



**A STUDY OF CORPORATE ENTREPRENEURSHIP
IN A DEPARTMENT OF DEFENSE ORGANIZATION**

THESIS

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Abstract

What determines if an organization has a corporate entrepreneurship (CE) environment? While being entrepreneurial in a private sector job usually means a greater market share or a higher profit margin; in a public research organization, CE must be measured in other ways. This thesis evaluates a Department of Defense (DoD) organization that performs basic research. Any organization that does government or nonprofit work must continually find new ways, methods, processes, or ideas to complete the mission. In this particular study, the mission is to continue to support the warfighter with limited and changing resources—to ensure the military can maintain dominance over the enemy combatant. How an organization encourages and supports new ideas or promotes CE is evaluated so that as funds become scarcer the work force becomes younger and global technology increases. Senior managers are aware of antecedents and outcomes that promote innovative behavior—these managers can properly allocate resources to encourage the desired behavior, ensuring our nation’s preeminent combat power to keep America strong, safe, and free.

Acknowledgments

I would like to express my sincere appreciation to Col Bill Quinn, who challenged me to get started on this many years ago. To my many teachers and research advisors, including Dr. Daniel Holt, Col Harold Arata, Lt Col John Elshaw, and Lt Col David Fass for their guidance and support throughout the course of this thesis effort. Their insight and experience is certainly appreciated. I am very appreciative of the efforts made by Ms. Karen Kettler in her helping me to create, edit, and modify all of the documentation in this thesis and the questionnaire.

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A STUDY OF CORPORATE ENTREPRENEURSHIP IN A DEPARTMENT OF DEFENSE ORGANIZATION

I. Introduction

Background

The Department of Defense has faced operational challenges over the past few decades. The increased oversight by congress, the strain of deployments on personnel, as well as decreasing budgets are forcing the military to transform the way they do business. In 2002, Defense Secretary Donald Rumsfeld, a well known advocate of transforming the military, said transformation would happen if a “culture of creativity and risk taking” was encouraged and an “entrepreneurial approach” was promoted. Our current Defense Secretary, Robert Gates is continuing the “culture of creativity” by requesting support from Department of Defense employees. During an August 9, 2010, Pentagon news conference, the Honorable Secretary Gates noted, “Within the department, we are launching an online contest for the purpose of soliciting and rewarding creative ideas to save money and use resources more effectively...” Secretary Gates has challenged the Pentagon to be creative and use unconventional thinking (Gates, 2009), noting that the DoD must do more than modernize its conventional forces, they must focus on today and tomorrow’s unconventional conflicts.

The Air Force, faced with shrinking budgets, a continued need for operational presence in several theatres across the world, and an aging workforce, is being tasked to

maintain its mission and modernize its forces, all at the same time. To accomplish these goals, many AF organizations are trying to find creative and innovative ways to support the war-fighter with fewer resources. One way of maintaining the mission with fewer resources is to create organizations that are innovative—or show a climate of “corporate entrepreneurship,” or CE.

A CE strategy can “facilitate the firm’s efforts to exploit its current competitive advantage and explore opportunities and competencies required to successfully pursue them” (Hornsby, Goldby, 2009). CE has been shown to have a positive effect on organizational performance and on the employees work environment (Hamel, 1999). There are many examples of how entrepreneurial behavior has helped large companies to compete in a global market by providing new technologies, increased performance, and new services (McGrath and MacMillan, 2000).

Most DoD organizations do not have a “profit” or an emerging market—but must maintain their “edge” on the battlefield as it is considered failure to be “second best.” It is imperative that an organization that is potentially facing resource reductions—find an advantage to compete and look for new ideas and implement innovative ways to complete the mission—whether that mission is to defeat the enemy on the battlefield or to maintain strategic advantage of the air, sea, space and cyberspace.

Many studies (Kuratko, Hornsby, and Bishop. 2005; Slevin and Covin, 1997; Holt, Rutherford, and Clohessy 2007) suggest that innovative activities within an organization result in positive outcomes, so recent focus has been on how an organization can “promote” an innovative atmosphere. Some questions that are being asked by current research include—does the organization appropriately reward their members (Sykes,

1992, Kuratko, Hornsby, et al., 2005) and does management adequately support innovative activities (Kuratko, Hornsby, Naffziger and Montagno 1993, Kuratko, Hornsby et al. 2005)? Additionally, does the organization's management accept members taking risk—and consequently accepting that there will be failures occasionally associated with that risk taking (Sathe 1985, Kuratko, Hornsby et al. 2005)? Are there adequate resources (including time and money) available for “innovative” activities (Damanpour, 1991; Slevin and Covin, 1997)? Finally, can the organization's structure ultimately support innovative activities (Covin and Slevin, 1991; Kuratko et al. 1993)? A brief discussion follows on the benefits of answering the above questions.

Benefits

This research effort has the potential to produce very useful information for government agencies, research organizations, or other nonprofit organizations that do not specifically work for profit. This study will provide the senior management of these aforementioned groups insight into the areas that influence the desired innovative behaviors within their organization and the eventual outcomes associated with those behaviors. Finally, the result of this study may provide senior managers with a better idea of what the strongest predictors of CE are if they want to develop an innovative climate within their organization.

Thesis Structure

The remainder of this thesis is organized as follows: Chapter II provides a review of the literature related to the perception of the innovative mindset. Additionally, it will look at previous research related to my antecedents and outcomes. Chapter III will

discuss the research methodology employed while conducting this research. Chapter IV will provide all relevant data analysis and results. Chapter V provides conclusions and recommendations for future research.

II. Literature Review

This chapter will provide a theoretical model of what constitutes an innovative mindset or CE within an organization and will discuss some of the relevant research literature that falls within the context of the model. First, the various terms used in discussing CE will be defined and put into context of this study. Next, the theoretical model will be presented and explained. Finally, the antecedents and outcomes that are hypothesized for determining the perception of CE in an organization will be discussed.

Defining Corporate Entrepreneurship

Corporate entrepreneurship can be defined as an organization that tries to “exploit product-market opportunities through innovative and proactive behavior” (Dess, Lumpkin, & McGee, 1999). CE is also defined as a strategic orientation which involves the regeneration of products, processes, services, strategies or complete organizations (Covin & Miles, 1999). According to Lumpkin and Dess (1996), innovativeness refers to an organization’s ability to encourage, support and promote new ideas and creative processes that may produce new products, services, or processes.

Several studies suggests (Kuratko, et al. 2005; Morris, Kuratko, and Covin, 2008) that when certain factors—organizational support, work discretion, rewarding innovative pursuits, resource allocation, and encouraging interaction between departments are present in an organization, the number of new ideas generated and implemented

increased. Pearce, Kramer and Robbins (1997) stated that when management supports an entrepreneurial mindset, there was a greater level of entrepreneurial activity amongst the employees within these organizations. Covin and Slevin (1991) also found positive relationships between entrepreneurial activities and formal organizational structures. Noting that we have defined the terms of CE, we can now look at the model that is being suggested for the framework of CE

Theoretical Framework for CE

Figure 1 presents the theoretical framework suggested for CE or an “innovative climate” in an organization. This model provides insight into the five antecedents important in the development of CE, and the predicted outcomes relevant to CE. The focus of this study was to investigate how the perception of CE is formed and whether these perceptions have an impact on desired outcomes.

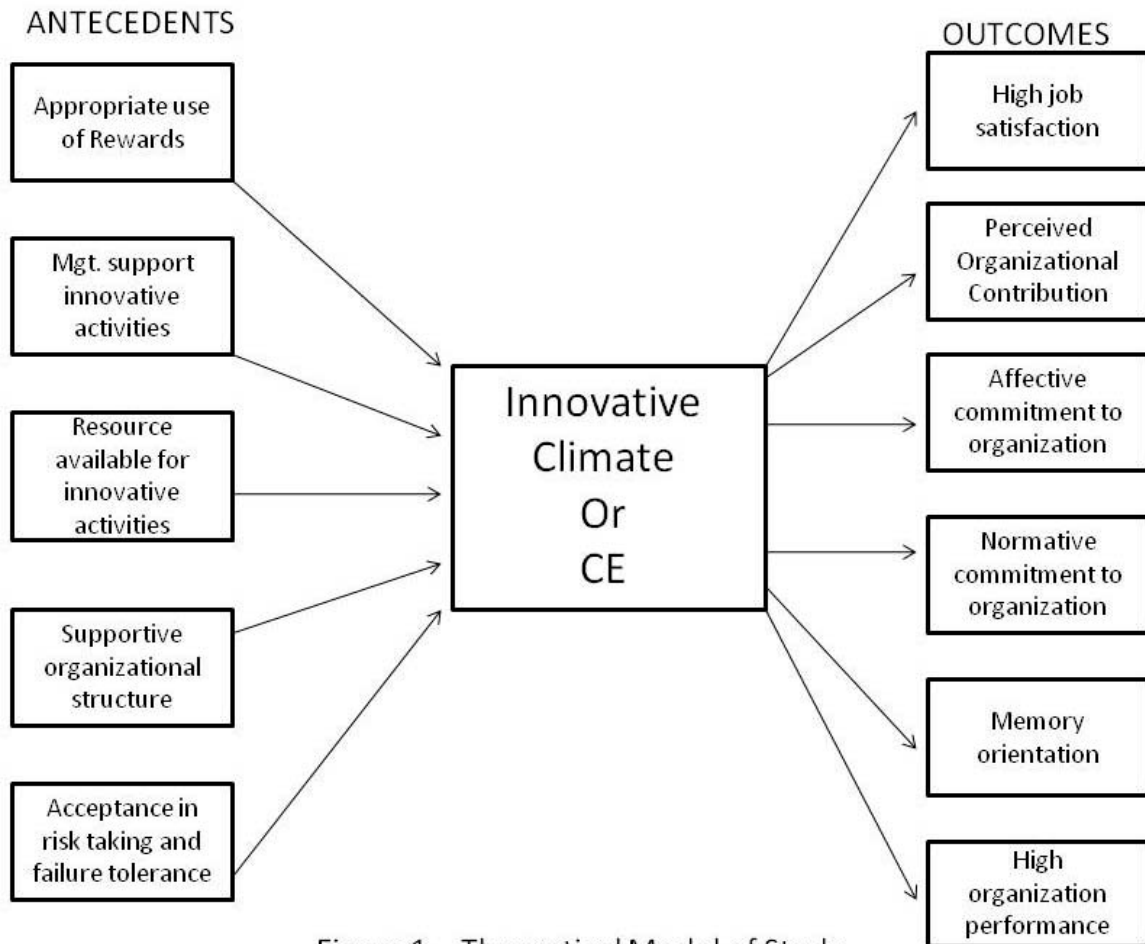


Figure 1 – Theoretical Model of Study

After looking at the model for CE, we will now breakdown the model into the basic research question and hypothesize the individual antecedents and outcomes.

Research Question and Hypotheses

The purpose of this research is to answer the following question: With limited and changing resources, what are the most important factors that managers of a non-profit company or organization can influence if they want to encourage an innovative environment (a CE atmosphere) and what are the expected outcomes of this environment?

We will now look at the hypothesized individual antecedents and outcomes of the research question.

Antecedents

Hornsby, Kuratko and Zahra (2002) developed an instrument which can quantitatively measure the five antecedents or factors (management support, work discretion/autonomy, rewards/reinforcement, time availability, and organizational boundaries) that are predicted to promote innovative activities in an organization. As discussed above, if properly applied, these five factors can be used by middle management to promote and encourage corporate entrepreneurial activities within an organization. If the individual employees perceive that there is positive reinforcement by using rewards, if there is adequate time and money to pursue risky projects, the organization accepts occasional failure, and that the organizational structure (as well as senior management) will support innovative pursuits, then the organization will have a higher likelihood of being perceived as “innovative” by its employees. In a typical “corporate entrepreneurship atmosphere” innovation could be measured by financial means, such as profit, new products brought to market, market share, etc. However, most of those measures are not appropriate in nonprofit or government organizations. We will now go through the antecedents one at a time and propose various hypotheses.

Rewards.

The employee’s perception that they will receive recognition for significant contributions or outstanding performance—especially for creative or innovative pursuits—is important to creating a CE atmosphere. Kuratko, Ireland, Covin, and

Hornsby (2005) noted that rewards and reinforcement are “developing and using systems that reward based on performance, highlight significant achievements, and encourage pursuit of challenging work.” Twomey and Harris (2000) found a positive relationship between reward and recognition systems and CE behavior of employees—illustrating that an effective reward program promoted the entrepreneurial mindset.

Hypothesis 1: Appropriate use of rewards and reinforcement has a positive impact on the organization and its members

So if the employee perceives that there is a good rewards program in place, this should promote CE within the organization. We will now discuss management support and the role it will have in the study of the CE climate.

Management Support.

The employee’s perception of management support should have a positive impact on CE. Kuratko, Ireland, et al. (2005) define management support as “the willingness of top level managers to facilitate and promote entrepreneurial behavior, including the championing of innovative ideas and providing the resources people require to take entrepreneurial actions.”

Hypothesis 2: The perception of management support for innovative activities has a positive impact on the organization and its members

Simply put, does the employee perceive that the current management buy-in to the idea that CE or innovation is important to the mission? Which leads to a question—if there is management buy-in, will management then make the resources necessary to support CE activities?

Resource Availability.

Resource availability, whether time or money, is of constant concern to most researchers. As monetary resources are minimized, equipment becomes outdated, staffing may be minimized, etc. Not only funds, but time constraints are of great concern to the researcher as well. Kuratko, Ireland, et al (2005) defined time availability as “evaluating workloads to ensure that individuals and groups have the time needed to pursue innovation and that their jobs are structured in ways that support efforts to achieve short and long term organizational goals.”

Hypothesis 3: The perception of resource availability for innovative activities has a positive impact on the organization and its members

So it would suggest that if a researcher has plenty of resources, the CE of the organization should be positively affected. So how do these resources get to the worker or what structures are in place to assist the researcher in getting these resources? We will now look at the supportive organizational structure.

Supportive Organizational Structure.

What precisely is meant by supportive organizational structure? Does the organization have a formal line of authority to get resources or decisions? Do they have a specific structured path for products, processes or ideas to flow? Pugh, Hickson, Hinings, and Turner (1968) defined organizational structure as having four basic dimensions—structuring of activities, concentration of authority, line control of workflow, and size of supportive components. Kuratko, Ireland, et al (2005) defined organizational boundaries as “precise explanations of outcomes expected from organizational work and development of mechanisms for evaluating, selecting, and using

innovations.” There has been one study, Covin and Slevin (1991) that did find a positive relationship between entrepreneurial activities and formal organizational structures.

Hypothesis 4: The perception of a supportive organizational structure for innovative activities has a positive impact on the organization and its members

Therefore, if an organization has a formal structure where the chain of authority is well defined, where there is definite control of workflow through the supervisors, etc. then, the employee should feel that the organization would support CE type activities. If there is tight chain of command or supervisory control, how would that affect the workers if they are trying to come up with creative and innovative ideas?

Another area of concern would be if the worker felt as if they would be ostracized if a project or idea that they came up with failed. This area of concern leads to our next hypothesis of risk taking and failure tolerance.

Risk Taking and Failure Tolerance.

Risk taking is when a worker perceives that his management will encourage him to take a calculated risk on an innovative idea. Failure tolerance is when the worker perceives that management will forgive a failure and not stigmatize the worker with that failure in future endeavors. Jennings and Lumpkin (1989) showed that an entrepreneurial organization is an organization that usually promotes calculated risk taking and accepts or tolerates failures. Risk taking and failure tolerance can be described as “top-level managers’ commitment to tolerate failure, provide decision-making latitude and freedom from excessive oversight, and to delegate authority and responsibility to middle-level managers.”

Risk failure tolerance is often referred to as the extent to which a worker perceives that the organization will tolerate failure of innovative ideas (Hornsby et. al., 2002). It can also describe how much the organization allows decision-making latitude, and whether the organization allows freedom from micromanagement or excessive oversight. Finally, does the organization delegate authority and responsibility to lower level managers? When a worker perceives that he can take on an innovative venture, and it not be a career-killer if the venture fails, then that should encourage the worker to take on these more creative tasks.

Hypothesis 5: The perception of acceptance in risk taking and failure tolerance for innovative activities by senior leaders has a positive impact on the organization and its members

Having looked at the antecedent hypotheses, we will now look at the various outcomes that are associated with an organization that has an atmosphere of Corporate Entrepreneurship.

Outcomes

As discussed above, most government or non-profit organizations are not interested in typical financial measures of performance such as profitability or earnings per share which can be easily measured (Zahra and Covin, 1995, Covin and Miles, 1999). These organizations (and specifically the one that is being studied here) do not consider profit a typical measure of success.

While success can be defined or measured in other assorted ways, such as new products or processes brought to the warfighter, publication in research journals, internal and external awards, etc., this paper is looking at what outcomes should be expected of an

organization with a CE atmosphere. Lumpkin and Dess (1996) suggest that subjective measures such as members having a perception of high job satisfaction, commitment to the organization, contribution to the organization, and whether the organization is performing highly successfully—are seen as positive outcomes for an entrepreneurial climate. We will now discuss these expected outcomes individually.

Job Satisfaction.

Do you enjoy what you do? Are you challenged and do you feel productive at the end of the day? Job satisfaction is defined by Dormann and Zapf (2001) as a “pleasurable or positive emotional state resulting from the assessment of one’s job or job experiences.” It has also been referred to as a pleasurable or positive emotional state resulting from an appraisal of one's job (Locke, 1969). Job satisfaction has been associated with a variety of positive organizational outcomes, including productivity (Wagner and Gooding, 1987) and lower rates of intention to leave the organization.

According to Bowling, Beerh, and Lepisto (2006),

Research has found that a number of dispositional variables, especially positive affectivity (PA; the tendency to experience positive feelings across time and places) and negative affectivity (NA; the tendency to experience negative feelings across time and places) are associated with general or global job satisfaction (Connolly and Viswesvaran, 2000).

Hypothesis 6: If there is a perception of an innovative atmosphere within an organization, then there should be a perception of high job satisfaction among the organization’s members

With the above hypotheses noted, an employee can have a perception of job satisfaction in a company without a CE atmosphere, but a high job satisfaction can be a good indicator of an organization with a CE atmosphere. Next we will discuss the perceived contribution of an individual to the organization.

Perceived Organizational Contribution.

Are you contributing to the organization? Does what you do for the organization make a difference? Shepherd and Krueger (2002) suggest that member's perceptions that their actions are desirable by the organization are positively related to entrepreneurial activity. One of the outcomes of an organization with a CE atmosphere should be that the individual members perceive that their contributions are important to the success of the organization.

Hypothesis 7: If there is perception of an innovative atmosphere, then organizational members should have the perception that they contribute to the organization

An individual's perception of contribution is important. However, what is that individual worker's commitment to the organization and would that be evident if the organization is committed to promoting a CE atmosphere?

Commitment to the Organization.

Does the individual worker have a commitment to the organization and why is that important? Bateman and Strasser (1984) states that organizational commitment is defined as "...an employee's loyalty to the organization, willingness to exert effort on behalf of the organization ...and desire to maintain membership." Porter, Steers, Mowday and Boulian (1974) defines organizational commitment as "a strong belief in and acceptance of the organization's goals, a willingness to exert considerable effort on behalf of the organization, and a definite desire to maintain organizational membership." Buchanan (1974) states that most scholars tend to define commitment as a "bond" between an individual (the employee) and their respective organization (the employer). In other words, the higher the organizational commitment by the employee, the more

likely they are to have higher loyalty to the company, work harder to support the company and stay employed with the company.

Meyer and Allen (1991) further break the term “organizational commitment” into three dimensions of commitment—affffective commitment, continuance commitment, and normative commitment. Affective commitment is the employee’s emotional attachment to the organization and its goals. Continuance commitment is when an employee willingly remains with an organization because of the nontransferable investments (such as benefits or retirement packages) they have with the organization. Normative commitment is the belief that an employee should stay with the organization or workplace because of a moral obligation to the organization. Meyer, Allen, & Smith (1993) further state that these commitments are a psychological state “that either characterizes the employee’s relationship with the organization or has the implications to affect whether the employee will continue with the organization.”

So while all three dimensions of commitment are important, affective and normative commitment are hypothesized here because if the organization has a CE atmosphere, then the employee would probably feel a high connection with the organization and its goals—as well as a moral obligation to the organization. Consequently, the employee is more likely to find creative or innovative solutions to organizational problems.

Hypothesis 8: If there is an innovative atmosphere, then organizational members should have a perception of affective commitment to the organization

Hypothesis 9: If there is an innovative atmosphere, then organizational members should have a perception of normative commitment to the organization

So if an organization has a CE atmosphere, there should be some level of affective and normative commitment to the organization. If there is some type of organizational commitment to the organization, there should also be some way to encourage those committed to retaining the organizational knowledge. This organizational knowledge is referred to as memory orientation and will be the next outcome discussed.

Memory Orientation.

As stated above, memory orientation refers to the continuation of corporate knowledge (as people retire, change jobs, etc.). According to Garvin (1993), “A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.” According to Hult, Hurley, Giunipero, and Nichols (2000), memory orientation is one of the “key dimensions of organizational learning...” in which they were referring to knowledge sharing and stressing communication throughout the organization.

Jaworski and Kohli (1993) note that communication and knowledge sharing among members of the organization results in a positive effect on organizational commitment among the various employees. Memory orientation is important to an organization with a CE atmosphere as the lessons learned can be incorporated into future planning or as creative assignments or suggestions come up. These lessons learned often save many hours of re-inventing the wheel when trying to get a research, or any such program, up and running.

Hypothesis 10: If there is an innovative atmosphere, then organizational members should have a perception of memory orientation in the organization

Sharing knowledge of the organization is one outcome of an organization with a CE atmosphere. Another outcome is the perception of the employee that the organization is a ‘high performing’ one.

Perceptions of High Organizational Performance.

As Jaworski and Kohli (1993) noted that organizational performance could be measure objectively (as noted above—by measuring profit, costs, etc.) or judgmentally—by measuring an employee’s perception of their organization operating at a high performance level. In this study, this measure is important as it may point out to management that increased CE atmosphere may lead to increased performance of the organization.

Hypothesis 11: If there is an innovative atmosphere, then organizational members should have a perception of high organizational performance

Summary

We have now defined Corporate Entrepreneurship examined the theoretical model associated with CE and looked at each of the 5 antecedents and 6 outcomes hypothesized for an organization with a CE atmosphere. We will now proceed to the Methodology section to discuss the method used to measure these factors in an organization.

III. Methodology

This chapter details the methodology used to assess the organization and this study's primary research question: With limited and changing resources, what are the most important factors that leadership of a non-profit company or organization can influence in order to create an innovative environment (a CE atmosphere) and what are the expected outcomes of that environment? Additionally, this section will include a discussion about the organization studied—the Materials and Manufacturing Directorate, and then I will provide details of the sample, procedures, measures, and analysis used to complete this research effort.

Materials and Manufacturing Directorate

The Materials and Manufacturing Directorate (RX) is part of the Air Force Research Laboratory (AFRL) of the US Air Force. Commonly referred to as a “Technical Directorate,” RX is responsible for pursuing basic research, which OMB (2010) defines as

Systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. Basic research, however, may include activities with broad applications in mind.

Further, the RX Mission Statement is

...to plan and execute the USAF program for materials and manufacturing technologies in the areas of basic research, exploratory development, advanced development, and industrial preparedness. Strategically focus all programs on providing the technology needed to meet the needs of today's, tomorrow's, and the next generation warfighter.

With the mission that RX is tasked with, it is necessary for this organization to be innovative in its approach to meeting these requirements.

AFRL/RX uses several methods to encourage innovation within its organization. AFRL has two large research portfolios that make up the body of its research and development investment. The Focused Long Term Challenge portfolio (FLTC) is comprised of integrated investment across technical disciplines (materials, propulsion, sensors, munitions, etc.). The combined technical strategy achieved through the integrated approach allows for AFRL to develop and transition new capabilities to the warfighter in a more efficient (more timely and more affordable) manner. To balance the FLTC portfolio, AFRL also has a Discovery portfolio. This portfolio stimulates innovation within technology disciplines and technical competencies. New ideas and technical concepts are supported so that the envelope of what may be possible can be expanded. Ideas that gain traction in the Discovery portfolio are brought into the FLTC portfolio so that eventually new effects and capabilities will always be available for transition.

We will now look at how the data was collected and analyzed. We will start with how we distributed the questions to the relevant sample, then talk about the procedures used to collect data and finally, discuss the measures that the data yielded.

Sample

An effort was made to contact each Division and Branch Chief within RX to explain the purpose of this study and to solicit that organization's participation. In each case where successful contact was made, the leadership of the organization was informed

of the study, purpose, and use of the data in a research setting. RX has over 1,300 personnel, including contractors, students, and military. Of these 1,300 personnel in 23 branches, 14 branches with 589 assigned personnel agreed to participate in the study (a 44% group participation rate). Some organizations declined to take participate in the study because they did not feel the study was appropriate for their organization.

Demographics of the respondents and of the RX organization are included in Tables 2 and 3, respectively. The following branches participated in the survey:

- RXBN—Nanostructured and Biological Materials Branch
- RXFM—Materials Support Branch
- RXLN—Processing Section
- RXM—Integration and Technology Branch
- RXMP—Processing and Fabrication Branch
- RXOB—Business Operations Branch
- RXOC—Information Operations Branch
- RXOF—Facility Operations Branch
- RXOP—Operations Planning Branch
- RXPJ—Hardened Materials Branch
- RXPS—Electronic and Optical Materials Branch
- RXSA—Materials Integrity Branch
- RXSC—Acquisition Systems Support Branch
- RXSSO—Coatings Integration Technology Branch

Now that we have seen which organizations took the survey, I will discuss the procedure of how we gathered the data.

Procedure

A three-section questionnaire was developed with a total of 82 questions. Section One, “Perceptions of the Organization,” contained 43 questions using a 1 to 5 Likert scale (1 being “strongly disagree” and 5 being “strongly agree”) along with 9 questions, including 2 “anchor questions,” using a seven-point response scale. Section Two, “General Perceptions of Your Job and Organization,” contained 25 questions on a 1 to 7 Likert scale (1 being “strongly disagree” and 7 being “strongly agree”). Finally, Section Three contained five questions relating to each respondent’s background. The survey is included as Appendix A.

Each questionnaire was physically printed out and delivered to the organization’s branch chief or designated appointee and the questionnaires were distributed to the individuals to fill out on their own time. There were no copies available online. An email was sent to the participating groups approximately one week prior to distribution of the questionnaire to state the reason for the survey and obtain approval from management. The message also contained point of contact information in case there were other questions and reiterated that this was an anonymous survey only to be used for research purposes.

Of the 589 surveys, 136 were returned for a response rate of approximately 23%. While the questionnaire did ask for demographic data from all respondents, contractor demographics are not kept by RX, so when the issue comes up as to whether this is a

relevant sample, there could be some concern about the large number of nonresponses to many of the demographic questions. However, there are some categories which do tend to suggest that the sample is of a relevant proportion, specifically, gender (83 male and 37 female in the sample size compared to 411 male and 145 female in the RX demographic data). Therefore, the sample size seems relevant in at least that respect.

I will now discuss the questionnaire and how the questions were formulated and broken down into antecedents and outcomes.

Measures

The survey was developed to measure the entrepreneurial mindset of employees, individual perceptions of the factors that influence these entrepreneurial actions, and perceptions of the outcomes related to or associated with each of the entrepreneurial behaviors.

Table 4 displays a summary of the name of each variable, gives a definition of the variable, and provides a sample of a question from each measure. The table also provides the type of response scale on which each variable was measured.

Entrepreneurial Mindset.

The entrepreneurial mindset of RX was measured with a nine-item scale adopted from Covin and Slevin (1989). These questions (using a two anchor responses and a seven-point response scale) relate to different perspectives of the innovative atmosphere (risk taking, proactiveness and innovativeness) of the organization. The respondents were asked to rate the entrepreneurial posture of RX in relationship to the nine items. For example, the respondents were asked (1) if the top managers of their organization favor

“a strong emphasis on supporting tried and true services and/or business practices or a strong emphasis on R&D, technological leadership, and innovations”; (2) if their organization “is very seldom the first organization to introduce new administrative techniques, operating technologies and business practices and/or is very often the first organization to introduce new administrative techniques, operating technologies and business practices”; and (3) if the top managers of their organization have a “strong preference for low-risk projects (with normal and certain outcomes) or a strong preference for high-risk projects (with chances of very attractive outcomes).” Higher scores correlate to a higher degree of an entrepreneurial mindset.

Entrepreneurial Actions.

A 43-item scale designed to measure the factors that promote innovative or entrepreneurial actions was borrowed from Hornsby, Kuratko, and Zahra’s Corporate Entrepreneurship Assessment Instrument (2002). The items were measured using a five-point Likert scale that ranged from 1= strongly disagree to 5 = strongly agree.

Appropriate use of rewards was measured using five questions—reflecting the extent to which employees feel that RX has an effective reward system. An example of this item is “the rewards I receive are dependent upon my work on the job.”

There were 17 items that measured Management Support. The items show the extent to which employees feel RX Management is willing to promote or facilitate entrepreneurial activities within the organization. An example item is “My organization is quick to use improved work methods.”

Resource Availability was measured with six questions. These items measured the extent to which RX employees feel that they have time available to pursue

entrepreneurial activities. An example is “I always have plenty of time to get everything done.”

Supportive Organizational Structure was measured in this study by using five items. These items measured the extent to which RX employees feel they have a supportive organizational structure for entrepreneurial activities. One example is “On my job, I have no doubt of what is expected of me.”

Ten items were used to measure Risk Taking and Failure Tolerance. These items measured the extent to which RX employees feel they have discretion and autonomy to pursue innovative activities. One example is “This organization provides freedom to use my own judgment.”

Outcomes.

Job satisfaction, perceived organizational contribution, affective commitment, normative commitment, memory orientation, and overall RX performance were measured as outcomes in this study. A seven-point Likert scale that ranged from 1 = strongly disagree to 7 = strongly agree was used to measure these outcomes.

Job Satisfaction was assessed using three items developed from a measure created by Cammann, Cortlandt and others (1983). The items measure the extent to which employees view their jobs positively. An example is “All in all, I am satisfied with my job.”

Perceived Organization Support was measured using three items taken from Lynch, Eisenberger, and Armeli’s scale to assess perceived organizational support (1999). These three items were used to measure the extent to which RX employees

believe they make contributions to the overall organization. One example is “I encourage others to try new and more effective ways of doing their job.”

Allen and Meyer (1990) developed items to measure Normative and Affective commitment which were used in this study. Five items measured normative commitment (the extent to which employees feel obligated to remain with an organization). Examples include “I think that people these day move from company to company too often” and “jumping from organization to organization does not seem at all unethical to me.” Eight items measured affective commitment (the extent that employees are emotionally attached to an organization). An example is “I do not feel like part of the family at my organization.”

Memory orientation was evaluated using four items developed by Hult, Tomas, Snow, and Kandemir (2003). These items measure the extent to which RX employees view certain areas of the learning process within RX and if there are any means or avenues within the organization to share that knowledge and/or those experiences. One example is “We have specific mechanisms for sharing lessons learned in our organization.”

Organizational performance was measured using two items from Hult et al. (2003) and assessed the extent to which employees view the overall performance of their organization in relationship to other organizations. Using two anchor responses and a seven-point response scale, overall organizational performance was measured. An example item asked employees to characterize their organization during the past year and whether they “performed poorly, in general, or performed excellent, in general.”

Analysis

The initial data analysis included assessing individual items from the survey and calculation of descriptive statistics for each scale that was used in the survey. To determine internal reliability, Chronbach's coefficient alphas were calculated for the scales.

The entrepreneurial mindset scale was analyzed to determine the extent to which this mindset exists within the RX Directorate. Multiple regression analyses were used to analyze the data. Multiple regression is a statistical procedure to check the relationship of one variable (the dependent—in this case, entrepreneurial mindset) against two or more independent variables (in this case, the five antecedent factors).

The outcomes were analyzed as individual perceptions—so a dichotomy test was established using the mean and one-half standard deviation above (for the high value) the mean and one-half standard deviation below (for the low value). Any value between the mean and $\pm$ one-half standard deviations was deleted. Once the innovative climate variable was dichotomized, multiple regression will be used to assess outcomes.

Summary

This chapter has addressed the sample, procedures, measures, and analysis used to complete this research effort. The next chapter will present the results of the data analysis.

IV. Analysis

The Entrepreneurship in DoD Organizations survey (Appendix A) was designed to collect data for the purpose of answering this study's primary research question: With limited and changing resources, what are the most important factors that management of a non-profit environment or organization can influence if they want to increase the perception of an innovative environment (a CE atmosphere) and what are the expected outcomes of this environment?

The conceptual model for this study, presented in Figure 3, was developed based on a literature review of information related to entrepreneurial mindset, its antecedents, and outcomes. This chapter evaluates the primary research question by using the data collected and analyzing the 11 hypotheses. Descriptive statistics for the variables used in the study will be presented, along with the scale reliabilities. The entrepreneurial mindset in RX is examined and the 11 hypotheses originally submitted are evaluated.

Descriptive Statistics

Table 5 provides a summary of the descriptive statistics for the variables used in this study. The table includes the name of each variable, the number of items in each scale, the mean and the standard deviation for each scale. In addition, the calculated Cronbach's coefficient alpha from this study is included.

Reliability

Cronbach alphas were calculated for each of the scales to evaluate the measure of reliability. George and Mallery (2003) provide the following guidelines: “ $\geq .9$ —Excellent, $\geq .8$ —Good, $\geq .7$ —Acceptable, $\geq .6$ —Questionable, $\geq .5$ —Poor, and $\leq .5$ —Unacceptable” (p. 231). As shown in Table 5, all of the alphas calculated in the study are in the acceptable or above range.

Assessment of CE

Using the same method employed by Covin and Slevin (1989), RX was evaluated to see to what extent the CE exists. All of the individual scores were summed and averaged to arrive at an overall organizational CE score. The mean rating of the scale was used to determine the extent of the mindset—with a higher score being interpreted as a higher degree of CE. The nine item scale had a mean score of 4.29 on the seven point scale with a standard deviation of 1.49 (Table 5).

Multiple regression analysis was used to evaluate the five antecedent factors against the entrepreneurial mindset of the organization. The reason this was used is that there were multiple predictors (the five factors) and it was desirable to see which ones were the significant drivers. So if any factor showed to be the significant driver of an entrepreneurial mindset, then it would be in the best interest of management to focus on that particular driver—if they were truly interested in creating a CE or innovative climate.

We will now go through each antecedent and outcome—showing if the hypotheses were supported and if that factor was significantly (and positively) related to the CE mindset within RX.

Antecedents.

Rewards and Reinforcement.

Hypothesis 1: Rewards and reinforcement are positively related to perceptions of an innovative climate.

NOT SUPPORTED. There was not a significant correlation between the appropriate use of rewards by RX Management and the entrepreneurial mindset of the RX employees. This relationship was demonstrated by a positive correlation of .217 which was not significant ($p < .05$)

This rewards and pay program may benefit employee morale; but as shown with the survey results in the case of RX, a contribution and rewards program does not have significant impact on a corporate entrepreneurship environment.

Management Support.

Hypothesis 2: Perceptions of management support are positively related to perceptions of an innovative climate

SUPPORTED. As predicted, there was a significant and positive correlation between the perception of management support for innovative activities and the entrepreneurial mindset of the RX employees. This was demonstrated by a positive and significant correlation of .000 ($p < .01$)

The analysis shows that perception of Management Support is the greatest factor in promoting a CE environment in the RX Organization.

Resource Availability.

Hypothesis 3: Perceptions of resource availability are positively related to the perception of an innovative climate

NOT SUPPORTED: There was not a significant correlation between the availability of resources and the entrepreneurial mindset of the RX employees. This relationship was demonstrated by a positive correlation of .217 which was not significant ($p < .05$)

Even though at times resources are scarce, those scarce resources may affect timeliness or the ability to perform research. However, the availability of resources is not a significant factor in determining the CE atmosphere within RX.

Supportive Organizational Structure.

Hypothesis 4: Perceptions of a supportive organizational structure are positively related to perceptions of an innovative climate

NOT SUPPORTED. A negative correlation between supportive organizational structure and the entrepreneurial mindset exists. The correlation of .034 suggests that the relationship is seen as significant ($p < .05$)

What the above suggests is that there is a significant relationship between organizational structure and CE; However, the negative relationship suggests that increased organizational structure within an organization actually decreases a CE atmosphere.

Risk Failure Tolerance.

Hypothesis 5: Perceptions of acceptance in risk taking and failure tolerance are positively related to perceptions of an innovative climate

NOT SUPPORTED: There was not a significant correlation between risk taking and failure tolerance and the entrepreneurial mindset of the RX employees. This relationship was demonstrated by a positive correlation of .977, which was not significant ($p < .05$)

Usually entrepreneurial outcomes arise from those organizations that allow for risk failure tolerance for entrepreneurial experimentation. In the case of RX, again, the Risk Failure Tolerance may be good for employee morale, but it does not significantly contribute to the CE environment.

Outcomes

As mentioned above, multiple regression analysis was done after establishing a dichotomy test for the data. We will now go through each outcome and discuss the relevance.

Job Satisfaction.

Hypothesis 6: Perceptions of high job satisfaction are positively related to perceptions of an innovative climate.

SUPPORTED. There was a .000 correlation between high job satisfaction of the RX organizational members and the entrepreneurial mindset which means this outcome was significant.

Perceived Organizational Contribution.

Hypothesis 7: Perceptions of organizational members contributing to the organization are positively related to perceptions of an innovative climate.
NOT SUPPORTED. The perception that RX members contribute to the innovative atmosphere is not significant ($p < .05$) and has a .924 correlation.

Organizational Commitment.

For a government or public sector entity, it becomes increasingly important that quality employees be retained and one way to retain quality government employees is to increase organizational commitment (Romzek 1990).

Hypothesis 8: Perceptions of affective commitment are positively related to perceptions of an innovative climate.

SUPPORTED. There was a .002 correlation between affective commitment of the RX organizational members and the entrepreneurial mindset which means this outcome was significant. ($p < .05$)

Hypothesis 9: Perceptions of normative commitment are positively related to perceptions of an innovative climate.

SUPPORTED. There was a .001 correlation between normative commitment of the RX organizational members and the entrepreneurial mindset which means this outcome was significant. ($p < .05$)

Memory Orientation.

Hypothesis 10: Perceptions of memory orientation are positively related to perceptions of an innovative climate.

SUPPORTED. There was a .000 correlation between memory orientation of the RX organizational members and the entrepreneurial mindset which means this outcome was significant. ($p < .05$)

Overall Organizational Performance.

Hypothesis 11: Perceptions of members have a high organizational performance are positively related to perceptions of an innovative climate.

SUPPORTED. There was a .005 correlation between overall organizational performance of the RX organizational members and the entrepreneurial mindset which means this outcome was significant. ($p < .05$)

Hypotheses Test Results

While multiple regression analysis was used to perform evaluations of the data, pairwise correlation of the study antecedent variables were calculated and tabulated. These calculated correlation values for all of the variable results are shown on Table 6. A dichotomy test was performed on the outcome variables using the mean and +/- one half standard deviations—the multiple regression analysis was then used to evaluate the data—comparing to the entrepreneurial mindset data. Table 7 summarizes this data.

Summary

This chapter summarized the data analysis used to address the study's primary research question and eleven associated hypotheses. Descriptive statistics for the variables used were presented along with scale reliability. The CE mindset within the RX members was assessed and the study's eleven hypotheses were evaluated.

V. Discussion and Conclusions

This chapter provides discussion on the subject matter and addresses the conclusions, benefits, and limitations of this study and provides recommendations for future research.

Discussion

I will now discuss three of the antecedent factors and how they particularly relate to RX. First, is a discussion on the rewards program and the pay system that RX employs for Scientists and Engineers.

Appropriate Use of Rewards and Reinforcement.

The Materials and Manufacturing Directorate has a unique rewards program. There are several annual Directorate awards that provide up to \$1,500 per person monetary compensation for high level contribution to the Directorate. These annual awards include the Cleary Scientific Achievement Award (individual or team), the Engineering Expertise Award (individual or team) the Schwartz Engineering Achievement Award, and the Kennard S&T Manufacturing Heritage Award. All of these awards have been established to stimulate internal research excellence by recognizing individuals or teams who have made the most outstanding research contributions. There are various other programs in which a person can be recognized (and rewarded with money or time off)—these include Civilian of the Quarter, Civilian of the Year, Notable Achievement Award, and Special Act Award. Each division within RX is highly

encouraged to submit a minimum of 12 awards each year. RX definitely has an aggressive rewards program.

An important part of the discussion of the AFRL rewards and reinforcement is the Lab Demo pay system which has been in effect for several years. Lab Demo does not reward longevity as the previous General Schedule (or GS) system did. A significant part of the Lab Demo pay system is to reward contribution. A very brief description of the major differences in the pay systems follow. While there have been many discussions about which system is more advantageous to the employee, and there are significant nuances to both systems, the discussion here centers on how the Lab Demo System promotes a CE atmosphere.

The GS System.

Briefly, the GS system provides a grade level (1 to 15), where each employee's basic position is determined by means of classifiers through the Position Description (PD) document. This document allows the classifier—using strict rules—to determine the grade of the employee. Typically, an employee will start out in one grade and as long as the employee does not receive an “unfavorable” or “unsatisfactory” rating (the reasoning for the “unsatisfactory” grading must be explained in the rating documents), the employee will continue to receive annual reviews and step increases (1 to 10) as long as they are in that position. Once an employee reaches Step 10, they will only receive cost of living increases as long as they are in that grade. Usually, an employee will have to change positions (or occasionally can request a desk audit from the Personnel Organization) to move to a higher-grade level.

The Lab Demo System.

According to the AFRL Manual 36-104 (2008), the Lab Demo System has a Broadband Level (I to IV); instead of a PD, a Statement of Duties and Experience (SDE) is completed, which provides a common set of criteria for all employees in the same job category. This is significantly different from the individualized PD in the GS system—employees in Lab Demo are compared and ranked to peers who are doing the same job in the same category. At each annual review, the SDE is evaluated and a Contribution Based Compensation System (CCS) is employed. Figure 2 shows the annual review cycle. What is significant with the Lab Demo system is that each employee completes a self-evaluation and meets with their respective supervisor. The managers then meet together to discuss the relative contributions of their respective employees. The overall philosophy is that time in grade is not a requirement to give someone a raise—what is more important is the contribution of an employee to the overall organization should be rewarded. Additionally, Lab Demo allows an employee to grow into higher-level work without necessarily changing positions. The ability to broadband allows for an employee to grow from one level to another just by showing a significant change or increase in contribution. These broadband moves must be approved by the division chiefs and by the Directorate. This is much different from the GS system where even if your contributions or job changes significantly, you may not get a higher rate of pay unless you physically change jobs.

RX has a very progressive pay system compared to other government organizations. This is of interest, because the analysis showed no connection between

rewards and CE. Now we will discuss how RX management provides support for innovative activities.

Management Support for Innovative Activities.

The RX Directorate has established an Innovative Plans Working Group Panel whose main objective is to review AFRL and RX Innovative Programs such as Lab Director's Funded projects—where each year, candidate projects are pitched to Senior Management for potential funding, Company Grade Officer's Initiative Program—where RX provides an opportunity for Company Grade Officers to take charge of a quick reaction program that directly impacts the warfighter, Summer Faculty Programs, and Chief Scientist funded programs to determine the optimum structure and funding to maximize the RX mission.

These programs in RX are intended to foster innovation and develop the work force and to make recommendations for changes (if needed) back to the RX Executive Group. The IPWG evaluates resources (funds and equipment) that are currently scheduled for programs in the future years (present to FY 15) and makes recommendations to the RX Executive Steering Group (Director, Deputy Director and all of the Division Chiefs) on allocation of those resources. In chartering this working group, the objective was to assure that any resources that are allocated to current programs are used as effectively as possible to stimulate the innovation and workforce development that RX needs. Table 1 shows the Innovative Plans Working Group and the resources that they can influence.

As discussed above, the Discovery portion of the research portfolio stimulates innovation by supporting new ideas and concepts. If an idea or concept is accepted for

further research, that concept is then integrated into the FLTC portfolio. Also, as mentioned above, the various independently funded innovative programs—such as Lab Director Funded Projects and CGOIP—provide access to resources to support innovative activities.

So RX does have several programs that show direct management support for innovative activities. This is of note, because our analysis has shown that management support is the significant driver for creating an innovative climate within RX. Finally, we will discuss supportive organizational structure and its impact on CE within RX.

Supportive Organizational Structure.

The literature discussed the positive impact of a supportive organizational structure within an organization that has an innovative climate. In our particular case, the results show that the impact of organizational structure was significant to the organization—but in a negative direction. This basically demonstrates that formal organizational boundaries inhibit creative thinking within the RX organization.

Conclusions

The purpose of this study was to answer the question: What are the most important factors that management of a non-profit environment or organization can influence if they want their employees to develop an innovative climate (a CE atmosphere) and what are the expected outcomes of this environment? This study then went on to examine a DoD organization and determine which antecedents are significant to the employees perception of a CE atmosphere. The results indicate that management support is by far the most significant factor in establishing a CE environment. The

outcomes which were predicted for an innovative organization were present in the Materials and Manufacturing Directorate except for Perceived Organizational Contribution.

Table 7 presents a summary of the eleven hypothesis test questions and their results. As discussed above, of the five antecedents that were hypothesized to have a significant and positive relationship between the antecedents and an entrepreneurial mindset, only one—Management Support was supported. Appropriate use of rewards and risk taking and failure tolerance were not significantly related to an entrepreneurial mindset within the RX organization.

The perception of RX management support is shown to positively affect the innovative activities of the RX employee. Pearce et al. (1997) stated that willingness of management to support the entrepreneurial mindset demonstrated a greater level of entrepreneurial activity amongst the employees of these organizations.

One of the most interesting findings is that a negative significant relationship between supportive organizational structure and the entrepreneurial mindset was demonstrated. The type of research atmosphere in RX could possibly explain this relationship where rigid rules, controls, and formal organizational structures actually curtail the creativity/innovativeness of the organization. Additionally, Jennings and Lumpkin (1989) showed that an entrepreneurial organization is an organization that usually promotes calculated risk taking and accepts or tolerates failures. The results show that RX employees did not perceive that management accepts risk taking and tolerates failure which may have inhibited the CE environment.

The available research established that the hypotheses of a link between RX resource availability and an entrepreneurial mindset were not supported. Krus and Helmstadter (1993) point out that one situation in which negative reliability may occur is when the scale items represent more than one dimension of meaning. This may possibly be the case—especially with this measure—where three questions were asked about workload and time availability while three questions were asked about getting work items accomplished. With overworked researchers, this may seem like a conflict; but in the world of basic research, there is a tremendous amount of miscellaneous work required (safety, tool control, chemical controls, etc.)—while the research has to be accomplished and completed.

Of the six outcome variables predicted to have a positive relationship with entrepreneurial mindset, all but one (perceived organizational contribution) was supported. Shepherd and Krueger (2002) suggested that members' perceptions that their actions are desirable by the organization and entrepreneurial activity is positively related. This is interesting as a perceived contribution and may be an area that is important for morale or for esteem, but does not necessarily support an innovative climate. Especially in large research groups, the ability to function as a team and teamwork is viewed as more important to the overall success of the projects.

The data noted that entrepreneurial mindset and memory orientation are positively related. As stated in Chapter II, according to Garvin (1993) "A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights." According to Hult et al., (2000), memory orientation is one of the "key dimensions of organizational learning..."

in which he was referring to knowledge sharing and communication throughout the organization. The benefit of lessons learned or knowledge transfer is that as research heads down a certain path, some old pitfalls may be avoided or some new methods that may have not been tried before may be encouraged. This knowledge is valuable in saving lost time or avoiding having to start from square one.

As hypothesized, there was a positive relationship established between an RX employee's entrepreneurial mindset and the overall organization's performance. This is one of the more important factors for both the employee and the senior managers. Most leaders want to get the most bang for the buck from the organization—this positive relationship suggests that if a leader can instill an innovative mindset within their employees, they have a better chance of increasing the levels of organizational performance.

Benefits and Contributions

This study resulted in data and information that can be provided to RX senior management to give insight into factors that influence innovative activities within the organization. It also discusses the outcomes associated with those behaviors. The study identified positive and significant correlations between perceived management support and an innovative mindset in the RX Directorate. The study also found a negative, yet significant relationship between supportive organizational structure and a CE mindset. Again, this states that the more formal rules and regulations that the organization sticks to, the less innovative that organization becomes.

This study found a positive and significant relationship between all of the predicted outcomes (Perceived Organizational Support did not show a significant relationship) and the CE mindset.

These findings should give insight to RX senior leaders as to areas where to focus to get the most innovative ideas and research out of their employees. Being that RX is devoted to basic research, it is essential to find new and unique solutions to help the warfighter keep their technological edge to dominate the enemy.

Limitations

This study does show results that should be seen as positive for the Materials and Manufacturing Directorate, but does have some limitations. This study had several problems with contractors and responses that were not complete—so the limitation of most concern is sampling bias. While the sample did seem to be fairly representative of the directorate as a whole, it is rather difficult to say how close this really is.

The population was always meant to reflect RX as a whole, including contractors and government employees, so one recommendation for further study would be to run the study again with government only and a separate study for contractors only.

One source of error that we may be introducing is the large contractor population within RX (over 50% of the total population). One of the reasons for the large contractor population is to have flexibility to respond to changing research requirements over the years, so this population may not have the expected long-term commitment that a typical government employee would have.

Another potential error could be the sample size. Note that RX is not allowed to keep demographics on the contractor workforce—but comparing the population that RX is allowed to keep data on (government employees, students, visiting faculty, etc.) with the sample demographics, it seems that a higher percentage of people with less than 15 years of experience filled out the survey vs. the general demographics of RX (54% of survey respondents had 15 years of service or less vs. 26% of RX employees have 15 years of service or less).

The questionnaires were asking respondents to fill out data based on their behaviors or how they felt about some particular item, otherwise known as “self-report measures,” which leaves room for additional potential errors. Sometimes this data can be skewed by respondents wanting to show themselves in a favorable light and might not report exactly how they truly believe. Another basic limitation is that of generalizing—meaning that the data we collected may be applicable in similar situations—but because this study was based on statistical probabilities, we cannot regard these results as neither conclusive nor exhaustive. Finally, this study was of cross-sectional design—taken over a small period of time—and with no time sequence implied so causality cannot be implied or determined.

This study did benchmark off of previous research to establish validity measures. The scales used in this study were taken from previously published studies that had established validity and reliability of the scales. The sample size precluded using factor analysis and this limits the validity of the study.

Recommendations for Future Research

Future research should be conducted in this area and can address some of the limitations in this research. Future researchers should segregate between contractors and government employees. Additionally, within the government employee positions, students should be addressed separately as many students have few years with the government and their jobs are essentially temporary positions so that may have an effect on the commitment numbers. There would be an advantage to have the entire directorate complete the questionnaire—or even a representative group from the entire directorate versus just the few branches who participated in this study.

It would also be interesting to get some of the other AFRL Technical Directorates and see how they would rate on the innovative scale. RX does basic research, but other directorates such as the Propulsion Directorate or the Air Vehicles Directorate do more advanced research (they take the materials we make and incorporate them into their research). It may be interesting to classify innovativeness on a style of research method. Finally, it would be good to introduce other antecedents and outcomes and see if there is any significant information determined from other variables. The five antecedents tested are considered by most of the literature to be the most significant antecedents, but it would be interesting to introduce others in this specific group to see if they are relevant to promoting that innovative mindset.

Summary

The purpose of this study was to determine to what extent the innovative mindset exists within the Materials and Manufacturing (RX) Directorate of the Air Force Research Labs of the United States Air Force. The results show that this mindset does exist within the RX Directorate and the study identified a specific set of factors that are perceived to positively and significantly influence the innovative climate within the directorate. It also established positive and significant relationships to the innovative mindset and several meaningful outcomes. The RX senior leaders can use the results of this research to promote a more entrepreneurial climate within the employees of the directorate.

Appendix

A Study of Entrepreneurship in DoD Organizations

This study is designed to assess the extent to which innovative behaviors exist in your organization. The goal of this questionnaire is to make senior leaders aware of the factors that influence innovative behaviors in their organizations so they can promote and support these factors in order to maximize organizational performance.

Privacy Notice

The following information is provided as required by the Privacy Act of 1974:

Purpose: To obtain information regarding entrepreneurship in DoD organizations.

Routine Use: The questionnaire results will be used to determine whether an entrepreneurial mindset exists in DoD organizations and to identify the factors that precede this mindset. A final report will be provided to participating organizations. No individual data will be revealed and only members of the Air Force Institute of Technology research team will be permitted access to the data.

Anonymity: We would greatly appreciate your participation in this questionnaire. ALL ANSWERS ARE STRICTLY ANONYMOUS. Therefore, you should not include your name anywhere on this questionnaire. If you would like to receive a summary of the results, contact information is provided below.

Participation: Participation is voluntary. No adverse action will be taken against any member of the organization who does not participate or who does not complete any part of the questionnaire.

Contact Information: If you have any questions or comments, contact information is provided below.

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INSTRUCTIONS

- Base your answers on your own thoughts and experiences.
 - Please read and answer each question before submitting your results.
-

Section 1 PERCEPTIONS OF THE ORGANIZATION
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We would like to understand how innovative you feel your organization and its leadership are. The following questions will help us do that. For each statement, please fill in the circled number that indicates the extent to which you agree that the statement is true.

① Strongly Disagree	② Disagree	③ Neither Agree Nor Disagree	④ Agree	⑤ Strongly Agree	
1. Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not.	①	②	③	④	⑤
2. I seldom have to follow the same work methods or steps for doing my major tasks from day to day.	①	②	③	④	⑤
3. I feel that I am always working with time constraints on my job.	①	②	③	④	⑤
4. Upper management is aware and very receptive to my ideas and suggestions.	①	②	③	④	⑤
5. In my organization, developing one's own ideas is encouraged for the improvement of the organization.	①	②	③	④	⑤
6. Many top managers have been known for their experience with the innovation process.	①	②	③	④	⑤
7. I have the freedom to decide what I do on my job.	①	②	③	④	⑤
8. My manager would tell his or her boss if my work was outstanding.	①	②	③	④	⑤
9. This organization provides the chance to do something that makes use of my abilities.	①	②	③	④	⑤
10. Promotion usually follows the development of new and innovative ideas.	①	②	③	④	⑤

① Strongly Disagree	② Disagree	③ Neither Agree Nor Disagree	④ Agree	⑤ Strongly Agree
11. There is little uncertainty in my job.			① ② ③ ④ ⑤	
12. This organization provides freedom to use my own judgment.			① ② ③ ④ ⑤	
13. I have much autonomy on my job and am left on my own to do my own work.			① ② ③ ④ ⑤	
14. During the past three months, my work load was too heavy to spend time on developing new ideas.			① ② ③ ④ ⑤	
15. There is considerable desire among people in the organization for generating new ideas without regard to crossing departmental or functional boundaries.			① ② ③ ④ ⑤	
16. My supervisor will give me special recognition if my work performance is especially good.			① ② ③ ④ ⑤	
17. My organization is quick to use improved work methods.			① ② ③ ④ ⑤	
18. Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.			① ② ③ ④ ⑤	
19. The "doers" are allowed to make decisions on projects without going through elaborate justification and approval procedures.			① ② ③ ④ ⑤	
20. It is basically my own responsibility to decide how my job gets done.			① ② ③ ④ ⑤	
21. People are encouraged to talk to workers in other departments of this organization about ideas for new projects.			① ② ③ ④ ⑤	
22. Money is often available to get new project ideas off the ground.			① ② ③ ④ ⑤	
23. My job is structured so that I have very little time to think about wider organization problems.			① ② ③ ④ ⑤	

① Strongly Disagree	② Disagree	③ Neither Agree Nor Disagree	④ Agree	⑤ Strongly Agree
24. The term "risk taker" is considered a positive attribute for people in my work area.			① ② ③ ④ ⑤	
25. This organization provides the chance to be creative and try my own methods of doing the job.			① ② ③ ④ ⑤	
26. On my job, I have no doubt of what is expected of me.			① ② ③ ④ ⑤	
27. My organization is quick to use improved work methods that are developed by workers.			① ② ③ ④ ⑤	
28. My supervisor will increase my job responsibilities if I am performing well in my job.			① ② ③ ④ ⑤	
29. My co-workers and I always find time for long-term problem solving.			① ② ③ ④ ⑤	
30. Harsh criticism and punishment result from mistakes made on the job.			① ② ③ ④ ⑤	
31. I always seem to have plenty of time to get everything done.			① ② ③ ④ ⑤	
32. I almost always get to decide what I do on my job.			① ② ③ ④ ⑤	
33. People are often encouraged to take calculated risks with new ideas around here.			① ② ③ ④ ⑤	
34. I have just the right amount of time and work load to do everything well.			① ② ③ ④ ⑤	
35. A worker with a good idea is often given free time to develop that idea.			① ② ③ ④ ⑤	
36. There are several options within the organization for individuals to get financial support for their innovative projects and ideas.			① ② ③ ④ ⑤	

① Strongly Disagree	② Disagree	③ Neither Agree Nor Disagree	④ Agree	⑤ Strongly Agree
37. My manager helps me get my work done by removing obstacles.			① ② ③ ④ ⑤	
38. The rewards I receive are dependent upon my work on the job.			① ② ③ ④ ⑤	
39. I feel that I am my own boss and do not have to double-check all of my decisions.			① ② ③ ④ ⑤	
40. This organization supports many small and experimental projects realizing that some will undoubtedly fail.			① ② ③ ④ ⑤	
41. My job description clearly specifies the standards of performance on which my job is evaluated.			① ② ③ ④ ⑤	
42. In the past three months, I have always followed standard operating procedures or practices to do my major tasks.			① ② ③ ④ ⑤	
43. I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.			① ② ③ ④ ⑤	

Questions 44 through 52 have a different response format. Each statement has two anchor responses and a seven-point response scale. Please fill in the circle number that indicates your response to the given statement.

EXAMPLE: *In general, the operating management philosophy in my organization favors . . .*

A strong insistence on a uniform managerial style throughout the organization.	①	②	③	④	⑤	⑥	⑦	Managers' operating styles allowed to range from the very formal to the very informal.
--	---	---	---	---	---	---	---	--

In this case, selecting ⑥ means you feel quite strongly that your organization favors allowing managers' operating styles to range freely from the very formal to the very informal.

44. *In general, the top managers of my organization favor . . .*

A strong emphasis on supporting tried and true services and/or business practices.	①	②	③	④	⑤	⑥	⑦	A strong emphasis on R&D technological leadership, and innovation.
--	---	---	---	---	---	---	---	--

45. *How many new services and/or business practices has your organization developed in the past five years?*

No new services and/or business practices.	①	②	③	④	⑤	⑥	⑦	Very many new services and/or business practices.
--	---	---	---	---	---	---	---	---

46. *Changes . . .*

In services and/or business practices have been mostly of a minor nature.	①	②	③	④	⑤	⑥	⑦	In services and/or business practices have usually been quite dramatic.
---	---	---	---	---	---	---	---	---

47. *My organization . . .*

Typically responds to actions which other organizations initiate.	①	②	③	④	⑤	⑥	⑦	Typically initiates actions which other organizations then respond to.
---	---	---	---	---	---	---	---	--

48. *My organization . . .*

Is very seldom the first organization to introduce new administrative techniques, operating technologies, and business practices.	①	②	③	④	⑤	⑥	⑦	Is very often the first organization to introduce new administrative techniques, operating technologies, and business practices.
---	---	---	---	---	---	---	---	--

49. *My organization . . .*

Typically seeks to avoid change preferring a "live-and-let-live" posture.	①	②	③	④	⑤	⑥	⑦	Typically adopts a very aggressive "undo-the-status-quo" postures.
---	---	---	---	---	---	---	---	--

50. <i>In general, the top managers of my organization have . . .</i>						
A strong preference for low-risk projects (with normal and certain outcomes).	①	②	③	④	⑤	⑥ ⑦ A strong preference for high-risk projects (with chances of very attractive outcomes).
51. <i>In general, the top managers of my organization believe that . . .</i>						
It is best to explore options gradually via timid, incremental behavior.	①	②	③	④	⑤	⑥ ⑦ Bold, wide-ranging acts are necessary to achieve the unit's objectives.
52. <i>When confronted with decision-making situations involving uncertainty, my organization's leadership . . .</i>						
Typically adopts a cautious "wait-and-see" posture in order to minimize the probability of making costly decisions.	①	②	③	④	⑤	⑥ ⑦ Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities.

Section 2 GENERAL PERCEPTIONS OF YOUR JOB AND ORGANIZATION

We would like to understand how innovative you feel your job and organization in general (where organization is defined as "Directorate"). The following questions will help us do that. For each statement, please fill in the circled number that indicates the extent to which you agree that the statement is true.

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree Nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree	
1. I do not feel emotionally attached to this organization.	①	②	③	④	⑤	⑥	⑦
2. Organizational conversation keeps alive the lessons learned from history.	①	②	③	④	⑤	⑥	⑦
3. I do not feel like part of the family at my organization.	①	②	③	④	⑤	⑥	⑦
4. I could be very happy to spend the rest of my career with this organization.	①	②	③	④	⑤	⑥	⑦
5. In general, I do not like my job.	①	②	③	④	⑤	⑥	⑦
6. All in all, I am satisfied with my job.	①	②	③	④	⑤	⑥	⑦
7. I encourage others to try new and more effective ways of doing their jobs.	①	②	③	④	⑤	⑥	⑦
8. I think that people these days move from company to company too often.	①	②	③	④	⑤	⑥	⑦
9. I continue to look for new ways to improve the effectiveness of my work.	①	②	③	④	⑤	⑥	⑦
10. I think that I could easily become as attached to another organization as I am to this one.	①	②	③	④	⑤	⑥	⑦
11. I do not feel a strong sense of belonging to my organization.	①	②	③	④	⑤	⑥	⑦

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree Nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
12. We audit unsuccessful organizational endeavors and communicate the lessons learned.						
①	②	③	④	⑤	⑥	⑦
13. We have specific mechanisms for sharing lessons learned in our organization.						
①	②	③	④	⑤	⑥	⑦
14. I make constructive suggestions to improve the overall functioning of my work group.						
①	②	③	④	⑤	⑥	⑦
15. This organization has a great deal of personal meaning for me.						
①	②	③	④	⑤	⑥	⑦
16. Jumping from organization to organization does not seem at all unethical to me.						
①	②	③	④	⑤	⑥	⑦
17. In general, I like working here.						
①	②	③	④	⑤	⑥	⑦
18. I really feel as if this organization's problems are my own.						
①	②	③	④	⑤	⑥	⑦
19. I was taught to believe in the value of remaining loyal to the organization.						
①	②	③	④	⑤	⑥	⑦
20. One of the major reasons I continue to work for the Air Force is that I believe that loyalty is important and therefore feel a sense of moral obligation to remain.						
①	②	③	④	⑤	⑥	⑦
21. Formal routines exist to uncover faulty assumptions about the organization.						
①	②	③	④	⑤	⑥	⑦
22. I enjoy discussing my organization with people outside of it.						
①	②	③	④	⑤	⑥	⑦
23. Things were better in the days when people stayed with the organization for most of their careers.						
①	②	③	④	⑤	⑥	⑦

The final two questions have two anchor responses and a seven-point response scale. As with the questions you answered in Section 1, please fill in the circled number that indicates your response to the given statement.

24. *Regarding our overall performance during the last year, we . . .*

Performed poorly in general.	①	②	③	④	⑤	⑥	⑦	Performed excellently in general.
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25. *Regarding our overall performance, during the last year, we . . .*

Performed poorly relative to other organizations.	①	②	③	④	⑤	⑥	⑦	Performed excellently relative to other organizations.
---	---	---	---	---	---	---	---	--

Section 3 BACKGROUND INFORMATION

This section contains items regarding your personal characteristics. These items are very important for statistical purposes. Respond to each item by typing your answer in the text box provided.

1. What is your age?

2. What is your gender?

3. What is your rank?

4. How long have you been in your current organization ("organization" is defined as "SPO/Squadron/Directorate")?

5. How many layers of management separate you from the leader of your organization ("leader" refers to "SPO Director/Squadron Commander/Directorate Director")?

Table 1. The RX Innovative Working Group Cost Data (\$K)

PROGRAM	AFRL Fellows	Lab Directors Fund Projects	ST Innovation Fund	CGOIP	HBCU/MI Program	Summer Faculty Fellowship Program
FY 10	300	500	511	400	448	0
FY 11	200	500	0	400	448	0
FY 12	200	1000	500	500	650	187
FY 13	200	1000	500	500	650	187
FY 14	200	1000	500	500	650	187
FY 15	200	1000	500	500	650	187

Table 2. Demographics of the Respondents

Age	Gender	Rank	Years in RX	Layers to Director
25 under = 17	M = 83	GS-14/15(eq) = 30	0-5 = 47	1 = 10 respondents
26-35 = 26	F = 37	GS-11/13(eq) = 29	6-15 = 31	2 = 27
36-45 = 35	Other/NR = 11	GS-10und/WG = 11	16-25 = 23	3 = 33
46-55 = 37		Contractor = 26	26+ = 15	4 = 24
56 over = 9		Other/NR = 25	Other/NR = 15	5 = 14
Other/NR = 7				Other/NR = 6

Table 3. Demographics of RX

Age	Gender	Rank	Years in RX
25 under = 53	M = 411	GS-14/15(eq) = 222	0-5 = 66
26-35 = 114	F = 145	GS-11/13(eq) = 159	6-15 = 102
36-45 = 106		GS-10und/WG = 53	16-25 = 119
46-55 = 199		Contractor = 748	26+ = 130
56+ = 95			

Table 4. Measures

Construct	Definition	Example Items	Response Scale
Entrepreneurial Mindset (Covin and Slevin, 1989)	Measures the extent to which respondents characterize their organization's entrepreneurial mindset, in terms of the tendency toward innovation, being proactive, and taking risk.	In general, the top managers of my organization favor...	Seven-point anchor response.
		A strong emphasis on supporting tried and true services and/or business practices.	1 to 7 A strong emphasis on R&D, technological leadership, and innovations.
		My organization...	Seven-point anchor response.
		Typically responds to actions which other organizations initiate.	1 to 7 Typically initiates actions which other organizations then respond to.
		In general, the top managers of my organization have...	Seven-point anchor response.
		A strong preference for low-risk projects (with normal and certain outcomes).	1 to 7 A strong preference for high-risk projects (with chances of very attractive outcomes).

Table 4. Measures (continued)

Construct	Definition	Example Items	Response Scale
Appropriate Use of Rewards (Hornsby et al., 2002)	Measures the extent to which respondents feel their organization has an effective reward system.	My supervisor will give me special recognition if my work performance is especially good.	Five-point Likert-type.
Management Support (Hornsby et al., 2002)	Measures the extent to which respondents feel management is willing to facilitate and promote entrepreneurial activity in the organization.	Money is often available to get new project ideas off the ground.	Five-point Likert-type.
Resource Availability (Hornsby et al., 2002)	Measures the extent to which respondents feel they have resources (including time) available for entrepreneurial activity.	During the past three months, my workload was too heavy to spend time on developing new ideas.	Five-point Likert-type.
Supportive Organizational Structure (Hornsby et al., 2002)	Measures the extent to which respondents feel they have a supportive organizational structure.	My job description clearly specifies the standards of performance on which my job is evaluated.	Five-point Likert-type.

Table 4. Measures (continued)

Construct	Definition	Example Items	Response Scale
Risk Taking and Failure Tolerance (Hornsby et al., 2002)	Measures the extent to which respondents feel they have discretion and autonomy to engage in entrepreneurial activity in the organization.	I seldom have to follow the same work methods or steps for doing my major tasks from day to day.	Five-point Likert-type.
Job Satisfaction (Cammann et al., 1983)	Measures the extent to which respondents view their job positively.	In general, I like working here.	Seven-point Likert-type.
Perceived Organizational Contribution (Lynch et al., 1999)	Measures the extent to which respondents believe they make contributions to the organization.	I continue to look for new ways to improve the effectiveness of my work.	Seven-point Likert-type.
Affective Commitment (Allen and Meyer, 1990)	Measures the extent to which respondents are emotionally attached to the organization.	I really feel as if this organization's problems are my own.	Seven-point Likert-type.
Normative Commitment (Allen and Meyer, 1990)	Measures the extent to which respondents feel obligation to remain with the organization.	I think that people these days move from company to company too often.	Seven-point Likert-type.

Table 4. Measures (continued)

Construct	Definition	Example Items	Response Scale
Memory Orientation (Hult et al., 2003)	Measures the extent to which respondents view particular aspects of the learning process within their organization and if mechanisms are in place for sharing knowledge and experiences.	We audit unsuccessful organizational endeavors and communicate the lessons learned.	Seven-point Likert-type.
Overall Organizational Performance (Hult et al., 2003)	Measures the extent to which respondents assess their organization's overall performance in relationship to other organizations.	Regarding our overall performance, during the last year, we... Performed poorly in general 1 to 7 Performed excellent in general.	Seven-point anchor response.

Table 5. Descriptive Statistics and Reliability Values for Study Variables

Variables (Items)	mean	scale	SD	Alpha*
Entrepreneurial Mindset (9)	4.29	1 to 7	1.49	0.83
Appropriate Use of Rewards (5)	3.60	1 to 5	0.97	0.83
Management Support (17)	3.13	1 to 5	0.96	0.86
Resource Availability (6)	2.69	1 to 5	1.06	0.72
Supportive Organizational Structure (5)	3.27	1 to 5	1.03	0.76
Risk Taking Failure Toler (10)	3.31	1 to 5	1.06	0.70
Job Satisfaction (3)	5.50	1 to 7	1.46	0.78
Perceived Org Contribution (3)	5.39	1 to 7	1.12	0.72
Affective Commitment (8)	4.52	1 to 7	1.70	0.77
Normative Commitment (5)	4.27	1 to 7	1.58	0.71
Memory Orientation (4)	3.86	1 to 7	1.51	0.80
Overall Org Performance (2)	5.03	1 to 7	1.30	0.83
* = Cronbach's coefficient alpha calculated from the study				

Table 6. Calculated Correlation Values

		Rewards	Mgt Suppt	ResAvail	SupOrgSt	Risk	JobSat	POS	AffComm	NormComm	MemOr	OrgPerf	EntMindSet
Rewards	Pearson Correlation	1.000											
	Sig (2-tailed)												
	N	136											
Mgt Suppt	Pearson Correlation	.628**	1.000										
	Sig (2-tailed)	0.000											
	N	136	136										
ResAvail	Pearson Correlation	0.002	.279**	1.000									
	Sig (2-tailed)	0.984	0.001										
	N	136	136	136									
SupOrgSt	Pearson Correlation	.503**	.457**	.320**	1.000								
	Sig (2-tailed)	0.000	0.000	0.000									
	N	136	136	136	136								
Risk	Pearson Correlation	.508**	.492**	0.009	.281**	1.000							
	Sig (2-tailed)	0.000	0.000	0.919	0.001								
	N	136	136	136	136	136							
JobSat	Pearson Correlation	.466**	.519**	0.143	.398**	.492**	1.000						
	Sig (2-tailed)	0	0.000	0.096	0.000	0.000							
	N	136	136	136	136	136	136						
POS	Pearson Correlation	0.112	0.168	-0.143	0.123	.274**	.268**	1.000					
	Sig (2-tailed)	0.193	0.051	0.97	0.155	0.001	0.002						
	N	136	136	136	136	136	136	136					
AffComm	Pearson Correlation	.526**	.510**	-0.038	.342**	.543**	.673**	.461**	1.000				
	Sig (2-tailed)	0.000	0.000	0.657	0.000	0.000	0.000	0.000					
	N	136	136	136	136	136	136	136	136				
NormComm	Pearson Correlation	0.158	.254**	0.059	0.095	0.189*	.213*	0.126	.371**	1.000			
	Sig (2-tailed)	0.066	0.003	0.493	0.273	0.027	0.013	0.145	0.000				
	N	136	136	136	136	136	136	136	136	136			
MemOr	Pearson Correlation	.451**	.644**	.245**	.424**	.309**	.456**	0.137	.492**	.385**	1.000		
	Sig (2-tailed)	0.000	0.000	0.004	0.000	0.000	0.000	0.112	0.000	0.000			
	N	136	136	136	136	136	136	136	136	136	136		
OrgPerf	Pearson Correlation	.374**	.468**	0.088	.354**	.392**	.541**	.169*	.512**	.205*	.492**	1.000	
	Sig (2-tailed)	0.000	0.000	0.311	0.000	0.000	0.000	0.049	0.000	0.017	0.00		
	N	136	136	136	136	136	136	136	136	136	136	136	
EntMindSet	Pearson Correlation	.391**	.587**	0.184*	0.164	.294**	.343**	0.075	.326**	.254**	.480**	.364**	1.000
	Sig (2-tailed)	0.000	0.000	0.032	0.056	0.001	0.000	0.388	0.000	0.003	0.00	0.00	
	N	136	136	136	136	136	136	136	136	136	136	136	136

** . Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Table 7. Summary of Hypotheses and Test Results

Hypothesis 1	Appropriate use of rewards and reinforcement has a positive impact on the organization and its members	NOT Supported
Hypothesis 2	The perception of management support for innovative activities has a positive impact on the organization and its members	Supported
Hypothesis 3	The perception of resource availability for innovative activities has a positive impact on the organization and its members	Not Supported
Hypothesis 4	The perception of a supportive organizational structure for innovative activities has a positive impact on the organization and its members	NOT Supported Significant but Neg impacts
Hypothesis 5	The perception of acceptance in risk taking and failure tolerance for innovative activities by senior leaders has a positive impact on the organization and its members	NOT Supported
Hypothesis 6	If there is an innovative atmosphere within an organization, then there should be a perception of high job satisfaction among the organization's members	Supported
Hypothesis 7	If there is an innovative atmosphere, then organizational members should have the perception that they contribute to the organization	NOT Supported
Hypothesis 8	If there is an innovative atmosphere, then organizational members should have a perception of affective commitment to the organization	Supported
Hypothesis 9	If there is an innovative atmosphere, then organizational members should have a perception of normative commitment to the organization	Supported
Hypothesis 10	If there is an innovative atmosphere, then organizational members should have a perception of memory orientation in the organization	Supported
Hypothesis 11	If there is an innovative atmosphere, then organizational members should have a perception of high organizational performance	Supported

VI. Bibliography

Air Force Research Laboratory. *Laboratory Personnel Demonstration Project*. AFRL Manual 36-104. 6-19. 1 July 2008.

https://livelink.ebs.afrl.af.mil/livelink/lisapi.dll/open/AFRL_Publications_Library

Allen, Natalie J. and John P. Meyer. "The Measurement and Antecedents of Affective, Continuance and Normative Commitment to the Organization," *Journal of Occupational Psychology*, 63: 1-18 (1990).

Bateman, T. and S. Strasser. "A Longitudinal Analysis of the Antecedents of Organizational Commitment," *Academy of Management Journal*, 21: 95-112 (1984).

Bowling, Nathan A., Terry A. Beehr, and Lawrence R. Lepisto. "Journal of Vocational Behavior," 69(2): 315-330 (2006).

Buchanan, B., II. "Building Organizational Commitment: The Socialization of Managers in Work Organizations," *Administrative Science Quarterly*, 19: 533-546 (1974).

Cammann, Cortlandt and others. "Assessing the Attitudes and Perceptions of Organizational Members," *Assessing Organizational Change: A Guide to Methods, Measures, and Practices*. New York: A Wiley-Interscope Publication, 1983.

Covin, Jeffrey G. and Morgan P. Miles. "Corporate Entrepreneurship and the Pursuit of Competitive Advantage," *Entrepreneurship: Theory and Practice*, 23(3): 47-63 (1999).

Covin, Jeffrey G. and Dennis P. Slevin. "A Conceptual Model of Entrepreneurship as Firm Behavior," *Entrepreneurship: Theory and Practice*, 16(1): 7-25 (1991).

Covin, Jeffrey G. and Dennis P. Slevin. "Strategic Management of Small Firms in Hostile and Benign Environments," *Strategic Management Journal*, 10: 75-87 (1989).

Connolly, J.J. and C. Viswesvaran. "The Role of Affectivity in Job Satisfaction: A Meta-Analysis," *Personality and Individual Differences*, 29: 265-281 (2000).

Damanpour, Fariborz. "Organizational Innovation: A Meta-Analysis of Effects of Determinant and Moderators," *Academy of Management Journal*, 34(3): 555-590 (1991).

Dess, G.G., G.T. Lumpkin, and J.E. McGee. "Linking Corporate Entrepreneurship to Strategy, Structure, and Process: Suggested Research Directions," *Entrepreneurship Theory & Practice*, 23(3): 85-102 (1999).

Dormann, Christian and Dieter Zapf. "Job Satisfaction: A Meta-Analysis of Stabilities," *Journal of Organizational Behavior*, 22(5): 483 (2001).

Executive Office of the President, Office of Management and Budget. *Preparation, Submission, and Execution of the Budget*. OMB Circular No. A-11. Part 2. Preparation and Submission of Budget Estimates. III. Max Data and Other Materials Required After Passback. Section 84. Character Classification (Schedule C). July 2010.
http://www.whitehouse.gov/omb/circulars_a11_current_year_a11_toc

Garvin, D.A. "Building a Learning Organization," *Harvard Business Review*, 71(4): 14 (1993).

Gates, Robert M. "A Balanced Strategy," *Foreign Affairs*, 88: 31-42 (2009).

George, D. and P. Mallery. *SPSS for Windows Step by Step: A Simple Guide and Reference. 11.0 update* (4th Edition). Boston: Allyn & Bacon, 2003.

Hamel, Gary. "Bringing Silicon Valley Inside," *Harvard Business Review*, 77(5): 71-84 (1999).

Holt, Daniel T., Matthew W. Rutherford, and Gretchen R. Clohessy. "Corporate Entrepreneurship: An Empirical Look at Individual Characteristics," *Journal of Leadership & Organizational Studies*, 13(4): 40 (2007).

Hornsby, J.S. and M.G. Goldby. "Corporate Entrepreneurial Performance at Koch Industries: A Social Cognitive Framework," *Business Horizons*, 52(5): 413-419 (2009).

Hornsby, J.S., D.F. Kuratko, and S.A. Zahra. "Middle Managers' Perception of the Internal Environment of Corporate Entrepreneurship: Assessing a Measurement Scale," *Journal of Business Venturing*, 17(3): 253-273 (2002).

Hult, G. Tomas M., Robert F. Hurley, Larry C. Giunipero, and Ernest L. Nichols, Jr. "Organizational Learning in Global Purchasing: A Model and Test of Internal Users and Corporate Buyers," *Decision Sciences*, 31(2): 293-325 (2000).

Hult, G. Tomas M., Charles C. Snow, and Destan Kandemir. "The Role of Entrepreneurship in Building Cultural Competitiveness in Different Organizational Types," *Journal of Management*, 29(3): 401-426 (2003).

Improving Government Program Performance. Executive Order 13450. 72 FR 64519. 15 November 2007. <http://www.archives.gov/federal-register/executive-orders/2007.html>

Jaworski, Bernard J. and Ajay K. Kohli. "Market Orientation: Antecedents and Consequences," *Journal of Marketing*, 57(3): 53-70 (1993).

Jennings, Daniel F. and James R. Lumpkin. "Functionally Modeling Corporate Entrepreneurship: An Empirical Integrative Analysis," *Journal of Management*, 15(3): 485-502 (1989).

Kuratko, D.F., J.S. Hornsby, and J.W. Bishop. "An Examination of Managers' Entrepreneurial Actions and Job Satisfaction," *International Entrepreneurship and Management Journal*, 1(3): 275-291 (2005).

Kuratko, D.F., R.D. Ireland, J.G. Covin, and J.S. Hornsby. "A Model of Middle-Level Managers' Entrepreneurial Behavior," *Entrepreneurship Theory & Practice*, 29: 699-716 (2005).

Kuratko, Donald F., Jeffrey S. Hornsby, Douglas W. Naffziger, and Ray V. Montagno. "Implementing Entrepreneurial Thinking in Established Organizations," *S.A.M. Advanced Management Journal*, 58(1): 28-39 (1993).

Krus, D.J., and G.C. Helmstadter. "The Problem of Negative Reliabilities," *Educational and Psychological Measurement*, 53: 643-650 (1993).

Locke, E.A. "What is Job Satisfaction?" *Organizational Behavior and Human Decision Processes*, 4: 309-336 (1969).

Lumpkin, G.T. and Gregory G. Dess. "Clarifying the Entrepreneurial Orientation Construct and Linking it to Performance," *Academy of Management Review*, 21(1): 135 (1996).

Lynch, Patrick D., Robert Eisenberger, and Stephen Armeli. "Perceived Organizational Support: Inferior Versus Superior Performance by Wary Employees," *Journal of Applied Psychology*, 84(4): 467-483 (1999).

McGrath, Rita Gunther and Ian MacMillan. *The Entrepreneurial Mindset*. Harvard Business School Press, 2000.

Meyer, J.P. and N.J. Allen. "A Three-Component Conceptualization of Organizational Commitment," *Human Resource Management Review*, 1: 61-89 (1991).

- Meyer, J.P., N.J. Allen, and C.A. Smith. "Commitment to Organizations and Occupations: Extension and Test of a Three-Component Conceptualization," *Journal of Applied Psychology*, 78(4): 538-552 (1993).
- Morris, M.H., D.F. Kuratko, and J.G. Covin. *Corporate Entrepreneurship & Innovation*, Mason OH: Thomson South-Western, 2008.
- Pearce, John A., Tracy Robertson Kramer, and D. Keith Robbins. "Effects of Managers' Entrepreneurial Behavior on Subordinates," *Journal of Business Venturing*, 12(2): 147-160 (1997).
- Porter, L.W., R.M. Steers, R.T. Mowday, P.V. Boulian. "Organizational Commitment, Job Satisfaction, and Turnover Among Psychiatric Technicians," *Journal of Applied Psychology*, 59: 603-609 (1974).
- Pugh, D.S., D.J. Hickson, C.R. Hinings, and C. Turner. "Dimensions of Organizational Structure," *Administrative Science Quarterly*, 13(1) 65-105 (1968).
- Romzek, Barbara S. "Employee Investment and Commitment: The Ties That Bind," *Public Administration Review*, 50(3): 374-382 (1990).
- Rumsfeld, Donald H. "Transforming the Military," *Foreign Affairs*, 81: 20-32 (2002).
- Sathe, Vijay. "Managing an Entrepreneurial Dilemma: Nurturing Entrepreneurship and Control in Large Corporations," *Frontiers of Entrepreneurship Research*, Wellesley MA: Babson College (1985).
- Shepherd, Dean A. and Norris F. Krueger. "An Intentions-Based Model of Entrepreneurial Teams' Social Cognition," *Entrepreneurship: Theory and Practice*, 27(2): 167-185 (2002).
- Slevin, Dennis P. and Jeffrey G. Covin. "Time, Growth, Complexity, and Transitions: Entrepreneurial Challenges for the Future," *Entrepreneurship: Theory and Practice*, 22(2): 43-68 (1997).
- Sykes, Hollister B. "Incentive Compensation for Corporate Venture Personnel," *Journal of Business Venturing*, 7: 253-265 (1992).
- Twomey, D.F. and D.L. Harris. "From Strategy to Corporate Outcomes: Aligning Human Resource Management Systems With Entrepreneurial Intent," *International Journal of Commerce and Management*, 10: 43-55 (2000).
- Wagner, John A. and Richard Z. Gooding. "Shared Influence and Organizational Behavior: A Meta-Analysis of Situational Variables Expected to Moderate Participation-Outcome Relationships," *Academy of Management Journal*, 30(3): 524-541 (1987).

Zahra, Shaker A. and Jeffrey G. Covin. "Contextual Influences on the Corporate Entrepreneurship-Performance Relationship: A Longitudinal Analysis," *Journal of Business Venturing*, 10(1): 43-58 (1995).

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14. ABSTRACT What determines if an organization has a corporate entrepreneurship (CE) environment? While being entrepreneurial in a private sector job usually means a greater market share or a higher profit margin; in a public research organization, CE must be measured in other ways. This thesis evaluates a Department of Defense (DoD) organization that performs basic research. Any organization that does government or nonprofit work must continually find new ways, methods, processes, or ideas to complete the mission. In this particular study, the mission is to continue to support the warfighter with limited and changing resources—to ensure the military can maintain dominance over the enemy combatant. How an organization encourages and supports new ideas or promotes CE is evaluated so that as funds become scarcer the work force becomes younger and global technology increases. Senior managers are aware of antecedents and outcomes that promote innovative behavior—these managers can properly allocate resources to encourage the desired behavior, ensuring our nation's preeminent combat power to keep America strong, safe, and free.					
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