics, whether the leadership characteristics of the studied group align with the innovation climate-supporting leadership characteristics revealed in the literature. Further uses of these findings would be to infer the probability of innovation within the organizations that the sample participants work for. This required that the study sample be of sufficient size to generalize successfully to the population and ensure that the collected data was normally distributed. This consideration is addressed in more detail in Chapter 3.

While the use of the Multifactor Leadership Questionnaire (MLQ) has been repeatedly validated as an instrument to reveal both transactional and transformational leadership propensities (Avolio et al., 1999), this study was intentionally narrow and focused. It was not part of the research questions to address the important role of leadership practices in the implementation phases that move innovation beyond concept and into tangible products or deliverable services. This study was restricted to

the investigation of leadership practices that influence idea generation, what Somech and Drach-Zahary (2013) call the "creativity phase" (p. 686), the part of innovation that foundationally serves as the genesis of new products and services.

Delimitations

Although the results of the study may be somewhat applicable to other branches of the U.S. military, the present study mainly involves retired army officers. This was simply a result of the army affiliation of the researcher, which was useful in gaining trust that fostered willingness to participate in the study as well as, presumably, more honesty and less guardedness during the recruitment process, allowing for more complete understanding of the studied topic. The literature review includes studies of other branches of the U.S. military, as there are many common elements within the cultures, across the branches. However, the literature review does not include studies of leadership or military culture of other nations, as we cannot assume that the culture would be similar enough to inform a study of U.S. for-profit or international military leadership.

The framework provided only for an examination of transformational and transactional leadership, not the ambidextrous combination of the two. Neither were passive or

laissez-faire leadership styles addressed. Additionally, the framework supports the examination of only innovation climate, not other known distinct components of innovation such as organizational innovation, individual innovation, and team innovation (McMurray, Islam, Pirola-Merlo, & Sarros, 2013).

Assumptions

Today's high-technology engineering defense contractors rely heavily on research and development in the areas of applied technology and engineering. This study assumed that competitive advantages revealed in the literature as a result of leadership-inspired innovation climates can specifically transfer into the foundations of differentiating product developments within the generalized business community. It was also assumed that to the degree that broad independent thinking is encouraged by leadership in technology and engineering communities of practice, a higher level of collective intelligence would be applied and greater innovative discoveries could be found, which ultimately will translate to a competitive advantage for the defense contracting firm.

The positive correlation between transformational leadership style and the characteristics fostering an innovation climate has been established by the literature (Archibald, 2015; Charbonnier-Voirin, El Akremi, & Vandenberghe, 2010). In addition, there is a relationship shown in the literature

between leadership characteristics and organizational innovation (Allameh, Babaei, Chitsaz, & Gharibpoor, 2012; Hoch, 2013; Jung & Sosik, 2006; Sarros, Cooper, & Santora, 2008). Both these assertions are supported by the literature review in Chapter 2.

Summary

This study aimed to examine the relationship between leadership and innovation climate; specifically, the leadership impact of those retired senior army officers serving or who have served in executive-level supervisor roles within high-technology engineering defense firms. It aimed to discover leadership style characteristics of this specific leader category, evaluated alignment with the innovation stimulating practices in the literature, and inferred through the use of statistical analysis a corresponding predictive impact on innovation climate within the studied leaders' organizations.

Chapter 2: Literature Review

Theoretical Framework

Two styles of leadership relate to the study's focus: transformational and transactional. One aim of this study is to detect which, if either, of these styles helps or hinders the innovation climate. The innovation climate relates to fostering the creative thinking phase directly, and the implementation of creative thinking indirectly. Jung and Avolio's (1999) theory of transformational versus transactional leadership styles impacting workforce engagement in brainstorming activities is juxtaposed with theories on leadership styles having an intervening impact on organizational innovation climate (Somech, 2006; Somech & Drach-Zahavy, 2013). The joint examination of these two theoretical elements serves as the foundation for the theoretical framework for this study.

Defining Innovation and Creativity in the Workplace

According to Rosing et al. (2011), "innovation is distinguished from creativity by the implementation, as opposed to mere generation, of ideas" (p. 957). West and Farr (1990) describe innovation as the creation of ideas, procedures, processes or products with the intent for these new discoveries to be useful to the organization. A review of the early innovation literature broadly reveals references to innovation as a generic term, failing to differentiate the two distinct

stages: (a) the creativity stage where new ideas are generated and (b) the implementation stage where new ideas are moved from concept into practical reality (Somech & Drach-Zahavy, 2013).

Many similar and overlapping concepts related to creativity in the workplace have been introduced in recent research. For example, *entrepreneurial orientation* means entrepreneurial approaches, strategies, and actions taken by firm managers, while *innovation capacity* represents the organizational environment that supports the development and maintenance of the firm's innovative capabilities. The innovative capabilities are known to affect an organization's performance, through enhancing individual project success and overall competitive advantage. As researchers hypothesize about the interrelatedness of these concepts, Parkman, Holloway, Sebastiao, and Pamplin (2012) recently indicated that innovation capacity mediates the entrepreneurial orientation for both individual projects and in terms of achieving competitive advantage. This implies that innovation climate--a related term with an equivalent meaning--is a crucial concept worthy of current study.

A review of recent literature indicates persisting linkages among organizational innovation, individual action and behavior, specific leadership type and style, and organizational culture and climate (Byrd 2012). The present study focuses on organization-level innovation climate; however, due to the

conceptual overlap, some articles on individual-level innovation and creativity are included in the literature review.

Makri and Scandura (2010) examined leadership and innovation in organizations that are distinguished for technological operations. They define innovation as "an iterative process initiated by the perception of a new market or service opportunity for a technology-based invention that leads to development, production, and marketing tasks striving for the commercial success of the invention" (Makri & Scandura, 2010, p. 76).

Somech and Drach-Zahavy (2013) examined innovation and creativity from a team-level perspective with relation to climate for innovation. Team creativity was higher when the team was composed of creative personalities and the team composition was heterogeneous in nature, with a diverse set of skills and knowledge. Team creativity can occur without necessarily contributing to innovation implementation. The climate for innovation plays an important role in the team being able to successfully implement ideas. The climate for innovation primarily involves management practices that encourage new ideas from employees and contexts that arise that call for change, such as competition. Climate for innovation along with diverse team composition and creative ability facilitate innovation.

Potential Downside of Innovation

Innovation is typically considered a desirable outcome, but there are potential downsides. Janssen, Van de Vliert, and West (2004) discussed the cost and benefits of outcomes of group and individual innovative practices. The authors explain that by definition innovation is controversial, unpredictable, and can often lead to unexpected outcomes. They explain that it is an assumption of the literature that innovation leads to a good outcome, but this assumption does not always hold. Individual innovation can result in greater stress due to stress of co-worker conflict and risk of failure. Potential negative outcomes include failure of the innovation, lowered group cohesion and potency, unclear objectives, and resistance to future innovation. When innovation is introduced by supervisors, the costs and benefits of group innovation are moderated by several factors, including group processes, eternal demands, and member diversity (Janssen et al., 2004).

The review of costs and benefits associated with implementing innovative practices suggests that, although companies have recently been encouraged to adopt innovative practices, it would be beneficial to examine the effects of innovation from a cost versus benefit perspective. This calls for research to examine innovation as the independent variable

to help the research community gain a better understanding of the outcomes of promoting innovative practices in companies.

Innovation as an Adaptive Strategy for Changing Markets

After admitting the potential downsides in the prior section, this section stresses several important benefits of innovation. Multiple forms of global economic stress have, in recent years, plagued organizations of all types. This inevitably imposes change on organizations, regardless of whether they proactively initiate it or are reactively manipulated by it. These economic stresses demand that organizations seek new ways of differentiating themselves in order to grow their share of shrinking markets. These constantly changing environments impose unprecedented challenges that demand innovation as a core competency for the sake of survival and organizational growth (Choi & Chang, 2009; Frese, Anderson, Erez, & Farr, 2009; Hansen & Levine, 2009).

Considering the value of innovation in relation to an organization's survival and growth, the factors that optimize or inhibit it receive relatively little attention (Chatman, Caldwell, O'Reilly, & Doerr, 2013; Drach-Zahavy & Somech, 2001; Eisenbeiss, van Knippenberg, & Boerner, 2008; Hülsheger, Anderson, & Salgado, 2009; Nijstad & Levine, 2007). Several recent researchers have reviewed over a decade of research showing the importance of leadership for innovation and

organizational development (Jansen, Vera, & Crossan, 2009; Nemanich & Vera, 2009; Yukl, 2009).

Leadership Characteristics Impacting Team Innovation

Leadership factors impact work climate in every way possible, including innovation or lack of it. Howell and Avolio (1993), in a seminal study, used measures of leadership, locus of control, and support for innovation to predict the performance of 78 managers. Results reveal that three transformational leadership measures were associated with a higher internal locus of control (i.e., belief in one's ability to affect change and perform well based on internal drive) and significantly and positively predicted business-unit performance over a 1-year interval. Transactional measures of leadership, including contingent reward and management by exception (active and passive), were negatively related to business-unit performance. Relationships between the transformational leadership scores and unit performance were moderated by the level of support for innovation in the business unit.

While many reputable creativity and innovation researchers focus on team innovation processes and moving from concept to product (Damanpour & Schneider, 2009; Drach-Zahavy & Somech, 2001; Somech & Drach-Zahavy, 2013), there is foundational impact on innovation that is predicated on organizational leaders recognizing the value of innovation and interacting with

followers in ways that promote and nurture innovation. More recently, researchers are applying an interactional approach to creativity and innovation, looking simultaneously at team context and team member characteristics (Choi, Anderson, & Veillette, 2009; George & Zhou, 2001; Taggar, 2001).

Sarros et al. (2008) discovered teams had a reduced probability of reaching innovation implementation in some contexts. These researchers viewed innovation as an outcome of many variables, but concluded that the predominant influential factor is leadership and organizational culture, emphasizing that the organization's leadership holds the charter to establish organizational culture.

Current Drive for Innovation in the High-Tech Defense Industry

One set of industries that particularly prize innovation is the high-tech industries, and the defense industry contracting with the military is no exception. Leadership style's impact on organizational innovation within the high-technology engineering defense contracting industry becomes particularly relevant in the face of a dramatically reduced defense budget, with increasingly larger cuts on the horizon. This leaves defense contractors in an unprecedented scramble to salvage market share or alternatively compensate by seeking to innovate their way into new markets. Thus, it stands to reason that, if there is a predominantly common set of leadership characteristics among

retired senior military officers serving in supervisor roles within organizations plagued by budget cuts, a disciplined study of their leadership impact on organizational innovation climate may be of value.

The U.S. Defense Department has confirmed that the United States will cut $487 billion out of its defense budget over the next 10 years, beginning in 2013. As a result, defense contracting organizations will predictably compete to sustain their revenue levels (Carlson, 2012). This foretells that there will be a much smaller revenue pie to be shared among the players in the technology-based defense industry, creating a climate of survival of the fittest where defense contractors must innovate, revise their products for different markets, or face dissolution.

Due to the predicted funding reduction, merely keeping market share mathematically predicts reduced revenue levels for defense contractors as a whole, as the total size of the pie decreases. Any hopes to preserve defense contractor revenue levels, let alone establish gains, will necessitate organizational leadership to drive innovation for the sake of the organization's competitive posture and ultimately its survival (Somech, 2006; Yandori, as cited in Schumacher & Wasieleski, 2013).

Definition of Two Leadership Styles

In this present study, two prominently studied leadership styles are investigated for their impact on innovation climate, and here the two styles are defined. The present study focuses on two leaderships styles that literature has shown are effective: transformational leadership and transactional leadership. Transformational and transactional styles are often juxtaposed. McColl-Kennedy and Anderson (2002) argued that transformational and transactional leadership have some similarities such as providing clarity of a desired outcome, recognizing accomplishments, and rewarding high performance; however, there are notable differences.

Transactional leadership defined. Bass (1999) defined transactional leadership, in a simplified manner, as the exchange between leader and follower in efforts to meet the leader's interests. The leader-follower hierarchy is emphasized with the transactional leadership construct. Avolio (1994) stated that transactional leadership primarily motivates through self-interest. Transactional leadership behaviors include giving material rewards or disciplining the follower depending on the adequacy of the follower's behavior or performance. According to Bass (1999), the constraints of transactional leadership include tighter adherence to an exchange-based interaction between leader and follower, where the achievers of clarified goals

receive rewards. In this transaction, the leader intervenes on an as-needed basis and encouragement for experimentation rarely occurs. Focus beyond the established plan and reward-for-performance agreement is uncommon. Therefore, little stimulation for innovation is expected from leaders practicing the transactional style. Allameh et al. (2012) emphasized that transactional leadership approaches management from a business standpoint, seeking to structure quid pro quo arrangements where deals are struck to trade value. Concerns for this leader include routine and short-term goals, and expediency for the sake of efficiency. This results in not taking the time to make new discoveries. While the literature collectively reinforces the limited value of transactional leadership in the creativity stage of innovation, it also reinforces its critical role in the implementation phase after the innovative process.

Transformational leadership defined. Transformational leadership is characterized by charisma, inspiration, intellectual stimulation, and individualized consideration (Avolio, 1994). Transformational leadership means discovering and using employees' talents, increasing enthusiasm, transmitting knowledge and buy-in for the organization's mission, and encouraging an entrepreneurial mindset as opposed to an emphasis on hierarchy (Allameh et al., 2012). Bass (1999) and Sarros, Cooper, and Santora (2008) described

transformational leaders as those who have the ability and capacity to influence followers to sacrifice their own personal interests for a collective goal and to perform beyond the expected level of performance. Lyons and Schneider (2009) manipulated transformational and transactional leadership styles to examine their influence on individuals' performance on a stressful task, and on perceived social support, self-efficacy beliefs, emotions, and stressor appraisals. In addition, this study examined whether these variables mediated the relationship between leadership style and performance. Participants viewed video instructions for a stressful task presented by an actor depicting one of three leadership styles: transformational, transactional-contingent reward, and transactional-management by exception. The transformational leadership condition was associated with enhanced task performance, higher social support perceptions, greater efficacy beliefs, lower negative affect, and lower threat appraisals compared to the transactional conditions. Causal modeling revealed that leadership style had a direct, rather than indirect, effect on task performance.

Transformational Leadership's Influence on Creativity and Innovation

The transformational style of leadership is broadly accepted as the most positively influential leadership style on innovation. Bass (1999) defined transformational leadership as

"moving the follower beyond immediate self-interests through idealized influence (charisma), inspiration, intellectual stimulation, or individualized consideration" (p. 11).

Allameh et al. (2012) found a significant positive relationship between transformational leadership and knowledge conversion. Transformational leadership, when applied in an innovation context, powerfully changes the fundamentals of a company. Bryant (2003) credited transformational leadership with effectively contributing to the creation and sharing of knowledge as the initial step in advancing organizational interests. What follows, as the second step, is innovation and creation adoption.

Eisenbeiss, van Knippenberg, and Boerner (2008) stated that fostering team innovation is increasingly an important leadership function. These researchers linked transformational leadership theory to principles of M. A. West's team climate theory and proposed an integrated model for the relationship between transformational leadership and team innovation. Results from a study of 33 research and development teams confirmed that "transformational leadership works through support for innovation, which in turn interacts with climate for excellence such that support for innovation enhances team innovation only when climate for excellence is high" (p. 1438). As a related finding, "frustration and optimism fully mediate the

relationship between leadership style and performance" (McColl-Kennedy & Anderson, 2002, p. 545).

Jung and Sosik (2006) focused on determining whether leadership styles had varying impact on individualists and collectivists while performing brainstorming tasks. Their studies manipulated and compared transactional and transformational leadership styles. Results showed more ideas were generated by collectivists if they had a transformational leader, but individualists led by transactional leaders generated more ideas. Their discovery, contrary to expectations, revealed collectivists generated more ideas than required, even when working alone.

Gumusluoglu and Ilsev (2009) affirmed the multiple studies that have shown transformational leadership's role in positively influencing organizational innovation. However, it went further to examine the contextual conditions that affect and augment this phenomenon. Their study conceptualized organizational innovation as the tendency of the organization to develop new or improved products or services and its success at bringing those products or services to market. The study proposed to moderate the effect by internal support for innovation, in terms of an innovation-supporting climate, and the allocation of adequate resources. Knowledge received from external organizations and resource acquisitions are proposed as external moderating

elements between transformational leadership and organizational innovation.

García-Morales, Lloréns-Montes, and Verdú-Jover (2008) examined the relationship between transformational leadership and organizational performance then analyzed theoretically and empirically how the leader's perceptions of different intermediate strategic variables related to knowledge and innovation. Their study revealed the requirement that leaders must (a) confront a reality based on knowledge and (b) foster innovation to achieve improvements in organizational performance. These authors assert that organizations with limited understanding of relationships between these strategic variables sometimes fail to achieve sustainable competitive advantage.

In their creativity research, relating transformational leadership style to innovation, others found correlation coefficients were higher for the organizational level than the individual level (Somech & Drach-Zahavy, 2013). From this article, it would be safe to infer that transformational leadership style for larger organizations is a large piece of the innovation puzzle.

Bryant (2003) integrated literature of transformational leadership and organizational knowledge. Bryant divided knowledge management into three categories: creating, sharing,

and exploiting knowledge. Transformational leadership is credited to effectively create and share knowledge, while transactional leadership is attributed to exploiting knowledge, all of which contribute to effective team performance.

Rosing, Frese, and Bausch (2011) reflected on a meta-analysis of 31 studies revealing a positively supporting connection between transformational leadership and innovation. This meta-analysis finds a weighted mean correlation of .28. However, results vary broadly ranging from .31 to .84 (Dayan, Di Benedetto, & Colak, 2009; Osborn & Marion, 2009).

After citing the above studies that show transformational leadership's positive impact on innovation, this discussion of literature continues by breaking down transformational literature into several of its components that have separately been linked to innovation. The following sections discuss leadership styles that are considered aspects of or characteristics of transformational leadership according to Avolio and Bass (2004): charisma, vision, intellectual stimulation (e.g., valuing knowledge conversion), individual consideration (e.g., valuing diversity), and shared leadership.

Charismatic Leadership's Influence on Innovation

Charisma is one aspect of transformational leadership (Avolio & Bass, 2004). Conger and Kanungo (1987) studied charismatic leadership through the ideals of sociologist Weber

and behavioral theory. The connotation of charisma has a long history in leadership literature. Conger shows the development of the definition of charisma from the biblical descriptions to behavioral sociologist Max Weber. Conger and Kanungo looked at the attributes of charismatic leadership and how these characteristics have the power to transform the followers to work towards the goal of the organization. There are interesting similarities between the constructs of charismatic leadership and transformational leadership.

It seems obvious to expect a positive relationship between transformational leadership and innovation because the supporting elements of innovation align conceptually with the positive effects of transformational leadership, particularly the enhancement of motivation and the deepening of organizational engagement and commitment. These develop in the follower as an increased sense of responsibility to challenge the status quo for the sake of continuous improvement (Berson, Nemanich, Waldman, Galvin, & Keller, 2006).

Shavinina (2011) provided an archival study relying on autobiographical and biographical accounts of well-known innovation leaders. The article presented a theory of innovation leadership by integrating a variety of independent directions of research. It aimed to explain the nature of innovation leadership at the individual level and specifically addressed

why some individuals excel at developing new products, processes, or services as a result of inspiration for generating and implementing new ideas. Inspiration is a transformational leadership characteristic related to charisma.

Paulsen, Maldonado, Callan, and Ayoko (2009) investigated the charismatic dimension of transformational leadership and its effects on innovative outcomes in research and development teams. Beyond revealing charismatic leadership style, survey data revealed team identity, cooperative strategies, and innovation as related to this style. The findings highlighted the charismatic leader's role in promoting team innovation by supporting team identity, commitment, expression of ideas, and cooperative decision making.

Visionary Leadership's Influence on Innovation

Closely related to the characteristics of charisma and inspiration is the transformational leadership quality of communicating a clear vision; "Vision is an idea of a valued outcome, which represents a higher order goal and motivating force at work" (West & Farr, 1990, p. 310). Hülsheger et al. (2009) contended that when vision is clear to the workforce and organizational goals are unambiguous, the level of commitment to and sense of attainability are increased. This agrees with the principle of shared vision as characterizing exemplary leadership (Kouzes & Posner, 2008) and as an aspect of

transformational leadership (Avolio & Bass, 2004). Here team member engagement and commitment elevate in relation to the degree that team members are welcomed to participate in the creation of the organization's vision. With focus and attention, teams are more inclined to expand goal-appropriate methods (Locke & Latham, 1990). Therefore, it stands to reason that probability of implementation is positively correlated with clarity of vision (Somech & Drach-Zahavy, 2013).

Knowledge Conversion as an Intermediary Influence

Intellectual stimulation is a defining characteristic of transformational leadership. Allameh et al. (2012) used correlational and regression statistics to find a significant positive relationship between transformational leadership and knowledge conversion, and no significant relationship was found between transactional leadership and knowledge conversion. Transformational leadership is characterized as being able to change the fundamentals of a company, even in ways that contrast with the will of the leader. This was hypothesized as being possible due to transformational leadership creating a knowledge conversion process. Knowledge conversion is the interaction between tacit and explicit knowledge as seen in socialization, externalization, combination, and internalization.

Diversity and Shared Leadership's Influence on Innovation

Shared leadership, also described as a more egalitarian approach, is often associated with transformational leadership, which relates to individualized consideration and the appreciation of individual diversity, as opposed to a focus on standards and conformity that is more associated with transactional leadership. Hoch (2013) investigated innovative practices and discovered them to be positively associated with shared leadership. Research on shared leadership has gained more attention due to companies adopting teamwork within companies. Shared leadership is considered informal and is contrasted with vertical leadership that is akin to CEO style management. Shared leadership can be utilized at the same time as other leadership practices within the company. Shared leadership has been observed as emergent especially when companies are in competitive situations and able to adapt to change. The authors discussed antecedents to the development of shared leadership with teams. They also discussed it as an essential component to innovative behaviors in teams. It is explained that because innovation involves phases such as creativity and application, team composition can be a factor for innovation. Different group members can be involved more heavily according to their area of specialization during the phases of innovation. A team can capitalize on this though maximizing shared leadership, in that

members' strengths vary. Collectively the team gains an overall strength that exceeds the best of what any individual can offer.

Hoch (2013) contrasted the shared leadership commonly associated with transformational leadership with the vertical command and control model commonly associated with transactional leadership. In Hoch's investigation of innovative practices, he discovered these practices to be positively associated with shared leadership, a concept much aligned with shared vision (Kouzes & Posner, 2008), where the way ahead is determined by the depth of engagement and collective intelligence of the team.

Sarros et al. (2008) examined team innovation behaviors closely and discuss how these can be better cultivated. Focusing on organizational culture that is conducive to the innovation processes in a company, the authors affirm that transformational leadership style is linked to successful innovation in organizational contexts. They define organizational innovation as referring to the "introduction of any new product, process, or system into an organization" (Sarros et al., 2008, p. 146). The authors contend Innovation is as an outcome of many factors, but primarily driven by the leadership and climate of the company. The researchers assume a functionalist perspective and claim that the leadership of the company is responsible for the primary creation of the so-called climate of the organization. In their analysis, innovation was measured using the support for

innovation and resource supply measures. “Support for innovation (16 items) measures the degree to which individuals view the organization as open to change, and resource supply (6 items) measures the degree to which resources (e.g., personnel, time) are perceived as adequate in the organization” (Sarros et al., 2008, p. 150).

Somech (2006) focused on leadership style as a key factor that has an intervening impact on a functionally heterogeneous team’s process and outcomes. This study examined 136 primary care teams to discover that in high functionally heterogeneous teams, a participative leadership style was positively associated with team reflection, which in turn fostered team innovation. However, this leadership style showed a propensity to decrease team in-role performance. The impact of directive leadership was in promoting team reflection under the condition of low functional heterogeneity, whereas no such impact was found under the condition of high functional heterogeneity.

Cowan-Sahadath (2010) revealed major organizational change as a complex process influenced by the characteristics of an organization, an integrated project and change management framework, and the importance of key leadership roles throughout the change process. The case study highlighted (a) strategy and vision supported by a business infrastructure aimed at rapidly responding to business needs, (b) the need for rapid access to

information for strategic decisions, and (c) streamlined business operations enabling the organization to deal with growing requirements. The case study introduced a conceptual framework that draws from theoretical change models, but is also grounded in the reality of its organization's change environment. This study relates to shared leadership because the need for rapid access to information for strategic decisions is typically a characteristic of flatter organizations. In contrast, in more hierarchical organizations, information is less often shared widely, but is seen as owned and dispensed by upper management. This can inhibit quick access to information.

Baucus (2008) indicated that a leader's rigidity and emphasis on hierarchical structure transfers to rigidity to the innovation process. Hierarchical structure is typically conceived of as the opposite of flat (i.e., egalitarian or shared leadership) structure. Shared leadership is typically thought of as a transformational leadership quality and hierarchy as a transactional leadership quality (Allameh et al., 2012), so this section's literature supports the idea of transformational leadership, more than transactional, as likely to promote innovation.

While the sections above cite studies reported to link transformational leadership--and its associated characteristics--directly with creative and innovative outcomes, still others

showed transformational leadership to influence creativity indirectly, through fostering an innovation climate. In the following section innovation climate is described, then the next section describes research linking transformational leadership and innovation climate, rather than other measures of innovation. Innovation climate is the specific measure of interest in the present study.

Innovation Climate

Charbonnier-Voirin et al. (2010) defined a climate for innovation as "norms and practices that encourage flexibility and the expression of ideas and learning" (Charbonnier-Voirin et al., 2010, p. 701). They related climate for innovation to climate for excellence. The researchers proposed that climate for innovation is a contextual variable that, when combined with perceived transformational leadership, can enhance individual performance. Employees in a climate for innovation in an organizational context are encouraged to think independently and contribute to the group in novel ways.

In a climate for innovation, employees are directed to the leader's message and actions, therefore the employees in such as climate would consider the leader to be credible. The authors also suggested that in a high climate for innovation, employees would benefit from a transformational leader because they would

be encouraged to cultivate their own ideas and personal resources in creative ways.

Climate for innovation was measured though team managers using the following focal points (Charbonnier-Voirin et al., 2010):

- Scanning and examining the external environment to anticipate changes.
- Building scenarios of the future to deal more effectively with expected changes.
- Identifying the best opportunities in your environment.
- Creating and innovating on a continuous basis to compete with other companies.
- Developing a culture of change within the team.
- Searching for opportunities for development.

Leadership's Influence on Innovation Climate

Gandz and Bird (1996) examined how competitive organizational pressures and the need to increase organizational performance creates a business climate that drives leaders by necessity to empower their organization's employees, providing space to be more creative and to exercise their judgment, to increase organizational performance. Gandz and Bird also asserted that innovation initiatives can be optimized by good leadership and management practices.

Pertl and Smith (2010) presented a hypothetical progression of an idealized maturation process (from inception to long-term solvency) of a new a company or technology in order to show the reliance of two interrelated competencies: leadership and innovation. They further investigated the state of health between these two competencies and noted an associated impact on organizational longevity and profitability.

Apekey, McSorley, Tilling, and Siriwardena (2011) assessed the relationship between leadership behavior and a culture of innovation. The study is applied in the context of general medical practices and uses the perspectives of quality improvement leads. The data collection instruments included a 12-point leadership scale and a seven-dimension culture of innovation scale. It concluded that organization practices require increased support for enhancement of leadership skills in order to effectively encourage innovation for the acceleration of healthcare improvements.

Using empirical data derived from research involving Taiwanese firms, Lin, and McDonough (2010) examined strategic leadership's role in mediating between the forces of exploration such as innovation and change, and inertial forces for exploitation of the status quo. It highlighted strategic leader decision-making as an action that enables and encourages the firm to balance exploration as well as exploitation. It

empirically investigates the multiple roles that leaders need to play in order to create a culture that (a) facilitates exploration and exploitation and (b) drives radical process and product innovation.

Isaksen and Akkermans (2011) asserted an organization's work atmosphere as an important influence on innovative productivity. More specifically, it cites the influence of organizational leaders and their effect on innovative productivity by way of stimulating a creative work climate. This quantitative exploratory study included 140 respondents from 103 different organizations who were sampled through the use of surveys. Partial correlation and mediation analysis confirmed leadership's effect on innovation as a result of improved creative work climates.

In their study, Damanpour and Schneider (2009) showed the relationship between the characteristics of a leader's position on innovation (i.e., a pro-innovation stance) and the organization's ensuing adoption of innovation practices. While this section noted studies that linked leadership with innovation, the following sections look at specific leadership types and characteristics and their influence on innovation climate.

Transformational Leadership's Influence on Innovation Climate

This section introduces studies that link two concepts: transformational leadership and innovation climate. For the first concept, transformational leadership, characterized by idealized influence is often described as creating changes in values, goals, and aspirations that are consistent with the values of followers, is identified as having a significant indirect effect on emotions of followers, including frustration and optimism (Avolio & Bass, 2004). For the next concept, *organizational climate* is a narrower construct than organizational culture. Citing past researchers, Ruppel and Harrington (2000) stated that climate refers specifically to the shared perceptions of the events, practices, procedures, and kinds of behaviors that are rewarded, supported, and expected.

Although many studies have directly correlated transformational leadership style with innovation outcomes (as noted in the prior section), only a few have found this leadership style to correlate specifically with factors that define an *innovation climate*, such as greater efficacy beliefs and creativity (Archibald, 2015).

Studies conducted by Jung et al. (2003) and Sarros et al. (2008) found that the organizational culture and climate for innovation was positively and highly correlated with a leader's ability to articulate vision, which is a transformational

leadership trait. Charbonnier-Voirin et al. (2010) evaluated perceptions of transformational leadership linked to adaptive performance. They also examined the role of climate for innovation on individual performance and transformational leadership. The authors stated that a climate for innovation is one with "norms and practices that encourage flexibility and the expression of ideas and learning" (Charbonnier-Voirin et al., 2010, p. 701).

Charbonnier-Voirin et al. (2010) asserted that a climate of innovation is a contextual variable that is open to moderation by the qualities of transformational leadership. The benefits of transformational leadership fall to the follower as they are encouraged to develop their own ideas. However, the larger beneficiary is the organization, as innovation climate translates into a climate of organizational excellence.

Rosing, Frese, and Bausch (2011) emphasized the plausibility of a positive relationship between transformational leadership and an innovation climate because "transformational leadership enhances motivation and may encourage the followers to challenge the status quo" (p. 958). This contrasts with transactional leadership and what Avolio, Bass, and Jung (1999) described as a quid pro quo relationship centered around objectives that are already predefined by sources beyond the

scope of the follower who is expected to deliver only a defined objective.

Military Leadership

Military leadership culture is often noted to have specific characteristics that seem related to its longstanding traditions and functions of discipline, conformity, and unquestioning compliance with orders. Leadership in the military has a well-known structure that is more in line with a transactional leadership model than the transformational model. The military is widely known as having hierarchical structure using authoritarian leadership (Ulmer, 1998). This typically involves transactional incentive structure, such as pay and promotion based on exact adherence to command (Rudner, 2007, para. 7). Uribe (2012) reported on the military culture and structure as follows:

> Military leaders, unlike civilian leaders, know that their soldiers don't have a choice to go look for another job that may pay more, have more vacation, etc. They sign a contract that is time-bound, and the force of their contract keeps them in their job. In the military, relating to employees is not as necessary as it is in the civilian world. Leaders don't have to engage their troops; they give them orders and the troops are expected to carry out those orders. (p. 133)

Citing Malone, Uribe noted that "military leaders don't have to relate to their soldiers; their duty is to complete their mission" (p. 134).

Even though the predominant style may be transactional leadership, there are many historical accounts of transformational leaders as well as recognition of the benefits of transformational leadership in the military setting. The following sections describe current emphasis in the military as well as a growing awareness of the need for transformational leadership in the military.

Emphasis in military training. The military leadership training does not typically include emphasis on characteristics and attitudes that foster innovation. For example, Grothe (2009) of the Army Command and General Staff at the Fort Leavenworth Kansas School of Advanced Military Studies explained needed changes to military leadership education for officers to develop skills of innovation and creativity. Shamir, Zakay, Breinin, and Popper found there are potential limiting factors to charismatic or transformational leadership in the highly structured military setting, due to the hierarchical setting and its role impact on subordinates (as cited in Roseman, 2014), thus such leadership attributes might not find optimal expression or growth in such settings.

In a recent study of organizational diversity management and job satisfaction, almost half the organizations reported that the largest challenge facing organizations over the next 10 years is obtaining human capital and optimizing their human capital investments (Munyeka, 2014). The demands of globalization, technological innovation, economic imperatives, ecological sensitivity, and the need for sustainable development are the challenges that business organizations worldwide face in order to survive. From the human perspective, the challenges are about socio-political transformation" (p. 438). Managing diversity and inculcating acceptance of diversity is noted as central to meeting these challenges.

Current use of transformational leadership in the military. Mayall (2008) studied National Defense University presidents who have a major role in educating senior military leaders. The results suggest that the presidents practiced all aspects of the model, such as fostering creativity, reframing new perspectives, and questioning of assumptions.

Uribe (2012) noted attributes of the military leaders derived from an assessment of generals and admirals: focus on lifelong learning, promotion based on performance, faithfulness and honor, focus on the whole person (and families of soldiers), and good bearing (i.e., self control and image management). These are value-based leadership attributes, and value-based

leadership is an important aspect of transformational leadership (p. 134). These attributes seem directly to relate to traits described as contributing to transformational leadership (Avolio, 1994): intellectual stimulation (as related to lifelong learning, individualized consideration (as related to focus on whole person and families of soldiers), and inspiration. Byrd (2012) confirmed, in a case study of organizational innovation within a military setting with a supportive non-combat function of human remains identification, that value-based leadership is central, with respondent quotes indicating goals and aspirations such as the following: "attain the highest level of scientific competence and integrity possible and maintain a level of ethical standing that is beyond reproach," "huge personal and professional sacrifices to work here," "the mission itself is rewarding and motivating," and from a subject who expressed a general discontent with the current work environment still believed "[t]his mission is very noble" (p. 58).

The need for transformational leadership skills. Regardless of the effectiveness of their past military leadership, leadership within a for-profit organization may necessitate or benefit from leadership attributes that are not typically found or valued within the military. Foremost, transformational leadership has been noted as a leadership style that encourages innovation. Rudnick (2007) insisted that "leaders who champion

innovation must establish a culture receptive to creativity and conducive to change" (para. 18). The typical and desired style of military leadership may particularly exemplify Rudnick's complaint that "recent research has called attention to a widening gap between competencies required for future leaders, on one hand, and the current availability of potential leaders possessing such competencies, on the other" (para. 2). Some transformational leadership attitudes match the military emphasis on loyalty to the nation and the unit of command as well as the emphasis on meeting high expectations of conduct. For example, Rudner noted that practices associated with transformational leadership include "to foster attitudes and assumptions that promote employees' loyalty to the organization's mission and vision . . . committed to planning" (para. 8) as well as to "serve as role models and set a standard for high employee expectations by encouraging employees to think beyond themselves" (para 8). However, other transformational leadership traits are not emphasized and are somewhat routinely discouraged in the military setting, such as the following traits: "future-oriented . . . open-minded, and dynamic" (Rudner, 2007, para. 8). Instead, the military emphasizes past tradition, rigid adherence to authoritarian structure, and a set chain of command. Although Rudner noted that "the practices associated with transformational leadership are observable and

learnable" (para. 8), it is debatable whether after decades of service in one style, the senior military leaders are apt to observe the benefit of adopting a different approach in the for-profit setting.

In one study of officers in the U.S. Air Force, interview responses about how leadership training could be improved suggested that transformational leadership styles could improve the training (Lee, 2011). Similarly Carleton's (2005) study of military versus civilian leadership showed data suggesting that the military use programs to develop relationship skills, which indicates that the transformational quality *charisma* may be typically lacking.

Military Leadership and Innovation

Bontrager (2011), in the U.S. Joint Forces Staff College, suggested implementing change to the organizational structure with training for facilitating creative problem solving as a way to address problems with the current organizational culture. Grothe (2009), in the Army Command and General Staff College at the Fort Leavenworth School of Advanced Military Studies, also insisted on the need for changes to military leadership education for officers from the adaptive approach to becoming more innovative.

McGuire (2002) theorized that an army leader development model composed of three pillars: institutional education,

operational assignments, and self-development initiatives. The army leadership development model prescribes a progressive and interconnected process. This three-pillar development model in its expanded form is shown to be recurring cycle of education, training, experience, assessment, feedback, and reinforcement in which responsibility for development lies with both the leader and the leader's superior.

Aude, Mitchell, and Cordes (2005) reviewed the development of valid and reliable assessment instruments as a logical first step to an overall leadership assessment, feedback, and action plan development as the foundation of the army's developmental programs. These researchers emphasized the development of a leadership assessment instrument that is relevant and applicable to leader behaviors exhibited on-the-job is optimized when receiving command guidance. The focus identifies leader domains associated with successful army leadership. Their work also claims the army hypothesizes that leadership as a skill set and an application focus holds distinctly different forms for those in Staff positions versus those in command positions.

Wong, Bliese, and McGurk (2003) and McGuire (2002) reflected on strategic leadership literature in military contexts and characterizes it by listing expected knowledge, skills, and abilities. Leadership development in Wong's framework suggested the inclusion of a broad and comprehensive

set of leadership components is problematic in that it unrealistically implies that the leader should be able to do everything. Consequently, leader development when the desired end-state is so all-inclusive becomes impractical. Wong's work focuses on reducing these long lists into a list of six meta-competencies: identity, mental agility, cross cultural savvy, interpersonal maturity, world-class warrior, and professional astuteness.

Singer (2009) highlighted emerging issues of command military leadership as a result of networked connections and unmanned systems. Singer asserts that these systems bring commanders closer to the battlefield from greater distances. While commanders are empowered with more information delivered more timely, the new technologies enable old trends of command interference, emerging as new extremes of micromanagement, inserting themselves into matters formerly handled at ranks many layers of command below them.

Bass, Avolio, Jung, and Berson (2003) examined the predictability of military platoon performance in high-stress and neutral stress situations. The research examined platoon potency, performance, and cohesion. The study involved 72 light infantry platoon leaders. Performance was assessed through combat simulation exercises. The investigators found that both transformational and transactional leadership styles effectively

contributed to platoon performance. However, their research indicated that transformational leadership positively correlated with platoon cohesion to a significant degree (+.33). Transactional leadership also had a positive correlation with platoon cohesion, but to a lesser degree (+0.11). Passive leadership had a negative relationship with both platoon cohesion and platoon performance (Bass et al., 2003).

In a study examining the leadership effects at the Uniformed Services University, the first federal medical school, Dong et al. (2012) surveyed military officers at the general officer rank to enhance their understanding of successful leadership in the context of military physicians. Analyzing results from the Multifactor Leadership Questionnaire, the study confirmed the Uniformed Services University curriculum effectively educating officers in leadership. Moreover, the survey respondents directly attributed their success to the leadership training they received at Uniformed Services University. The leadership characteristics reference by the flag officers surveyed where consistent with what the literature describes as transformational leadership. The findings have important implications for the efficacy of transformational leadership as part of military leadership training in contexts beyond the realm of military medical officers. Four factors in

this study focused on the supervisor group's degree of transformational leadership:

- Idealized influence: holding subordinates trust and respect
- Inspirational motivation: bringing meaning and purpose to subordinate's work
- Intellectual stimulation: encouragement to find new approaches to long-standing methods
- Individualized consideration: expressing interests in others

Two factors in this study focused on the supervisor group's degree of transactional leadership:

- Contingent reward: telling others what must be done in order to be rewarded
- Management by exception: telling others what is expected and accepting performance that is within strictly defined standards

The last factor was focused on laissez faire leadership style, characterized by being content to let things ride as they are. (This last style is not included in the leadership characteristics investigated in the present study.) Uniformed Services University physicians who had received the rank of general officer emphasized their beliefs that leadership should be included in curriculum as a core competency.

Lönnqvist, Paunonen, Nissinen, Ortju, and Verkasalo (2011) studied army cadets on the basis of two types of self enhancement:

- Moralistic bias: communal self-enhancement
- Egotistic bias: agentic self-enhancement

The researchers investigated leadership styles as a means for promoting a cadet to officer status. The investigators used the two identified styles as foundation for their study. While individuals scoring high in either of the two styles received promotions, only the agentic self-enhancement style received positive feedback from followers.

Lyons, Swindler, and Offner (2009) examined change readiness in the United States Military in response to applied leadership. The results indicated that change (transformational) leadership from senior executives was most predictive of individuals' reported change readiness for military officers and civilian personnel. In addition to change leadership from senior executives, general leadership was also predictive of change readiness for enlisted personnel. Both leadership and change readiness were significantly related to higher intentions to engage in the change initiative (Lyons et al., 2009).

The change readiness of personnel appeared to increase according to the stages outlined by the trans-theoretical model of behavior change (TTM), thus suggesting that this may be a

useful model for predicting intentions to engage in and support organizational change initiatives.

Shamir, Zakay, Breinin, and Popper (1998) conducted a correlative study of charismatic leader behavior in military units with positive subordinate responses. Researchers used three different samples of subordinates to assess leader behavior, individual-level correlates, and unit-level correlates, respectively. They also examined the effects of charismatic (transformational) behaviors and unit-level correlates on superiors' assessments of leaders' performance. The findings provided only weak support for the theory and indicate a need for greater sensitivity to the multiple constituencies of leaders in theories and studies of charismatic leadership in organizations. It is possible that follower attribution processes that are unrelated to leader behavior produce charismatic effects. It is also possible that other charismatic leader behaviors, de-emphasized by the self-concept-based theory but emphasized by other theories, are more important and influential than those examined by the researchers.

Stadelmann (2010) conducted a correlational study of the effect of transformational leadership on subordinates’ extra effort and the moderating role of command structure. The study hypothesized that subordinates respond with extra effort, to a

higher degree, under the influences of transformational leadership than they do to transactional leadership.

This study showed that officers scoring high for transformational leadership are more likely to be found at the top two tiers of the leader hierarchy in the military and militia, with officers scoring high in transactional leadership composing the majority of the bottom tier of the leadership hierarchy. The study also revealed that subordinates put in extra effort for transformational leaders, but the study did not control for the data stating that transformational leaders are usually higher ranking, therefore, requiring more reverence.

Consistent with the prior-reviewed literature regarding transformational and transactional leadership in relation to innovation climate, Rosing et al. (2011) assumed that innovation is better served with a departure from rigid leadership in favor of applied adaptable leadership behaviors. These researchers suggest that leadership flexibility is particularly useful when applied in support of the stages within the innovation cycle, highlighting a dynamic condition in the way leadership influences innovation. Mitchell and James (2001) reinforced the idea that a dynamic, not linear, relationship is necessary to nurture innovation.

Huse (2003) noted that the U.S. Army has been in the midst of unprecedented transformation. Weaponry, vehicles, technology,

and especially people are the focus of change. With the need to manage these changes simultaneously, leadership challenges increase immeasurably. Transformational leadership has been noted as more effective than other styles for leading an organization through change (Yukl, 2001). Huse conducted a case study intended to show the applicability of transformational leadership within the U.S. Army through a describing the transformational leadership styles and techniques of two army generals who served during periods of transition. Huse also asserted that "throughout the course of military history, there have been numerous leaders within the U.S. Army that were considered exceptional in the areas of creativity, inspiration, and envisioning" (p. 21). Conceptually, the army supports transformational leadership, as evidenced by a paragraph in Field Manual 22-100 that discusses this leadership style and recommends transformational leadership practices. Citation is: Field Manual 22-100, Army Leadership (Washington D.C.: Government Printing Office, August 1999), 3-17. Huse noted the necessity of military leadership capable of leading effectively in an uncertain environment (p. 39).

General Eric K. Shinseki, Chief of Staff of the U.S. Army stated the following:

> We are, have been, and will remain a values-based institution where loyalty, duty, respect, selfless service,

> honor, integrity, and personal courage are the cornerstone of all that we do today and all of our future successes. (as cited in Huse, 2003, p. 1)

Northouse (2001), another leading author on leadership styles, stated that transformational leadership is a process that changes and transforms individuals, and is primarily concerned with values, ethics, standards, and long-term goals. It further involves assessing followers' motives, satisfying their needs, and treating them as full human beings. It is a process that subsumes charismatic and visionary leadership.

Burns (1978) also suggested that the transforming leader is one who, though initially driven by the search for individual acknowledgment and recognition, ultimately advances communal purpose by being attuned to the objectives of his or her followers.

Summary

The literature abundantly reveals a relationship between successful innovation climates and the leaders who drive it. This study is well rooted in the literature, which offers a solid theoretical foundation. After data collection and analysis, the study used the findings to infer the leadership style impact of the studied leader-group on their organizations' innovation climate.

Chapter 3: Methods

Research Design and Rationale

The preceding literature review provided the theoretical framework intended to serve as the principal grounding for this study on the impact of leadership style on organizational innovation climate. This study intended to reveal the dominant leadership styles of a sample of retired army senior officers (between transactional or transformational) through the Multifactor Leadership Questionnaire. The self-report survey dataset was collected from both the supervisors themselves and from their subordinates.

The current study used a quantitative research method and a descriptive correlation design. Use of bivariate correlations was an appropriate statistical test because variables were compared in pairs. Also, the sample size of 100 was adequate for correlations. A sample of this size or larger was needed in order to ensure the results were not due to the effects of outliers (Howell, 2008). The variables were tested to reveal either positive or negative relationships and included a predictor variable characteristic of transactional leadership (contingent reward behaviors) and predictor variables that are characteristics of transformational leadership (idealized influence behaviors, idealized influence attributes, individualized consideration, intellectual stimulation, and

inspirational motivation) and the outcome variable innovation climate, which represents the presence of a work environment that encourages or facilitates innovation. Significant correlations should be seen when a decrease or increase in one variable allows a researcher to predict (with a specified degree of accuracy) a change in another variable (Leedy & Ormond, 2010).

Restatement of the Research Questions and Hypotheses

Hypothesis testing was used to determine whether there is adequate statistical significance to justify rejection of the null hypotheses associated with each of the research questions. The null and alternative hypotheses are noted below as related to specific research questions.

RQ 1. What are the demographic characteristics of the sample of retired military senior officers in executive-level supervisory roles within the high-technology engineering defense industry? This question was answered by the inclusion of demographic questions for the supervisor sample.

RQ 2. According to the retired army senior officers' self-report, is there a predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

- H1: A statistically significant predominance will be found between the two styles of leadership).
- H0: No statistically significant predominance will be found between the two styles of leadership).

RQ 3. According to the retired army senior officers' self-report, when this sample is divided into higher and lower rank at the time of army retirement, is there a difference between the upper and lower rank subgroups in predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

- H2: A statistically significant predominance will be found between the two styles of leadership).
- H0: No statistically significant predominance will be found between the two styles of leadership).

RQ 4. According to the subordinate group, is there a predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry?

- H3: A statistically significant predominance will be found between the two styles of leadership).

- H0: No statistically significant predominance will be found between the two styles of leadership).

RQ 5. According to the retired army senior officers' self-report, what is the relationship between the leadership style and innovation climate? This question will be answered by responses to the MLQ and the innovation climate subscale of the Workplace Innovation Scale.

- H4: A statistically significant relationship will be found between contingent reward behaviors and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between contingent reward behaviors and innovation climate.

- H5: A statistically significant relationship will be found between idealized influence behaviors and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence behaviors and innovation climate.

- H6: A statistically significant relationship will be found between idealized influence attributes and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence attributes and innovation climate.

- H7: A statistically significant relationship will be found between individualized consideration and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between individualized consideration and innovation climate.

- H8: A statistically significant relationship will be found between intellectual stimulation and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between intellectual stimulation and innovation climate.

- H9: A statistically significant relationship will be found between inspirational motivation and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between inspirational motivation and innovation climate.

- H10: A statistically significant relationship will be found between management by exception (active) and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between management by exception (active) and innovation climate.

RQ 6. According to the subordinates' report, what is the relationship between the leadership style and innovation

climate? This question will be answered by responses to the MLQ and the innovation climate subscale of the Workplace Innovation Scale.

- H11: A statistically significant relationship will be found between contingent reward behaviors and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between contingent reward behaviors and innovation climate.

- H12: A statistically significant relationship will be found between idealized influence behaviors and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence behaviors and innovation climate.

- H13: A statistically significant relationship will be found between idealized influence attributes and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence attributes and innovation climate.

- H14: A statistically significant relationship will be found between individualized consideration and innovation climate.

H0: (r = 0) A statistically significant relationship will not be found between individualized consideration and innovation climate.

- H15: A statistically significant relationship will be found between intellectual stimulation and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between intellectual stimulation and innovation climate.

- H16: A statistically significant relationship will be found between inspirational motivation and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between inspirational motivation and innovation climate.

- H17: A statistically significant relationship will be found between management by exception (active) and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between management by exception (active) and innovation climate.

RQ 7. Is there a difference between the supervisors' responses and subordinates' responses regarding innovation climate? This question was answered comparing the groups' responses to the innovation climate subscale of the Workplace Innovation Scale.

- H18: A statistically significant difference will be found between the groups in their responses to the innovation climate subscale.

  H0: (r = 0) No statistically significant difference will be found between the groups in their responses to the innovation climate subscale.

RQ 8. Is there a difference between the supervisors' self-ratings and the subordinates' ratings of their supervisors on the MLQ?

- H20: A statistically significant difference will be found between the groups in their responses to the idealized influence behaviors subscale.

  H0: No statistically significant difference will be found between the groups in their responses the idealized influence behaviors subscale.

- H21: A statistically significant difference will be found between the groups in their responses to the idealized influence attributes subscale.

  H0: No statistically significant difference will be found between the groups in their responses the idealized influence attributes subscale.

- H22: A statistically significant difference will be found between the groups in their responses to the individualized consideration subscale.

H0: No statistically significant difference will be found between the groups in their responses the individualized consideration subscale.

- H23: A statistically significant difference will be found between the groups in their responses to the intellectual stimulation subscale.

  H0: No statistically significant difference will be found between the groups in their responses the intellectual stimulation subscale.

- H24: A statistically significant difference will be found between the groups in their responses to the inspirational motivation subscale.

  H0: No statistically significant difference will be found between the groups in their responses the inspirational motivation subscale.

- H25: A statistically significant difference will be found between the groups in their responses to the management by exception (active) subscale.

  H0: No statistically significant difference will be found between the groups in their responses the management by exception (active) subscale.

Description of Population and Sample

The larger population for the current study was the individuals employed as supervisors within the high-technology

engineering defense industry who have a background of military service, particularly in the U.S. Army, in addition to those employed under them.

Inclusion criteria for the supervisor group were as follows: participants had (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) current full time employment in a high-technology engineering defense contracting firm, having held an executive-level supervisor position for at least 6 months as a program manager, director, vice president, president, or CEO.

Inclusion criteria for the subordinate group consisted of employees having worked for at least 6 months under one of the respondents qualifying with the above inclusion criteria. The MLQ scores were obtained through the self-rating assessment tool and the subordinate's leader rating tool. As noted by Cerny (2008) who evaluated leadership in a military setting, although a trait assessment can be a good tool to measure leadership ability, more information can be gained from group members' perceptions about the leadership role. Thus the subordinate rating is considered an important aspect of the present study.

Sampling Method

Sample selection may involve more than one sampling strategy. The strategies used in this research were (a)

criterion sampling assures the sample meets general criteria and (b) purposeful sampling, used to identify cases of interest from people who know others who would qualify as part of the sample (Creswell, 2013). Purposeful sampling is directed at individuals who have experience that and purposefully inform an understanding of the research problem (Creswell, 2013).

The researcher's goal was to obtain a sample size of 100 respondents from each of the groups described in the following subsections (making 200 total participants). A total of 65 valid surveys were completed for the supervisor group and 35 for the subordinate group. The timeframe of data gathering was 3 weeks.

The researcher used personal contacts within the high technology defense industry to assist with the distribution of the study's survey. To protect the randomness of subject selection, care was taken to not directly approach potential participants who might fit the criteria of the targeted study groups. Human resource managers and other non-qualifying supervisors of known high technology defense companies were contacted by phone and email and were asked to make a broad distribution of the study's survey throughout their organizations. Skip logic embedded in the survey was used to filter out persons who did not meet the population criteria. A passage through the filters led the qualifying participants to one of two sets of survey questions, depending on whether they

met the criteria of the supervisor (leader) group or the subordinate (follower) group. There were 595 respondents who completed at least the filter questions on the survey. Of these, 488 were disqualified by not meeting the inclusion criteria and 7 were disqualified as incomplete surveys. Of the 100 remaining respondents who were included in the study, 65 met the supervisor (leader) criteria, and 35 met the subordinate (follower) criteria. The filter question about their role as supervisor or subordinate was used to divide them into groups.

To increase the snowball effect of distribution, all recipients of the email were encouraged by language included at the end of the survey to forward the email to others who might be interested in participating in this study.

Sample of supervisors. Recruitment contact persons were requested to send the survey invitation to supervisors meeting the inclusion criteria.

Sample of subordinates. Even though many of the subordinate employees may work on a variety of teams and projects, and therefore may report to more than one supervisor, any employee who reports to a qualifying supervisor was considered a subordinate for the purpose of this study. Recruitment contact persons were requested to send the survey invitation to subordinates of supervisors meeting the inclusion criteria, so that in the event the supervisor himself or herself declined to

participate, the employees could still do so. This was thought to potentially add validity to the sample, as the subordinate responses came from a larger pool, rather than only from those with supervisors who accepted the invitation to participate.

The supervisors were not linked in the surveys with the supervised employees, giving the supervised employees the assurance that even their collective responses would not be known by their supervisor. This was intended to give them an added level of collective anonymity, allowing the researcher to assume that responses would be more valid, not subject to any bias reflecting a desire to avoid supervisor disapproval or incur supervisor approval.

Human Subjects Considerations

Risk to participants in this study was considered minimal. The sought participants were not in a protected subject group as defined by the National Institute of Health (2005) and the standard procedures to ensure anonymity were followed. The investigator for this study was certified by the National Institutes of Health, Office of Extramural Research, and received Pepperdine University IRB permission for use of human subjects before beginning data collection (see Appendix A).

See Appendix B through D for the communications between the researcher and respondents, including the informed consent statement. All precautions to protect human research

participants were followed in accordance with the guidelines provided by NIH Office of Extramural Research. This included the following:

- No specific identifying information was gathered in any part of the study, and participants were asked to not volunteer any identifying information to the researcher by email or otherwise.
- Participants were informed of the inclusion criteria and topic of study.
- Participants were informed that participation is voluntary.
- The prospective participants' right to opt out of taking the study's survey was allowed through (a) ignoring the invitation to participate or (b) non-submission of a completed or partially completed questionnaire.
- Participants were informed of the type of questions and the average time needed to complete the questionnaire.
- Participants were informed that the researcher is unaware of any (a) potential risks associated with participating in the study or (b) direct benefits to the participant, although the participant's occupational field may benefit from increased understanding of specific leadership concerns and potentials.

- Participants were informed that anonymity would be maintained.
- Participants were informed that results of the study would be available for the participants' review at the completion of the study, upon request.

This study limited the collection of data to digital form. The dataset was digitally stored on a removable hard drive that was physically stored in a locked combination safe when not in use for data analysis. After the completion of the study, the original questionnaire responses became unavailable, subject to the privacy policy of the survey collection service (https://contribute.surveymonkey.com/privacy). The dataset collected by the researcher will be kept for a minimum of 3 years for research purposes.

The dataset was kept in electronic form, available only to the researcher, statisticians, and others directly involved in the research. Reference to the participants in this study was strictly limited to using the collective label *participants*, not identifying respondent characteristics by location. The IP addresses of the participants' survey responses were stripped from the data collected, then deleted.

Setting and Procedures

Recruitment strategy. The recruitment for this study proceeded as described in the following steps:

1. Formal permission was sought from high-technology engineering defense industry organizations listed through the Chamber of Commerce of Huntsville/Madison County (2013) to solicit participation from their employees who meet the inclusion criteria. Company administrators, supervisors, and persons known to the researcher were contacted by phone to explain the purpose of the study and make specific requests for participation invitation emails to be sent to them and/or their employees. The researcher sought approval from each appropriate organizational authority for the survey to be distributed, within their respective organizations, to both those fitting the leadership criteria and also their subordinates. Seventeen organizations agreed to distribute the survey to targeted groups in their organizations.
2. The administrative personnel assisted the researcher by forwarding the study participation invitation to those interested in participating in a study of leadership impact on innovation climate. The study used a single survey, with embedded skip logic, to filter out those who did not meet the inclusion criteria for either group. If a participant passed through all qualifying gates, they were directed to one of two questions sets, identical except for wording designed for either the supervisor or the subordinate. For

the supervisor group criteria included (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) current full time employment in the high-technology engineering defense industry, having held an executive-level supervisor position for at least 6 months. For the subordinate group, criteria were working under a person with those criteria (in the supervisor group) for at least 6 months. The employees themselves were allowed to self-identify as meeting the study criteria.

3. An email (a) explained the study; (b) invited participation from those who self-identified as interested in participating in a study of leadership impact on innovation climate; (c) invited email recipients to forward the email to others they know who meet the profile criteria of this study; (d) explained this study's adherence to IRB protections for risks to human subjects; (d) explained that to maintain anonymity and prevent gathering of signatures of informed consent, consent would be established by completion of the survey; (e) provided a link to the survey that was accessed through an online survey service (Surveymonkey) where participants were presented with survey items described in the instrumentation section; (f) extended an invitation that email recipients, whether they

chose to take the survey or not, could request an emailed copy of the results of the study, which they would receive after the research would be completed and published; and (g) requested completion of the survey within 1 week. See Appendix B.

Data collection. The data collection for this study proceeded as described in the following steps:

1. Participants accessed the survey online (as described above).
2. After three weeks, 100 qualifying surveys had been collected, and the data collector was closed.
3. The anonymity of participants was honored as initially represented. The IP addresses of the participants' survey responses were stripped from the data collected and deleted. The remaining variables from respondents were exported into an SPSS file from the survey service site. The SPSS file was modified to hold only the variables and the case responses. Data cleaning was initiated by visually scanning the rows to detect any entered data that had an extremely suspect pattern, such as all responses on one extreme of the scale; however, no surveys were observed to have a suspect response set. Surveys with all or almost all responses missing were also identified and removed.

Instrumentation

The survey was comprised of three sets of questions that were presented to respondents in this order: demographic questions that served as sorting questions and inclusion criteria (see Appendix E), leadership questions, and innovation climate questions.

Demographic questions. Responses to demographic questions were used for the purpose of ensuring that the inclusion criteria were met and sorted respondents into the leader group or subordinate group (see Appendix E). Demographic questions were also used to answer research question 1. RQ 1 asks: What are the demographic characteristics of the sample of retired military senior officers in supervisor roles within the high-technology engineering defense industry?

Multifactor Leadership Questionnaire (MLQ) short form. The main instrument selected for this study was the Multifactor Leadership Questionnaire. This instrument measures components of transformational leadership and transactional leadership (Avolio et al., 1999). The MLQ has been used extensively worldwide and is strongly predictive of leader performance across a broad range of both military and civilian organizations.

Participants were asked to respond to items in the MLQ 5x-Short (the current, classic version) using a 5-point Likert

scale (*not at all* to *frequently if not always*). See Appendix F for sample questions.

The following two described MLQ scales are identical except that in the first, the question was posed as a question about ones own leadership role, while in the second, the question was posed about ones immediate supervisor.

- MLQ - Self only: These items allowed individuals to report about their own leadership. It allowed a researcher to measure how the leaders perceive themselves with regard to specific leadership attitudes and behaviors.
- MLQ - Rater only: These items allow individuals to report about the leadership of their immediate supervisor. It allows a researcher to measure how the subordinates perceive their leaders with regard to specific leadership attitudes and behaviors.

To answer the research questions for the present study, there was no need to include the questions that load on the subscales for passive and laissez-faire leadership styles. *The MLQ Manual and Sample Set* confirmed that use of the set of two subscales (transformational and transactional) was acceptable, without inclusion of all four subscales (Avolio & Bass, 2004, p. 119). Use of these two subscales alone in the present study was believed to increase the response rate by decreasing the amount of time necessary to complete the survey.

Thus the passive and laissez-faire leadership subscales were omitted. Even if some of the leaders in the study might tend toward those styles, the current interest is to determine the strongest leaning toward one of the two styles focused on in the present study: transactional or transformational. Completing the questionnaire electronically usually takes about 15 to 20 minutes, but with two subscales omitted, it should take less time.

Innovation climate questions. The innovation climate subscale, part of the Workplace Innovation Scale (WIS), was used as a measure of innovation climate (see Appendix F for sample questions and Appendix G for permission to use in the present study). This scale helped determine the extent of an innovation climate perceived by supervisors and subordinate employees. It was correlated with the leadership style questionnaires measuring the two types of leadership of concern in the present study.

Validity and Reliability

Both instruments use an interval level of measurement. This level of measurement allows for differences in variables to be detected, but it is not exact as a ratio level measurement is, thus it cannot be assumed that the difference between each point on the scale is equal (Leedy & Ormond, 2010).

MLQ. Reliability scores for the MLQ subscales ranged from moderate to good (Antonakis, 2001). It has been well used in leadership studies, including study of military leadership (Lorell, Lowell, Moore, Greenfield, & Vlachos, 2002). Several studies reported respectable validity. The subscales have been tested to reveal any relationships among them, and revisions were made to ensure the subscales measure distinct factors (Avolio & Bass, 2004).

WIS. The WIS has demonstrated reliability over the past 9 years in various Australian contexts (McMurray et al., 2013). The innovation climate subscale had excellent validity shown by the Cronbach's alpha ($\alpha = 0.63$).

Operationalization of Variables

The independent variable is the supervisors' predominant leadership style (whether transactional or transformational), as indicated by scores on the MLQ. The dependent variable was innovation climate, as measured by the innovation climate subscale of the Workplace Innovation Scale.

Data Analysis

The dataset was transferred directly from the online survey into SPSS. The dataset was examined for inconsistencies such as missing responses or incomplete surveys. Seven surveys were missing all or almost all survey item responses, and these were removed from the sample (Leedy & Ormond, 2010).

For research question 1, regarding the demographic characteristics, the dataset is descriptive and was presented as percentages, averages, as well as response ranges. Correlations and comparison of means were used to answer the remaining research questions, as detailed in Chapter 4.

Summary

Quantitative analysis was used to determine relationships between leadership style and innovation climate. The MLQ, the innovation climate subscale, and demographic questions were presented in online survey format. Participants were (a) retired military senior officers in supervisor roles within the high-technology engineering defense industry as well as (b) the immediate subordinates of this sample of supervisors. This research design is intended to allow the researcher to accept or reject a set of hypotheses about the leadership style of retired army senior officers serving in supervisor roles in the high-technology engineering sector and the associated impact on organizational innovation climate.

Chapter 4: Results

This chapter presents the findings from the survey administered to retired U.S. Army senior officers currently employed as supervisors in the high-technology engineering defense industry and those working under them. This chapter reports the results of the statistical tests of the relationship between leadership style and past military rank and how these are related to scores on innovation climate as perceived by both participant groups (supervisors and subordinates).

Chapter 3 described the process of targeting respondents, filtering out non-qualifying respondents, and sorting respondents into the two groups. The filter questions successfully prevented 488 non-qualifying respondents from filling out the survey. Of the 100 respondents who were included in the study, 65 met the supervisor (leader) criteria and 35 met the subordinate (follower) criteria.

Data Preparation

The dataset was visually inspected to identify any problems with missing data or response sets. Of the 107 respondents who were not disqualified by the filter questions, 7 were dropped because they either did not respond to the survey or only a few items from it. For the remaining 100 respondents, a total of 8 missing values divided across 7 respondents were replaced with their corresponding series means.

Descriptive statistics, frequency tables, histograms, stem-and-leaf plots, and boxplots were examined for the supervisor and subordinate groups. No excessive deviations from normality, extreme outliers, or other problematic characteristics were identified in the distributions of the variables used in the inferential statistics.

Reliability

In the present study, the Cronbach's alphas for the innovation climate subscale of the Workplace Innovation Scale were .80 and .85 for the supervisor and subordinate groups, respectively. *The MLQ Manual and Sample Set* confirmed that use of the set of two subscales (transformational and transactional) was acceptable, without inclusion of all four subscales (Avolio & Bass, 2004, p. 119). Use of these two subscales alone in the present study was believed to increase the response rate by decreasing the amount of time necessary to complete the survey.

Reliability scores among MLQ factor scores (subscales) were reported for (a) the 2004 normative sample based on U.S. data (Avolio & Bass, 2004, p. 73) and (b) the present study. Both were at the $p < .05$ level, as noted in the first two numerical columns of Table 1. The overall pattern of reliability scores resembles those in the MLQ manual.

Table 1

Reliability Scores

Style	MLQ subscales	Reliability scores for supervisors self-ratings		Reliability scores for subordinates' ratings	
		Avolio & Bass	Present study	Avolio & Bass	Present study
Transformational leadership	Idealized attributes/ influence	.70	.44	.77	.81
	Idealized behaviors/ influence	.64	.68	.70	.72
	Inspirational motivation	.76	.57	.83	.81
	Intellectual stimulation	.64	.66	.75	.69
	Individual consideration	.62	.50	.80	.71
Transactional leadership	Contingent reward	.60	.51	.73	.68
	Management by exception (active)	.75	.80	.74	.77

Subscale intercorrelations found for the present study MLQ responses are noted in Table 2 and Table 3. On the supervisor self-report version of the MLQ survey for the present study, the original wording "I express satisfaction when others meet expectations" was changed. Instead of the term *others* this study used *subordinates*. This survey item loads on the contingent reward subscale, which in turn loads on the transactional leadership subscale. This word change was thought to enhance clarity, because for a respondent who might fit both the supervisor and subordinate category, who might be answering as a supervisor, the response would then be limited to responding about their supervisory role rather than including the

expressions of satisfaction they might make toward peers and supervisors.

Table 2

Subscale Intercorrelations for Supervisor Responses

		MLQ subscales						
		Transformational					Transactional	
MLQ subscales	Correlation	Idealized attributes	Idealized behaviors	Inspirational motivation	Intellectual stimulation	Individual consideration	Contingent reward	Management by exception (active)
Idealized attributes or idealized influence (attributes)	Pearson correlation	1	.531	.359	.404	.372	.386	.470
	Sig. (2-tailed)	-	.000	.003	.001	.002	.001	.000
Idealized behaviors or idealized influence (behaviors)	Pearson correlation	.531	1	.614	.626	.429	.440	.232
	Sig. (2-tailed)	.000	-	.000	.000	.000	.000	.063
Inspirational motivation	Pearson correlation	.359	.614	1	.522	.454	.565	.132
	Sig. (2-tailed)	.003	.000	-	.000	.000	.000	.295
Intellectual stimulation	Pearson correlation	.404	.626	.522	1	.516	.486	.339
	Sig. (2-tailed)	.001	.000	.000	-	.000	.000	.006
Individual consideration	Pearson correlation	.372	.429	.454	.516	1	.384	.118
	Sig. (2-tailed)	.002	.000	.000	.000	-	.002	.350
Contingent reward	Pearson correlation	.386	.440	.565	.486	.384	1	.312
	Sig. (2-tailed)	.001	.000	.000	.000	.002	-	.012
Management by exception (active)	Pearson correlation	.470	.232	.132	.339	.118	.312	1
	Sig. (2-tailed)	.000	.063	.295	.006	.350	.012	-

Table 3

Subscale Intercorrelations for Subordinate Responses

		MLQ subscales						
		Transformational					Transactional	
MLQ subscales	Correlation	Idealized attributes	Idealized behaviors	Inspirational motivation	Intellectual stimulation	Individual consideration	Contingent reward	Management by exception (active)
Idealized attributes or idealized influence (attributes)	Pearson correlation	1	.619	.760	.724	.742	.693	.155
	Sig. (2-tailed)	-	.000	.000	.000	.000	.000	.374
Idealized behaviors or idealized influence (behaviors)	Pearson correlation	.619	1	.688	.767	.602	.738	.320
	Sig. (2-tailed)	.000	-	.000	.000	.000	.000	.061
Inspirational motivation	Pearson correlation	.760	.688	1	.728	.569	.653	.137
	Sig. (2-tailed)	.000	.000	-	.000	.000	.000	.432
Intellectual stimulation	Pearson correlation	.724	.767	.728	1	.758	.710	.395
	Sig. (2-tailed)	.000	.000	.000	-	.000	.000	.019
Individual consideration	Pearson correlation	.742	.602	.569	.758	1	.692	.253
	Sig. (2-tailed)	.000	.000	.000	.000	-	.000	.143
Contingent reward	Pearson correlation	.693	.738	.653	.710	.692	1	.212
	Sig. (2-tailed)	.000	.000	.000	.000	.000	-	.223
Management by exception (active)	Pearson correlation	.155	.320	.137	.395	.253	.212	1
	Sig. (2-tailed)	.374	.061	.432	.019	.143	.223	-

An additional analysis was run to show that this change did not pose a problem in terms of the reliability of the subscale. This analysis provided the corrected item-total correlations for the items on this subscale (CR) and the reliability with the

item removed. The change does not appear to be a problem for the following reasons: (a) the two words have essentially the same meaning in context, (b) the reliability of the subscale is in the same range as the other subscales, and (c) its corrected item-total correlation of .20 was close to those of the other three items (.29, .40, and .38) and meets the minimal criterion for inclusion in the subscale according to the rule of thumb of not being under .20 (Everitt, 2006), and (d) the Cronbach's alpha for the subscale remained unchanged with or without the item included (.51 in both cases).

Findings

This section begins by reporting descriptive statistics for RQ 1 and inferential statistics to test the hypotheses for the remaining RQs. An alpha level of .05 was used for all tests of statistical significance.

RQ 1: Demographic Characteristics

RQ 1 asked: What are the demographic characteristics of the sample of retired military senior officers in supervisor roles within the high-technology engineering defense industry?

The only demographic data gathered was rank at retirement from U.S. Army. Due to the small numbers of higher-ranked generals, adding more demographic information for them would have compromised anonymity. These data are presented via two

tables, one for the supervisor respondents and one for the subordinate respondents.

Table 4 shows the *self-reported* count and percentages of rank at retirement from the U.S. Army for the 65 supervisor respondents, while Table 5 shows the *subordinate-reported* count and percentages of rank at retirement from U.S. Army for their supervisors, some of whom may have been respondents in this study. Clearly, because of the discrepancy in the counts and percentages of the two tables, either (a) some of the subordinate respondents' supervisors were not the same as the supervisor group responding in this survey or (b) the correct ranks were not known to the subordinate respondents. The first explanation seems the more likely to be operative in this case, because the survey did not include any request to respondents nor any instruction to the survey administrators that would ensure that subordinate respondents were responding about supervisors who were also respondents to the survey.

Table 4 shows that the majority of supervisor respondents were in the two lowest ranks included in this study: lieutenant colonel (35.4%) and colonel (44.6%). The higher-ranking respondents together comprised 20% of the supervisor sample.

Table 4

Supervisor Rank at Retirement From Military (Self-report)

Rank	Frequency	Valid percent	Cumulative percent
Lt. Colonel (O-5)	23	35.4	35.4
Colonel (O-6)	29	44.6	80.0
Brigadier General (O-7)	3	4.6	84.6
Major General (O-8)	5	7.7	92.3
Lt. General (O-9)	4	6.2	98.5
General (O-10)	1	1.5	100.0
Total	65	100.0	

Note. Rank is listed from the lowest to the highest included in this study.

Table 5 shows that the supervisors reported about by the subordinate respondents were predominantly in the lowest rank (lieutenant colonel, 57.1%). The rest of the supervisors reported about by the subordinate respondents together comprised 42.9% of the subordinate sample.

Table 5

Supervisor Rank at Retirement From Military (Subordinate-report)

Rank	Frequency	Valid percent	Cumulative percent
Lt. Colonel (O-5)	20	57.1	57.1
Colonel (O-6)	6	17.1	74.3
Brigadier General (O-7)	2	5.7	80.0
Major General (O-8)	3	8.6	88.6
Lt. General (O-9)	4	11.4	100.0
General (O-10)	0	0	100.0
Total	35	100.0	

Note. Rank is listed from the lowest to the highest included in this study.

RQ 2: Supervisor Self-Reported Predominant Leadership Style

RQ 2 asked: According to the retired army senior officers' self-report, is there a predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry? The following hypotheses relate to this RQ:

- H1: A statistically significant predominance will be found between the two styles of leadership.
- H0: No statistically significant predominance will be found between the two styles of leadership.

The mean scores of supervisors indicated the predominant leadership style as transformational (a statistically significant result). Thus, the null hypothesis is rejected.

As explained in Chapter 3, the two styles of leadership (transformational and transactional) are the dependent variables determined by the MLQ scores. The raw scores from the MLQ subscales are used to load onto two factors, which in this analysis are the two leadership styles. The mean of means of the combination of subscales representing idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration were used to determine the studied leaders' relative level of transformational leadership. The mean of mean values of the combination of subscales representing

contingent reward and active management-by-exception were used to determine the studied leaders' relative level of transactional leadership. Comparison of the executive supervisors' self-reported leadership style revealed a statistically significant predominance of transformational leadership.

The MLQ has norms that have been established by a very large sample. Norm-referenced tests yield information regarding an individual's score in comparison to a norm or average of performance by similar individuals. Normed *z* scores were used because they offer a way to compare these leaders' scores on the leadership styles with a larger group of leaders who have responded to the same survey items.

One reason that the additional analysis with norm-referenced scores was thought important was to help ensure that one change in the wording of one scale item did not affect the results. The following item loads on the contingent reward subscale, which in turn loads on the transactional leadership factor: "I express satisfaction when others meet expectations." In the present study, the wording used was "I express satisfaction when subordinates meet expectations" for the supervisor version and "My supervisor expresses satisfaction when subordinates meet expectations" (standard wording as found in the current version of the MLQ) for the subordinate version.

This wording was thought to enhance clarity, because for a respondent who might fit both the supervisor and subordinate category, who might be answering as a supervisor, the response would then be limited to responding about their supervisory role rather than including the expressions of satisfaction they might make toward peers and supervisors. This was the only variation from the original wording of the subscales used.

For the purpose of determining predominance, transactional and transformational leadership styles were represented in two ways: (a) the mean of the means of the raw MLQ subscale scores for each type and (b) the mean of means of the norm-referenced MLQ subscale scores for each type. The means based on the raw scores were used to make straightforward comparisons of scores on different MLQ subscales in terms of the frequency of the leadership style tendencies measured by the scale items. The means based on the norm-referenced scores were used to be able to compare scores on different MLQ subscales with each other along a common metric that represents the extent to which scores are above or below what is considered typical for each particular leadership style. Normed *z* scores were computed using the means and standard deviations of the appropriate normative samples reported in the MLQ manual. Referring to Table 10 of the MLQ manual (Avolio & Bass, 2004, p. 71), the supervisor self-reports were converted to *z* scores using the means and standard

deviations from the *self* column (respondents rating themselves), and the subordinates' ratings were converted to *z* scores using the means and standard deviations from the *lower level* column (respondents at a lower level than the leader they rated). The supervisor self-reported predominant leadership style was transformational for both the raw scores and the normed *z* scores, as shown in Table 6 and Table 7.

Table 6

Means of Raw Scores and Normed Z Scores for Supervisor Self-Report MLQ Ratings of Leadership Styles

Score type	Leadership style	Mean	*N*	*SD*
Raw scores	Transformational	3.4432	65	.38175
	Transactional	2.5386	65	.58026
Normed *Z* scores	Transformational	.7721	65	.48391
	Transactional	.3487	65	.66791

Table 7

Paired Samples Comparisons for Raw Scores and Normed Z Scores for Supervisor Self-report MLQ Ratings of Leadership Styles

	Paired Differences					*t*	*df*	Sig. (2-tailed)
	Mean differences	Std. Deviation	Std. error mean	95% confidence interval of the difference				
				Lower	Upper			
Raw scores	.90461	.49233	.06107	.78261	1.02660	14.814	64	.000
Normed *Z* scores	.42336	.56540	.07013	.28326	.56346	6.037	64	.000

Note. MLQ transformational mean minus the MLQ transactional mean = mean difference.

RQ 3: Predominant Leadership Style by Rank

RQ 3 asked: According to the retired army senior officers' self-report, when this sample is divided into higher and lower rank at the time of army retirement, is there a difference between the upper and lower rank subgroups in predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry? The following hypotheses relate to this RQ:

- H2: A statistically significant predominance will be found between the two styles of leadership.
- H0: No statistically significant predominance will be found between the two styles of leadership.

The self-reported supervisor predominant leadership style was the same for higher and lower ranks (a statistically significant result for both, with both as transformational in their predominant style). Thus, the null hypothesis is not rejected.

Moreover, in terms of predominant leadership style, an exploratory analysis revealed that there was no statistically significant difference in either transformational or transactional leadership style between the two rank tiers.

As explained in Chapter 3 (and above in the results for RQ 2), the two styles of leadership (transformational and transactional) are the dependent variables determined by the MLQ

scores. The raw scores from the MLQ subscales that load on the transformational and transactional leadership factors were used in this analysis (Avolio & Bass, 2004, p. 71) as well as *z* scores to compare the results to the normative sample.

The supervisor group was divided into a higher and a lower rank tier, as shown in Table 8 and Table 9. While six distinct senior officer ranks were examined, the divide between the lower rank tier and the higher rank tier was made between colonels and generals.

Table 10 shows the analysis conducted to test within-rank (tier) differences. The exploratory analysis showed similar results, in that there were no statistically significant differences between the lower rank tier and the higher rank tier on the mean of the means of the raw scores or normed *z* scores on the MLQ transformational or transactional leadership subscales, $-0.030 \leq ts(63) \leq 0.123$, $.902 \leq ps \leq .981$.

Table 8

Leadership Style Means by Rank Tier (Raw Scores)

Rank tier	Leadership style	Mean	*N*	*SD*
Lower rank supervisors Lt. Colonel (O-5) Colonel (O-6)	Transformational	3.4425	52	.38487
	Transactional	2.5431	52	.60922
Higher rank supervisors Brigadier General (O-7) Major General (O-8) Lt. General (O-9) General (O-10)	Transformational	3.4462	13	.38431
	Transactional	2.5207	13	.46681

Note. Rank is listed from lower to highest.

Table 9

Leadership Style Means by Rank Tier (Normed z Scores)

Rank tier	Leadership style	Mean	*N*	*SD*
Lower rank supervisors Lt. Colonel (O-5) Colonel (O-6)	Transformational	.7714	52	.48798
	Transactional	.3522	52	.70382
Higher rank supervisors Brigadier General (O-7) Major General (O-8) Lt. General (O-9) General (O-10)	Transformational	.7749	13	.48670
	Transactional	.3348	13	.52312

Table 10

Paired Samples Tests Comparing Leadership Style Means Within Lower and Higher Rank Supervisor Tiers

		Paired differences							
					95% Confidence Interval of the Difference				
Rank	Score type	Mean differences	Std. deviation	Std. error mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Raw scores	Lower rank tier	.89940	.51856	.07191	.75503	1.04377	12.507	51	.000
	Higher rank tier	.92542	.38641	.10717	.69191	1.15893	8.635	12	.000
Normed *z* scores	Lower rank tier	.41916	.59651	.08272	.25309	.58523	5.067	51	.000
	Higher rank tier	.44015	.43850	.12162	.17517	.70514	3.619	12	.004

Note. See prior tables for a list of lower and higher rank tiers.

RQ 4: Subordinate-reported Predominant Leadership Style

RQ 4 asked: According to the subordinate group, is there a predominant leadership style (either transactional or transformational) practiced by retired army senior officers serving in supervisor roles in the high-technology engineering defense industry? The following hypotheses relate to this RQ:

- H3: A statistically significant predominance will be found between the two styles of leadership).
- H0: No statistically significant predominance will be found between the two styles of leadership).

The mean scores of subordinates' ratings of supervisors indicated the predominant leadership style as transformational when using raw scores (a statistically significant result) but did not indicate a predominant leadership style when using normed *z* scores (a statistically non-significant result). Thus, the null hypothesis is partially rejected. The null hypothesis is rejected for the analysis using raw scores but not for the analysis using normed *z* scores.

As explained in Chapter 3 (and above in the results for RQs 2 and 3), the two styles of leadership (transformational and transactional) are the dependent variables determined by the MLQ scores. The raw scores from the MLQ subscales are used to load onto two factors, which in this analysis are the two leadership styles, while normed *z* scores are used to confirm the results in relation to a norm established by a larger sample.

As described for RQ 2, the mean of mean values of the combination of subscales representing contingent reward and active management-by-exception were used to determine the studied leaders' relative level of transformational and transactional leadership. A comparison of these mean of means

values was used to conclude leadership style predominance (Avolio & Bass, 2004, p. 71).

The mean difference when using normed *z* scores is small, especially compared to the corresponding supervisor self-ratings, so even if there were a statistically significant result in supervisors being rated as having a predominantly transactional leadership style, it would not be important practically. However, it is of interest that supervisors rated themselves more predominantly transformational than is the norm (for the MLQ overall), while the subordinates did not share that view. Table 11 shows the paired samples comparison for raw scores on the MLQ, while Table 12 shows the paired samples comparisons using raw scores and normed *z* scores for the MLQ.

Table 11

Means of Raw Scores and Normed Z Scores for Subordinate MLQ Ratings of Supervisor Leadership Styles

Score type	Leadership style	Mean	*N*	*SD*
Raw scores	Transformational	2.8257	35	.68001
	Transactional	2.3955	35	.64037
Normed Z scores	Transformational	-.0089	35	.84967
	Transactional	.1521	35	.75069

Table 12

Paired Samples Comparisons for Raw Scores and Normed Z Scores for Subordinate MLQ Ratings of Supervisor Leadership Styles

	Paired Differences					*t*	*df*	Sig. (2-tailed)
	Mean differences	Std. Deviation	Std. error mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Raw scores	.43023	.54027	.09132	.24464	.61582	4.711	34	.000
Normed *Z* scores	-.16096	.62883	.10629	-.37697	.05505	-1.514	34	.139

Note. MLQ transformational mean minus the MLQ transactional mean = mean difference.

RQ 5: Supervisor-Reported Link Between Leadership Style and Innovation Climate

RQ 5 asked: According to the retired army senior officers' self-report, what is the relationship between the leadership style and innovation climate? The following hypotheses relate to this RQ:

- H4: A statistically significant relationship will be found between contingent reward behaviors and innovation climate. H0: (r = 0) A statistically significant relationship will not be found between contingent reward behaviors and innovation climate.
- H5: A statistically significant relationship will be found between idealized influence behaviors and innovation climate.

H0: (r = 0) A statistically significant relationship will not be found between idealized influence behaviors and innovation climate.

- H6: A statistically significant relationship will be found between idealized influence attributes and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence attributes and innovation climate.

- H7: A statistically significant relationship will be found between individualized consideration and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between individualized consideration and innovation climate.

- H8: A statistically significant relationship will be found between intellectual stimulation and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between intellectual stimulation and innovation climate.

- H9: A statistically significant relationship will be found between inspirational motivation and innovation climate.

H0: (r = 0) A statistically significant relationship will be found between inspirational motivation and innovation climate.

- H10: A statistically significant relationship will be found between management by exception (active) and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between management by exception (active) and innovation climate.

All MLQ scales for the self-reported leadership styles were positively correlated with innovation climate (a statistically significant result), except for management by exception (active). Thus, the null hypothesis is rejected for hypotheses 4 through 9, although the null hypothesis for hypothesis 10 is not rejected. Table 13 shows the MLQ subscale scores correlations with innovation climate scores for this research question (supervisors) and the next (subordinates).

Table 13

Correlations Between MLQ Subscales and Innovation Climate for Supervisors and Subordinates

MLQ subscale	Supervisors *n* = 65		Subordinates *n* = 35	
	Correlation with innovation climate subscale	Sig. (2-tailed)	Correlation with innovation climate subscale	Sig. (2-tailed)
Idealized attributes or idealized influence (attributes)	.447	.000	.696	.000
Idealized behaviors or idealized influence (behaviors)	.530	.000	.693	.000
Inspirational motivation	.532	.000	.692	.000
Intellectual stimulation	.614	.000	.791	.000
Individual consideration	.697	.000	.767	.000
Contingent reward	.618	.000	.712	.000
Management by exception (active)	.184	.143	.410	.014

RQ 6: Subordinate-Reported Link Between Leadership Style and Innovation Climate

RQ 6 asked: According to the subordinates' report, what is the relationship between the leadership style and innovation climate? The following hypotheses relate to this RQ:

- H11: A statistically significant relationship will be found between contingent reward behaviors and innovation climate. H0: (r = 0) A statistically significant relationship will not be found between contingent reward behaviors and innovation climate.

- H12: A statistically significant relationship will be found between idealized influence behaviors and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence behaviors and innovation climate.

- H13: A statistically significant relationship will be found between idealized influence attributes and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between idealized influence attributes and innovation climate.

- H14: A statistically significant relationship will be found between individualized consideration and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between individualized consideration and innovation climate.

- H15: A statistically significant relationship will be found between intellectual stimulation and innovation climate.

  H0: (r = 0) A statistically significant relationship will not be found between intellectual stimulation and innovation climate.

- H16: A statistically significant relationship will be found between inspirational motivation and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between inspirational motivation and innovation climate.

- H17: A statistically significant relationship will be found between management by exception (active) and innovation climate.

  H0: (r = 0) A statistically significant relationship will be found between management by exception (active) and innovation climate.

All MLQ scales for the subordinate-reported leadership styles were positively correlated with innovation climate (a statistically significant result; see Table 11). Thus, the null hypothesis is rejected for hypotheses 11 through 17.

RQ 7: Supervisor vs. Subordinate Ratings of Innovation Climate

RQ 7 asked: Is there a difference between the supervisors' responses and subordinates' responses regarding innovation climate? The following hypotheses relate to this RQ:

- H18: A statistically significant difference will be found between the groups in their responses to the innovation climate subscale.

H0: (r = 0) No statistically significant difference will be found between the groups in their responses to the innovation climate subscale.

Supervisors rated innovation climate higher than subordinates did (a statistically significant result). Thus, the null hypothesis is rejected. The mean rating for supervisors (M = 2.95 SD = .56) was statistically significantly higher than it was for the subordinates (M = 2.40, SD = .80), $t(98) = 4.04$, p = .000.

RQ 8: Supervisor vs. Subordinate Ratings of Leadership Style

RQ 8 asked: Is there a difference between the supervisors' self-ratings and the subordinates' ratings of their supervisors on the MLQ? The following hypotheses relate to this RQ:

- H19: A statistically significant difference will be found between the groups in their responses to the contingent reward behaviors subscale.

  H0: No statistically significant difference will be found between the groups in their responses the contingent reward behaviors subscale.
- H20: A statistically significant difference will be found between the groups in their responses to the idealized influence behaviors subscale.

H0: No statistically significant difference will be found between the groups in their responses the idealized influence behaviors subscale.

- H21: A statistically significant difference will be found between the groups in their responses to the idealized influence attributes subscale.

  H0: No statistically significant difference will be found between the groups in their responses the idealized influence attributes subscale.

- H22: A statistically significant difference will be found between the groups in their responses to the individualized consideration subscale.

  H0: No statistically significant difference will be found between the groups in their responses the individualized consideration subscale.

- H23: A statistically significant difference will be found between the groups in their responses to the intellectual stimulation subscale.

  H0: No statistically significant difference will be found between the groups in their responses the intellectual stimulation subscale.

- H24: A statistically significant difference will be found between the groups in their responses to the inspirational motivation subscale.

H0: No statistically significant difference will be found between the groups in their responses the inspirational motivation subscale.

- H25: A statistically significant difference will be found between the groups in their responses to the management by exception (active) subscale.

  H0: No statistically significant difference will be found between the groups in their responses the management by exception (active) subscale.

Compared to how subordinates ranked them, supervisors rated themselves higher on all leadership styles (a statistically significant result), except for idealized influence attributes and management by exception (for which there were no statistically significant differences). Thus, the null hypothesis is rejected for hypotheses 19, 20, 22, 23, and 24, while the null hypothesis is not rejected for hypotheses 21 and 25.

To describe this result in greater detail, for the following MLQ subscales, supervisors rated themselves higher than subordinates did: contingent reward behaviors, idealized influence behaviors, individualized consideration, and intellectual stimulation. For the following MLQ subscales, there was no difference between the ratings by supervisors and the

ratings by subordinates: idealized influence attributes and management by exception (active). See Table 14 and Table 15.

Table 14

Means for Supervisor Self-ratings and Subordinates' Ratings of Supervisors on MLQ Subscales

MLQ subscale	Group	Mean	*SD*
Idealized attributes or idealized influence (attributes)	Supervisor	3.2200	.53681
	Subordinate	3.1143	.82992
Idealized behaviors or idealized influence (behaviors)	Supervisor	3.4578	.47498
	Subordinate	2.8857	.73850
Inspirational motivation	Supervisor	3.4423	.39963
	Subordinate	3.1071	.74084
Intellectual stimulation	Supervisor	3.6885	.66144
	Subordinate	2.4643	.72290
Individual consideration	Supervisor	3.4077	.40642
	Subordinate	2.5571	.87885
Contingent reward	Supervisor	3.2542	.53309
	Subordinate	2.8338	.74474
Management by exception (active)	Supervisor	1.8231	.87803
	Subordinate	1.9571	.89625

Note. For each row reporting supervisor results, $n = 65$; for each row reporting subordinate results, $n = 35$.

Table 15

Independent Samples T Tests Comparing Supervisor Self-ratings and Subordinates' Ratings of Supervisors on MLQ Subscales

MLQ subscales	*t*	*df*	Sig. (2-tailed)	Mean differences	Std. error difference	95% confidence Interval of the difference	
						Lower	Upper
Idealized influence (attributes)	.771	98	.442	.10568	.13702	-.16624	.37760
Idealized influence (behaviors)	4.703	98	.000	.57204	.12163	.33067	.81340
Inspirational motivation	2.945	98	.004	.33516	.11382	.10930	.56103
Intellectual stimulation	8.544	98	.000	1.22424	.14328	.93991	1.50857
Individual consideration	6.617	98	.000	.85055	.12853	.59548	1.10562
Contingent reward	3.261	98	.002	.42038	.12890	.16458	.67619
Management by exception (active)	-.723	98	.471	-.13407	.18542	-.50202	.23389

Summary

The following list summarizes the findings most relevant to each research question.

- RQ 1: With 65 supervisor respondents and 35 subordinate respondents, the supervisor respondents made up roughly two-thirds of the sample. The majority of supervisor respondents were in the two lowest ranks included in this study: lieutenant colonel (35.4%) and colonel (44.6%). The higher-ranking respondents (four ranks of generals) together were 20% of the supervisor sample. The supervisor group that the subordinates reported about was not the same group as the supervisor respondents; in other words, it is

possible that some of the supervisor respondent group members were the same supervisors the subordinate group reported about, but not all were.

- RQ 2: The mean scores of supervisors' self-report indicated the predominant leadership style as transformational (a statistically significant result).
- RQ 3: The self-reported supervisor transformational and transactional leadership styles were the same for higher and lower ranks (showing no significant differences). Thus, the null hypothesis is not rejected. The independent examination of colonels (O-5 and O-6) and generals (O-7 through O-10) show that the two levels do not differ in the extent to which they have a transformational or transactional leadership style.
- RQ 4: The mean scores of subordinates' ratings of supervisors indicated the predominant leadership style as transformational when using raw scores (a statistically significant result); however, ratings did not indicate a predominant leadership style when using normed *z* scores (a statistically non-significant result).
- RQ 5: Both MLQ scales for the self-reported leadership styles were positively correlated with innovation climate (a statistically significant result), except for the subscale management-by-exception (active).

- RQ 6: Both MLQ scales for the subordinate-reported leadership styles were positively correlated with innovation climate (a statistically significant result).
- RQ 7: Supervisors rated their organization’s innovation climate as being higher than subordinates’ ratings of innovation climate (a statistically significant result).
- RQ 8: Compared to how subordinates ranked them, supervisors rated themselves higher on all leadership styles (a statistically significant result), except for idealized influence attributes and management by exception. For these two subscales there were no statistically significant differences between supervisor self-ratings and subordinate ratings of their supervisors.

Chapter 5: Conclusions and Recommendations

This study examined the relationship between leadership style and past military rank, and how these might impact an organization's innovation climate. The survey data provided an in-depth view of the leadership style of retired U.S. Army senior officers currently employed as supervisors in the high-technology engineering defense industry, as reported by the supervisors themselves and those working under them. Two leadership styles--transactional and transformational--were the focus of the study. Innovation climate was also examined, as potentially affected by leadership style.

This chapter relates the findings to the existing literature, discusses the implications of the findings, makes recommendations for practical application, notes limitations, makes suggestions for further research, and summarizes the over-arching conclusions of the study.

Summary of Findings and Implications

RQ 1 relates to demographic characteristics. The higher rank tier, consisting of general officers (O-7s through O-10s), represented 20% of the total qualified respondents in the supervisor group. The lower rank tier, composed of colonels (O-5s and O-6s), represented 80% of the total qualified survey respondents in the supervisor group. This ratio of generals to colonels (.25) follows the general pattern commonly found in

hierarchically structured organizations, where the number of slots decreases toward the top of the hierarchy.

RQ 2 relates to executive-level supervisors' self-reported predominant leadership style. The mean scores of executive-level supervisors indicated their predominant leadership style as transformational. This conclusion is drawn from the scoring of transformational leadership subscales in the MLQ, as compared to the scoring of transactional subscales in the MLQ. The scoring of the transformational subscales indicated a propensity for the studied leaders to apply a comprehensive combination of influences and behaviors. This includes idealized influence *attributes* (as a subscale), which is composed of instilling pride in others, placing the good of the group above their own self-interests, and a leader acting in ways that generates respect for their behavior. The idealized influence *behaviors* include openly referencing their most important values, emphasizing a sense of purpose, considering the moral and ethical implications of their decisions, and promoting a shared sense of mission.

The transformational leadership propensity of these leaders points to their self-reported use of inspirational motivation, where they optimistically speak of what is to come, enthusiastically welcome the challenge of their team's work,

craft and share a clear vision, and confidently express that what they are setting out to do will be achieved.

The scoring of the MLQ indicates their confidence in their propensity to provide intellectual stimulation, where they continually examine the appropriateness of their critical assumptions and welcome different perspectives in the process of resolving problems. They also show a confidence in their propensity to appreciate the individuality of their subordinates, and show a willingness to give their time to coach and develop others' strengths.

The qualities described above directly align with the MLQs subscales relating to transformational leadership. One implication of these findings is that despite the appropriate transactional leadership that was generally accepted as situationally appropriate in their active-duty military life, these leaders show an appreciation of and a self-reported adoption a predominantly transformational leadership style when acting as executives in the high-technology for-profit industry.

RQ 3 relates to self-reported predominant leadership style by rank. The sample of executive supervisors was examined for two independent leader groups divided into a lower rank tier, composed of colonels (O-5s and O-6s) and a higher rank tier, composed of general officers (O-7 through O-10). The examination of each group revealed no predominance of one leadership style

over the other. In other words, colonels and general officers held similar views of their leadership style in terms of transformational and transactional characteristics. This may not seem to contribute much to the study, but it does offer an important point. For other finding, one question may arise as to the generalizability of the findings of this study's *supervisor respondent group* and the supervisor group *described by subordinates*, given that the former group is comprised of comparatively higher-ranked members. The finding for RQ 3 is evidence that at least in the supervisors' perceptions, these groups should be seen as largely comparable.

RQ 4 relates to subordinate-reported predominant leadership style. The mean scores of subordinates' ratings of supervisors indicated the predominant leadership style as transformational when using raw scores (a statistically significant result). The implication is that subordinates view their supervisors' transformational and transactional characteristics similarly to the way the supervisors view those characteristics.

However, by applying normed *z* score analyses, the comparison of means showed that the subordinate group saw their supervisors as being slightly more transactional than transformational, although this result was not statistically significant. In other words, when comparing this sample subordinate group with a normative sample (i.e., a very large

sample including private, non-profit, and governmental supervisors responding to the MLQ), this study's subordinate sample rated their supervisors as more transactional than the normative sample rated their supervisors. (Note that, as explained in Chapter 4, the supervisors described by the subordinate group are not necessarily the same supervisors that comprise the supervisor group in the present study). This trend, though it is not at a significant level, seems to imply that to some extent, subordinates' see their executive-level supervisors as having transformational leadership qualities at a lesser degree than the normative sample outside the present study sees these qualities in their supervisors.

RQ 5 relates to the supervisor-reported link between leadership style and innovation climate. Both MLQ scales for the self-reported leadership styles (transformational *and* transactional) were positively correlated with innovation climate at a statistically significant level, except for the management by exception (active) subscale. This indicates that these supervisors believe that both leadership styles have a role in fostering an innovation climate. This also seems to indicate that management-by-exception is not perceived to foster an innovation climate, according to the executive-level supervisors. These findings help to refute the notion that decades of leadership in a military setting predisposes the

military retiree to predominantly function as a transactional leader in other, post-military settings. The earlier-presented findings for RQ 2, which revealed that executive-level supervisors perceive themselves as predominately transformational in their leadership style, coupled with the positive correlation found for this research question (RQ 5), seems to indicate that retired U.S. Army leaders serving as executives in the high-technology defense sector are capable of situational leadership (Northouse, 2001) and/or ambidextrous leadership, utilizing one or both styles depending on the current need. Ambidextrous leadership refers to a leader's ability to foster both explorative (innovative and creative) and exploitative behaviors in followers by increasing or reducing variance in their behavior and flexibly switching between those behaviors (Rosing et al., 2011)

The finding that the MLQ's management-by-exception subscale (loading on the transactional leadership scale), lacked a statistically significant correlation with innovation climate, seems to indicate that these leaders may consider the leadership elements within the management-by-exception subscale as the least useful leadership approaches. The management by exception subscale refers to actions and attitudes such as focusing attention on irregularities, mistakes, exceptions, complaints, and deviations from standards (Avolio & Bass, 2004, pp. 114-

115). Reflecting on the discovery associated with RQ 2, this finding also seems to indicate that these leaders believe that they tend to apply the practices related to transformational leadership (i.e., encouragement and inspiration) before they focus their attention on the mistakes or policy deviations of their subordinates.

RQ 6 relates to the subordinate-reported link between leadership style and innovation climate. Both MLQ scales for the subordinate-reported leadership styles (transformational *and* transactional) were positively correlated with innovation climate at a statistically significant level. This is similar to the finding for RQ 5, with the supervisors' self-report matching the subordinates' report of a similar supervisor group. This finding indicates that the subordinates believe that both leadership styles have a role in fostering an innovation climate.

It should be noted that the transactional leadership qualities were believed to also foster an innovation climate, showing a significant positive correlation with innovation climate, instead of just being non-significant (i.e., neutral). This finding does not support prior studies in which transactional leadership style was reported to have a counterproductive impact on aspects of innovation climate, such as knowledge conversion (Allameh et al., 2012), perceived social

support, self-efficacy beliefs, emotions, and threat appraisals (Lyons & Schneider, 2009). Instead, this study's findings somewhat support the findings of Jung and Sosik (2006), as described in the literature review, suggesting that under varying conditions, some subordinates generated more ideas (i.e., a measure of innovation) under a transformational leader, while other subordinates generated more ideas under a transactional leader. In other words, there was an interaction among type of leader, type of subordinate, and type of situation, with differing outcomes for each combination.

Moreover, the positive correlation between leadership style and innovation climate may indicate that the use of these leaders' transactional qualities, when assessing the application of these qualities in the context (i.e., utilizing situational and/or ambidextrous leadership), seems to indicate an ability to pick and choose the transactional and transformational qualities that enhance innovation climate, depending on the situation.

RQ 7 relates to the supervisor vs. subordinate ratings of innovation climate. Supervisors rated their organization's innovation climate higher than subordinates did (at a statistically significant level). This seems to indicate that executive-level supervisors conceptually understand the leadership nuances required to optimize innovation climate and perhaps believe they are applying what is necessary to provide a

practical, positive impact, while subordinates interpret the executive-level supervisors' impact on innovation climate to be at a lower level than their leaders believe it is.

RQ 8 relates to the supervisor vs. subordinate ratings of leadership style. Compared to how subordinates ranked their supervisors, the present study's supervisor group rated themselves higher on both MLQ leadership scales (a statistically significant finding) except for idealized influence attributes and management by exception subscales (for which there were no statistically significant differences). This finding indicates that supervisors may see their leadership roles as more prominent, important, and impactful than the subordinates believe they are, even though subordinates agree with supervisors' evaluation of their leadership in terms of distribution of transformational and transactional characteristics (as shown for RQ 4).

The two subscale exceptions in this finding are from both transformational and transactional leadership styles, with one subscale from each leadership style showing a non-significant difference between the supervisor and subordinate ratings. The balanced aspect of these exceptions seems to add further support to these leaders' ability to function ambidextrously and refutes the notion that these leaders heavily lean towards the

transactional side. The possible implications of these subscale exceptions are discussed next.

For the idealized influence subscale, subordinates agreed with the high ratings the supervisor group gave themselves. Idealized influence is a characteristic of the transformational leadership style. The high ratings that subordinates gave their supervisors for the idealized influence subscale indicates that the subordinates hold these leaders in high regard, which has added validity when considering the complete anonymity provided by the present study's procedures. The elements of idealized influence include qualities that relate to a person's character. This includes holding the group's interests above their own self-interest, behaving in ways that generate respect, and considering the moral and ethical implications of decisions (Avolio & Bass, 2004).

Management-by-exception (passive) is a characteristic of the transactional leadership style. As a tribute to the supervisors, the subordinates agreed in their ratings that this attribute, seen as less promoting of innovation climate (see findings for RQ 5), was less prominent in these supervisors' leadership style.

Recommendations for Practical Application

The practical utility of the findings seems most suitable for leadership training within for-profit businesses that

purposely hire former military high-ranking officials into executive-level supervisory positions, especially for industries where--as in the aerospace industry--innovation climate is prized. Executive-level supervisors, regardless of their decades of experience, may benefit from leadership training. The following recommendations are suggestions for inclusion of these findings in training such leaders.

Training on leadership impact. Findings for RQ 8 indicate that supervisors may see their leadership roles as more prominent, important, and impactful than the subordinates believe they are. To add to this concept, supervisors rated innovation climate higher than subordinates did (at a statistically significant level; see RQ 7). For training purposes, the inclusion of a conceptual understanding of power may help both leader and follow differentiate, for the sake of their working relationship and their organization's effectiveness, the dissimilarities between power and leadership. Recently studies of followers have been investigating impact of followership characteristics on leadership and the co-creation of influence (Uhl-Bien, Riggio, Lowe, & Carsten, 2014). A leadership training incorporating followers' feedback or followers' participation makes sense in this context.

Clarify expectations on leadership style. This study revealed, with statistical significance, that the executive-

level supervisors perceive themselves (RQ 2) and are perceived by subordinates (RQ 4) as having the qualities that represent a predominant transformational leadership style. However, by applying normed z score analyses, the comparison of means showed that the subordinate group saw their supervisors as being slightly more transactional than transformational, although this result was not statistically significant. Although not worthy of tremendous attention, as a non-significant result, the trend may indicate an opportunity to discuss whether such organizations would benefit from an increase in the transformational attributes of supervisors. If leaders perceive themselves to be adequately promoting innovation climate, little may be done to shift how they engage their followers who do not perceive as much influence on innovation climate (RQ 7).

Organizations may benefit by training involving both leaders and followers as participants in a shared setting, as this training could establish a common transformational leadership language for leaders and followers alike. According to Uhl-Bien et al. (2014), it is in the leader and follower relationship that the leader delivers an organizational impact through the engaged contributions of their followers. A review of the principles of leadership as impacting innovation climate may prove beneficial, helping leaders and followers to work within a common paradigm to foster the continual

development of the leader and follower relationship. The application of shared visioning (Kouzes & Posner, 2008) may broaden the idea sources and expand the scope of choices for product and service differentiation. This may require the executive leader to invite others into the decision space that may have traditionally been in the sole territory of the executive-supervisor. The transactional leadership has been seen as common in military organizational structures, and transactional leadership does seem to have practical value for advancing in rank while in the military, yet it does not necessarily reveal the executive-level supervisors' ability to communicate the value of the leader and follower relationship to their subordinates. According to one organizational leadership researcher (K. Claypool, personal communication, April 7, 2015), "A common, misguided, qualifying characteristic of defining a leader often uses terms relating more to the amount of power, position, and decision rights that are provided by the organization." Claypool further contends, "Little is mentioned about aligning the hearts and minds of followers or stimulating deeper levels of engagement in organizational interests. This view seems common, not only with those describing leaders, but with leaders describing themselves."

This type of leadership discussion could help organizations utilize transactional leadership and transformational leadership

according to situational demands. This study seems to indicate the executive-level supervisors are capable of functioning with a transformational leadership style, a transactional leadership style, or a combination of the two, depending on the situation. Knowing when to shift gears and how to communicate the shift to followers can potentially raise their organization's effectiveness. Leaders should be cautioned that the transformational leadership approach often takes more time than alternative leadership approaches, thus in some cases, the expediency of "getting the job done" might be better achieved through the application of transactional leadership. If what the organization requires is available only within a time-constrained window, use of transactional leadership may often be necessary.

On the other hand, the benefits of applied transformational leadership include aligning individual contributors into a higher-level collective impact, where the impact of a set of synergized contributors is greater than the sum of the individual contributors involved. Establishing this alignment takes time. When time allows, the opportunity to capture latent creativity could be harnessed by an organization if they are willing to assemble their resources through the application of transformational leadership to foster an innovation climate.

Training and communication on situational applications of leadership styles, for both executive-supervisors and subordinates, can benefit their organizations, as both leader and follower develop a common understanding of how situations, associated urgency factors, and windows of opportunity temper the process of choosing the leadership style applied. With an understanding of affecting factors, both leader and follower can flexibly adapt to the mode that maximizes the fulfillment of organization interests. It may be useful for organizations to communicate their expectations to executive-level supervisors that the leaders' ideal role is to offer support and provide a climate of innovation, in ways fostered by transformational leadership, not to keep subordinates in line and on task, as a more transactional role.

Recommendations for Future Studies

Representative sample. The higher rank tier, consisting of general officers (O-7s through O-10s), represented 20% of the total qualified respondents in the supervisor group. The lower rank tier, composed of colonels (O-5s and O-6s), represented 80% of the total qualified survey respondents in the supervisor group. This ratio of generals to colonels (.25) follows the general pattern commonly found in hierarchically structured organizations, where the number of slots decreases toward the top of the hierarchy. Although the proportion of generals

compared to colonels responding to this study followed this expected pattern, the ratio of generals to colonels in the U.S. Army is even smaller than the ratio of generals to colonels responding to this study. This suggests the possibility that, while fewer in number, a larger percentage of retired U.S. Army general officers are in the executive-level range of positions in the high-technology defense sector, versus the percentage of U.S. Army retired colonels. If future studies had more representative sampling (unlike the present study's convenience sample) and showed a similar percentage, this would confirm the assumed high demand for general officers in the high-technology defense industry.

Innovation climate and leadership style. Results for RQ 7 indicate that supervisors rated their organization's innovation climate higher than subordinates did (at a statistically significant level). Prior studies have suggested a complex relationship between leadership style, with some conditions in which transformational and some conditions in which transactional is more conducive to innovation climate (Jung & Sosik, 2006). Future studies might explore various leadership behaviors under various conditions to determine which lead to subjective improvement in innovation climate, or more importantly, measurable improvement on return on investment (ROI). Transformational leadership is touted in the literature

to pay big dividends in establishing and nurturing an innovation climate (Rosing, Frese, & Bausch, 2011). Positioning the organization through differentiated products and services can potentially be accelerated through the expansion of the creative sources applied, though more evidence is needed for this assertion.

Ambidextrous and situational leadership styles. The framework for the present study provided only for an examination of transformational and transactional leadership, not the combination of the two. The earlier-presented findings for RQ 2 revealed that executive-level supervisors perceive themselves as predominately transformational in their leadership style. Coupled with the positive correlation found for both leadership styles and innovation climate (RQ 5), the findings seem to indicate that retired U.S. Army leaders serving as executives in the high-technology defense sector are capable of situational leadership (Northouse, 2001) and/or ambidextrous leadership (Rosing et al., 2011), having the capacity to apply either a transformational or transactional leadership style, or a combination of the two, depending on what the leadership situation demands. Ambidextrous leadership is a recently formulated conceptualization that differs from situational leadership. Ambidextrous leadership is defined as a leader's ability to foster both explorative (innovative and creative) and

exploitative behaviors (positioning talents and incentives where needed) in followers by increasing or reducing variance in their behavior and flexibly switching between those behaviors (Rosing et al., 2011). Because the present study indicated a correlation of both transactional and transformational leadership with innovation climate, future studies might profitably include ambidextrous leadership to determine when and how each style fosters an innovation climate. The dual-leadership style of the executive-level supervisors suggests an ability to function in a wide band of leadership situations. This may indicate that the diversity of exposure throughout their careers may have shaped them in ways that reveal their understanding of what makes an effective and versatile leader.

Findings of this study indicate that both leadership styles have a role in fostering an innovation climate. Specifically it should be noted that some transactional leadership qualities showed a significant positive correlation with rating of the organization's innovation climate, instead of just being non-significant (i.e., neutral). This finding does not support prior studies in which transactional leadership style was reported to have a counterproductive impact on aspects of innovation climate, such as knowledge conversion (Allameh et al., 2012), perceived social support, self-efficacy beliefs, emotions, and threat appraisals (Lyons & Schneider, 2009). Instead, this

study's findings somewhat support the findings of Jung and Sosik (2006), as described in the literature review, suggesting that under varying conditions, some subordinates generated more ideas (i.e., a measure of innovation) under a transformational leader, while other subordinates generated more ideas under a transactional leader. In other words, there was an interaction among type of leader, type of subordinate, and type of situation, with differing outcomes for each combination. Further research, extending Jung and Sosik's concepts, could clarify the potential of ambidextrous leadership.

Qualitative study. Findings for RQ 6 revealed that both MLQ scales for this study's supervisor group (as reported by subordinates) were positively correlated with innovation climate (at a statistically significant level). Yet, supervisors rated innovation climate higher than subordinates did (at a statistically significant level; see RQ 7). This finding opens an opportunity for a future qualitative study to elaborate on what leadership qualities most influence subordinate engagement in the innovation process. With the insights provided by such a study, innovation leaders may be able to leverage findings to fine tune their leadership approach and optimizing subordinates' contributions. Further, a qualitative study could also shed light on how innovation climate might be perceived or defined differently by these two groups (supervisors and subordinates).

Innovation climate and objective metrics. Leaders should be cautioned that the progress made in the development of innovation climate is often assessed subjectively, as is the case in the present study. Much value could be gained from studies that utilize objective measures of innovation climate and creativity, especially when applied in real work settings. Researchers are cautioned that the metrics applied in organizations functioning in the free market, where performance objectives are readily quantified, are not easily applied to measuring the progress or benefits of innovation while in process. In other words, the revelation of an industry-leading product or service that was spawned by a robust innovation climate is not recognized until it emerges in tangible form. The application of return on investment analysis (ROI) or tangible progress metrics, the dominating methods of value assessment, does not apply well in the assessment of building and advancing an innovation climate. Effective measurement may require a longitudinal study. A suggested recommendation is to build a supporting coalition from all levels in the organization and, in particular, as far up as possible in the reporting chain, while at the same time building in feedback to build a trustworthy database. This type of research could clarify benefits of innovation climate. Such studies could bring the bigger picture to bear on decisions. Without such metrics, an uninformed

superior, using classical metrics, can apply decision rights that can terminate a project or even the positions of individuals involved, though such persons may be using assessment methods that are not well suited for evaluating the innovation process. Such actions inhibit the innovation climate.

Variously operational definitions of innovation. The framework for the present study provided for the examination of only innovation climate, not other known distinct components of innovation such as organizational innovation, individual innovation, and team innovation (McMurray, Islam, Pirola-Merlo, & Sarros, 2013). Future studies might profitably include a variety of measures of innovation, such as is available by the full Workplace Innovation Scale.

Summary and Conclusion

This study's research questions were based on the researcher's conjecture that after 20 to 40 years of reinforced military-specific leadership, the authoritative and transactional leadership style that is predominant in military settings would remain consistent as the predominant leadership style used by prior military officers even as some of them move on to serve in the civilian business sector. The focus of this examination stemmed, in part, from foundational literature (Rudner, 2007, para. 8) reflecting on the military culture's

emphasis on past tradition, rigid adherence to authoritarian structure, and a set chain of command.

The literature review notes the positive correlation between transformational leadership style and characteristics fostering an innovation climate (Allameh, Babaei, Chitsaz, & Gharibpoor, 2012; Charbonnier-Voirin, El Akremi, & Vandenberghe, 2010), as well as the relationship shown in the literature between leadership characteristics and organizational innovation (Hoch, 2013; Jung & Sosik, 2006). The related over-arching question was whether, after decades of service during which primary duties were predominately carried out through the use of a predominantly transactional style, the prior senior military leaders are apt to observe, learn, and apply the benefit of adopting a different approach in a for-profit setting, namely transformational leadership.

The introduction of this study considered the high demand to employ retired, high-ranking officers in the high-technology defense industry, after their retirement from military service. Defense firms commonly seek to hire these officers to leverage the retired officers' institutional knowledge of funded defense programs, their associated relationship and influence network, and the carry-over authority that many of these officers continue to hold, even after their exit from the military. This study concerned the leadership impact of these retired senior

army officers serving in executive-level supervisor roles within high-technology defense firms.

This study examined the relationship between the leadership characteristics of these executive-level supervisors and innovation climate. This study quantitatively examined--through the steps of collecting online survey data, then applying statistical analysis--the impact of applied leadership on the organizational innovation climate. Organizational climate is defined by Charbonnier et al. (2010) as an environment in which followers are encouraged to independently develop ideas and collaborate with team members to synthesize multiple perspectives for larger collective creativity, a place where employees are exposed to "norms and practices that encourage flexibility and the expression of ideas and learning" (p. 701). The study examined the leadership style of the supervisors to infer leadership style predominance through statistical analysis of survey data collected through the Multifactor Leadership Questionnaire (MLQ), a survey tool that has been repeatedly validated to reveal both transactional and transformational leadership propensities, among other leadership styles not examined for this study (Avolio et al., 1999). The MLQ results were correlated with the innovation climate subscale of the Workplace Innovation Scale. The main findings were as follows:

- The mean scores of the military-background executive-level supervisors indicate their predominant leadership style as transformational, as rated by themselves and as rated by subordinates of these executive-level supervisors.
- Baucus (2008) indicated that a leader's rigidity and emphasis on hierarchical structure transfers to rigidity to the innovation process, which led the researcher to question whether military leadership might inhibit innovation climate. Correlations between leadership styles and innovation climate seemed to refute the notion that decades of leadership in a military setting predispose the military retirees to predominantly function as a transactional leader in a for-profit post-military leadership setting.
- Both MLQ scales for the subordinate-reported leadership styles were positively correlated with innovation climate at a statistically significant level. The positive correlation of both leadership styles with innovation climate seems to indicate that these leaders have the ability to utilize both transformational and transactional qualities to enhance innovation climate.
- The study seems to indicate that subordinates interpret their organization's innovation climate to be at a lower level than their executive-level supervisors' interpret it to be (based on a statistically significant finding).

- The subordinate ratings of the executive-level supervisors' idealized influence subscale, as compared to subordinates' ratings on all other subscales, was as high as the executive-supervisors' self-reports. This indicates that the subordinates hold these leaders in high regard. The elements of idealized influence include qualities that relate to a person's character. This includes holding the group's interests above their own self-interest, behaving in ways that generate respect, and considering the moral and ethical implications of decisions (Avolio & Bass, 2004).

In conclusion, while there are indications that subordinates interpret the executive-level supervisors' impact on innovation climate to be at a lower level than executive-level supervisors believe, there is also statistically significant support to indicate that retired high-ranking U.S. army leaders, serving as executives in the high-technology defense industry, are capable of effectively applying either a transformational or transactional leadership style, or a combination of the two, depending on what the leadership situation demands. The study also indicates that the leadership qualities of these executive supervisors include the transformational leadership qualities that foster an innovation climate (as described by Gumusluoglu & Ilsev, 2009; Rosing et al., 2011; Somech & Drach-Zahavy, 2013).

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APPENDIX A

IRB Permission Letter

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

January 5, 2015

Joe Collazo
[redacted]

Protocol #: E1014D03
Project Title: Impact of Leadership Style on Innovation: A Study of Retired Military Senior Officers in Executive Roles Within the High-Technology Engineering Defense Industry

Dear Mr. Collazo,

Thank you for submitting your application, *Impact of Leadership Style on Innovation: A Study of Retired Military Senior Officers in Executive Roles Within the High-Technology Engineering Defense Industry*, for expedited review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your advisor, Dr. Schmieder-Ramirez completed on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. As the nature of the research met the requirements for expedited review under provision Title 45 CFR 46.110 (Research Category 7) of the federal Protection of Human Subjects Act, the IRB conducted a formal, but expedited, review of your application materials.

I am pleased to inform you that your application for your study was granted **Full Approval**. The IRB approval begins today, **January 5, 2015**, and terminates on **January 5, 2016**. In addition, your application to waive documentation of informed consent has been **approved**.

Your final consent form has been stamped by the IRB to indicate the expiration date of study approval. One copy of the consent form is enclosed with this letter and one copy will be retained for our records. **You can only use copies of the consent that have been stamped with the GPS IRB expiration date to obtain consent from your participants.**

Please note that your research must be conducted according to the proposal that was submitted to the GPS IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For ***any*** proposed changes in your research protocol, please submit a Request for Modification form to the GPS IRB. Please be aware that changes to your protocol may prevent the research from qualifying for expedited review and require submission of a new IRB application or other materials to the GPS IRB. If contact with subjects will extend beyond **January 5, 2016 a Continuation or Completion of Review Form** must be submitted at least one month prior to the expiration date of study approval to avoid a lapse in approval.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy material" at http://www.pepperdine.edu/irb/graduate/).

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact me. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Thema Bryant-Davis, Ph.D.
Chair, Graduate and Professional Schools IRB
Pepperdine University

6100 Center Drive, Los Angeles, California 90045 ▪ 310-568-5600

APPENDIX B

Phone Recruitment Script

This phone recruitment script was used in initial contact of the company administrators and supervisors.

Hello. This is Joe Collazo. I am the Vice President of COLSA Corporation. Like your organization, my corporation is part of the high-technology engineering defense industry.

I am currently in a doctoral program in Organizational Leadership with Pepperdine University. I would like to invite your employees to anonymously participate in a study intended to examine the relationship between leadership style and innovation climate. Specifically, I am investigating leadership style characteristics of retired U.S. Army senior officers serving in executive-level supervisor roles in the high-technology engineering defense industry and evaluate the alignment of the discovered leadership characteristics and practices of this leader category with the characteristics reported in the literature to foster an innovation climate.

Participation will consist of completing an anonymous online multiple-choice survey that would take approximately 30 minutes to complete. To maintain anonymity, participants will be asked to not volunteer any identifying information to the researcher by email or otherwise.

I am seeking participants meeting the following criteria sets:

• Individuals who work in the high-technology engineering defense industry under the supervision of someone meeting the following criteria.

OR

• Individuals who (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) hold current full time employment in a high-technology engineering defense contracting firm, having held an executive-level supervisor position for at least 6 months as a program manager, director, vice president, president, or CEO.

Would you be willing to allow me to contact your employees to request their participation?

[If yes] Would you kindly provide an email or letter stating written permission to allow me to contact your employees to request their participation?

[if no] Thank you for your time, and if you reconsider, please call me at [number].
[if yes] Thank you. I would like the phone numbers of supervisors who meet that description so that I can personally invite them to participate. Also, I would like to forward an email that could be sent to any of your employees who might be subordinates of supervisors who meet that description (and they would be able to identify themselves as meeting the study criteria). Thank you again. I greatly value your assistance. Have a good day.

APPENDIX C

Email Invitation to Participate in Study

Hello. This email is sent by Joe Collazo (forwarded by your company administrators). Like you, I work in the high-technology engineering defense industry. Based on your work affiliation, and with the permission of your workplace, I invite you to participate in a study intended to examine the relationship between leadership style and innovation climate. Specifically, this study seeks to discover leadership style characteristics of retired U.S. Army senior officers serving in executive-level supervisory roles in the high-technology engineering defense industry and evaluate the alignment of the discovered leadership characteristics and practices of this leader category with the characteristics reported in the literature to foster an innovation climate.

Participation will consist of completing an anonymous online multiple-choice survey that would take approximately 30 minutes to complete. To maintain anonymity, please do not volunteer any identifying information to the researcher by email or otherwise.

You are invited to participate if you meet one of the following criteria sets:

- You work in the high-technology engineering defense industry under the supervision of someone meeting the following criteria.

OR

- You have (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) hold current full time employment in a high-technology engineering defense contracting firm, having held an executive-level supervisor position for at least 6 months as a program manager, director, vice president, president, or CEO.

Please feel free to forward this email to others you know who meet the qualifying criteria to participate.

You may send an email request, whether you complete the survey or not, to ask the researcher to send you an electronic copy of the research results when they are published and available.

If you choose to participate, please complete the survey within 1 week of receiving this invitation, in order to ensure that your responses are included in the dataset. The following is informed consent information that describes your rights as a

research participant and contains additional information about the study. Following that description is a link to the survey. Thank you for your time and interest.

APPENDIX D

Informed Consent Statement

This statement and informed consent statement will preface the online survey:

My name is Joe Collazo, and I am a student in Organizational Leadership at Pepperdine University, Graduate School of Education and Psychology, who is currently in the process of recruiting individuals for my study titled, "Impact of Leadership Style on Innovation: A Study of Retired Military Senior Officers in Executive-level Supervisor Roles Within the High-Technology Engineering Defense Industry." (The professor supervising my work is Dr. June Schmieder-Ramirez.) The study is designed to investigate characteristics of leaders and companies within the high-technology engineering defense industry, so I am inviting individuals to anonymously participate who meet the following criteria:

- I (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) have current full time employment in a high-technology engineering defense contracting firm, having held an executive-level supervisor position for at least 6 months as a program manager, director, Vice President, President, or CEO.

OR

- I work in the high-technology engineering defense industry under the supervision of someone meeting the above criteria.

Informed Consent Statement

Please understand that your participation in my study is strictly voluntary. The following is a description of what your study participation entails, the terms for participating in the study, and a discussion of your rights as a study participant. Please read this information carefully before deciding whether or not you wish to participate.

If you decide to participate in the study, you will be asked to anonymously complete an online survey that is expected to take approximately 30 minutes. Please complete the survey alone in a single setting.

Although minimal, there are potential risks that you should consider before deciding to participate in this study. These risks include potential uncertainty about how to answer questions and potential unease about the introspective process. This is considered to be likely similar in nature to the risk for unease that most people face on a daily basis in their normal occupations.

The potential benefits to you for participating in the study are that your organization may gain useful information about its managerial practices and you may personally benefit from the introspective process.

If you decide to participate and find you are not interested in completing the survey in its entirety, you have the right to discontinue at any point without being questioned about your decision. You also do not have to answer any of the questions on the survey that you prefer not to answer--just leave such items blank.

After 1 week a reminder note will be sent to you to complete and return the survey. If the necessary number is not received, three additional reminder emails may be sent. Since this note will go out to everyone, I apologize ahead of time for sending you these reminders if you have complied with the deadline.

If the findings of the study are presented to professional audiences or published, no information that identifies you personally will be gathered or released. The data will be digitally stored on a removable hard drive that will be physically stored in a locked combination safe when not in use for data analysis. The dataset will be kept for a minimum of 3 years and perhaps used by other investigators in the future.

If you have any questions regarding the information that I have provided above, please do not hesitate to contact me at the address and phone number provided below. If you have further questions or do not feel I have adequately addressed your concerns, please contact June Schmieder-Ramirez, Ph.D. at June.Schmieder@pepperdine.edu. If you have questions about your rights as a research participant, contact Thema Bryant-Davis, the Chairperson of the GSEP Institutional Review Board, Pepperdine University, at 310-568-5753 or gpsirb@pepperdine.edu.

By completing the survey, you are acknowledging that you have read and understand what your study participation entails, and are consenting to participate in the study.

Thank you for taking the time to read this information, and I hope you decide to complete the survey. You are welcome to contact me to request a brief emailed summary of the study findings in about 6 months. If you decide you are interested in receiving the summary, please email the researcher and do not identify whether or not you chose to complete the survey.

Sincerely,

Joe Collazo
Vice President, COLSA Corporation
[contact information removed prior to dissertation publication]

APPENDIX E

Demographic Questions and Sorting Sequence

Filter questions at the beginning of the survey were as follows, to prevent non-qualifying respondents from filling out the survey and to ensure that respondents were correctly identified in the supervisor or the subordinate category.

<table>
<tr><td colspan="2">1. What is your position ranking in your current job in the high-tech defense industry?
a. Supervisor level (e.g., program manager, director, vice president, president, or CEO)
b. Other</td></tr>
<tr><td>if supervisor level:

2. How long have you worked in your current position (or a comparable position in the high-tech defense industry)?
a. 6 months or more
b. under 6 months</td><td rowspan="3">2. Do you currently (or have you in the past 6 months) worked under an supervisor in the high-tech defense industry who has held for at least 6 months an supervisor leadership position (i.e., a program manager, director, vice president, president, or CEO) and has a background of service in the U.S. Army at a command level of lieutenant colonel or higher?</td></tr>
<tr><td>if yes: go on to question 3
if no: go to script for disqualified respondent</td></tr>
<tr><td>3. Have you retired from the U.S. Army?</td></tr>
<tr><td>if a: go on to question 4
if b: go to script for disqualified respondent</td><td>if yes: proceed to subordinate survey questions
if no or uncertain: go to script for disqualified respondent</td></tr>
<tr><td>4. When you retired, what was your rank?
Options: lieutenant colonel, major, general, other</td><td>subordinate survey questions begin with this script: Please answer the following leader-related questions as they pertain to this supervisor with a U.S. Army background. Answer the workplace-related questions as they pertain to the work group that is under the supervision of this supervisor with a U.S. Army background.</td></tr>
</table>

If response is *other*, go to script for disqualified respondent. If response was a qualifying listed option, proceed to supervisor survey questions.	

Disqualified Respondent Script:

Please accept our apology if the inclusion criteria in the invitation to participate were not clear to you. Based on your last response, it appears that you do not meet the inclusion criteria for the present study. We still invite you to email the author to receive a description of the results of the study (send your request to [email removed]). If you clicked this response in error and you believe you do meet the inclusion criteria and would like to participate, please re-start the survey. Inclusion criteria require that you meet the following description of either a OR b:

a. I have (a) served in the U.S. Army for a minimum number of 20 years, (b) retired at the rank of lieutenant colonel or higher, and (c) current full time employment in a high-technology engineering defense contracting firm, having held an executive-level supervisor position for at least 6 months as a program manager, director, vice president, president, or CEO.

b. I have worked for at least 6 months under a supervisor who meets the above inclusion criteria.

(If you meet both criteria a and b, you may choose to respond from your supervisor position or from your subordinate position, or you may take the survey twice, answering one complete survey from your supervisor position and the other from your subordinate position.)

APPENDIX F

Sample Questions for Instruments

Multifactor Leadership Questionnaire (MLQ) short form

The following two MLQ scales are identical except that in the first, the question is posed as a question about ones own leadership role, while in the second, the question is posed about ones immediate supervisor.

- MLQ - Self only sample question: I spend time teaching and coaching
- MLQ - Rater only sample question: This leader spends time teaching and coaching

Instructions for rater only form: This questionnaire is used to describe the leadership style of your main supervisor or your work-group leader who has a military background, as described in the invitation to participate in this study. Please answer all items if possible. If an item is irrelevant, or if you are unsure or do not know the answer, skip the question. Please answer this questionnaire anonymously. For the following descriptive statements, judge how frequently each statement fits your perception of your main supervisor or your work-group leader who has a military background.

Innovation Climate Questions

Instructions: For the following descriptive statements, rate your agreement with each statement in relation to your immediate work group.

My boss gives me useful feedback regarding my creative ideas.

Response options for MLQ self only, MLQ rater only, and WIS:

- strongly disagree
- disagree
- neither agree nor disagree
- agree
- strongly agree

APPENDIX G

Permission to Use Workplace Innovation Scale

Date: Wed, Sep 24, 2014 at 7:38 PM
Subject: Re: request for use of Workplace Innovation scale

I would be delighted to. Plus I like your study and can see how the two concepts would compliment one another. One of my DBA students, Dr Kathryn Von Treur, used the MLQ and WIS in a recruitment agency.

Do keep me posted on how your studies progress.
Best wishes,

Adela

Professor Adela J McMurray PhD
Deputy Head Research & Innovation
School of Management
College of Business
RMIT University

Note. Contact information was removed prior to dissertation publication.