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Antecedents to Organizational Performance: Theoretical and Practical Implications for Aircraft Maintenance Officer Force Development

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ANTECEDENTS TO ORGANIZATIONAL PERFORMANCE: THEORETICAL AND PRACTICAL IMPLICATIONS FOR AIRCRAFT MAINTENANCE OFFICER FORCE DEVELOPMENT

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Abstract

Dwindling defense budgets and reduction in force programs have necessitated the relentless pursuit of cost savings and efficiency improvement initiatives in the USAF. Under the auspices of force development, this research explored the impact of Aircraft Maintenance Officer (21A) human capital, learning organization (culture), and knowledge management on organizational performance. Survey methodology was utilized to gather data with both theoretical and practical implications on 21A force development practices. Solicitation of information regarding 21A competencies, utility of current AF logistics courses, and latent constructs were conducted through a web-based self-administered cross-sectional survey. Data were collected from 574 21As out of a possible 1,337 in the ranks of second lieutenant through colonel, yielding a 42.9% response rate.

Examination of the latent variables human capital, learning organization, and knowledge management was conducted using exploratory factor analysis and multiple linear regression concluding a positive effect on organizational performance. Practical application of the theoretical findings could yield potential cost savings through the consolidation, restructuring, or removal of logistics courses currently considered under the 21A Deliberate Continuum of Learning (DCoL) having been identified as having low utility. Implications for researchers, practitioners, and senior 21A leadership are discussed along with limitations, recommendations, and areas for future research.

To my wife and daughter,

your sacrifices did not go unnoticed and I am extremely grateful to the both of you.

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I. Introduction

Overview

This chapter serves as a brief introduction to the thesis topic background and motivation for research. The research problem statement, objectives, hypotheses, and investigative questions will also be discussed as well as the research focus and theoretical lens used. Finally, this chapter will conclude with a brief overview of the methodology, assumptions and limitations of research, and possible implications of the results.

Background

There are two main forces affecting the increased emphasis on logistics officer force development and training. First, both the public and private sectors have recognized prudent management of the supply function is essential to the overall success of the larger organization. Second, increasing fiscal constraints and economic instability within the United States (U.S.) government necessitate the careful evaluation of how best to spend taxpayer dollars.

In 2008, a careful examination within the Department of Defense (DoD) aimed at the training and education needs of the logistics forces spurred the Deputy Under Secretary of Defense for Logistics and Material Readiness, in the DoD Logistics Human Capital Strategy (HCS), to stress the following:

> As the world changes rapidly, profoundly, and in every dimension—social, economic, and political—the logistics workforce needs to continuously evolve and operate in a way that optimizes the human capital of the entire enterprise rather than individual parts. It is imperative that the logistics workforce align its human capital with transformed

> warfighting, modernized weapons systems, business rules, emerging enterprise management systems, and executive-level strategic goal (Office of the Secretary of Defense, 2008).

The growing popularity of supply chain management and the role of the supply manager, or logistician, led to the rapid development of logistics courses within the DoD. The Air Force Logistics Force Development Division (AF/A4L) however, recognized that, by 2011, Logistics Officers (21X) attended more than 200 different DoD funded logistics courses; 90 of which are Air Force funded, and many overlap in content taught (Cooper, 2012). Faced with the critical task of providing a Deliberate Continuum of Learning (DCoL) for the logistics field, AF/A4L agreed that today's logistics leaders require a more purposeful and focused preparation than in the past (Cooper, 2012).

The shrinking size of the force, due to increased fiscal constraints and congressionally mandated reduction in force initiatives, further escalates the need to consolidate and refine logistics officer training. The DoD's military and civilian workforce peaked in fiscal year 2011 at 3.1 million personnel, and steadily decreased over the next three years and is expected to continue decreasing over the next two years to below the 2001 level of 2.9 million (U.S. Government Accountability Office, 2013). Senior Air Force leaders, recognizing the current and future fiscal challenges, understand the need to make "prudent choices to ensure that the Air Force is able to release the full potential of airpower" (Welsh, 2013).

In his address to the Senate Armed Services Committee on May 6, Air Force Chief of Staff General Mark A. Welsh III noted per-capita costs for Airmen have grown more than 40 percent since 2000 (Welsh, 2014). As noted by recent and current force reduction programs human capital investments are low hanging fruit when considering options to target financial

relief. As logistics officers continue to face Reduction in Force (RIF) programs, and as the DoD looks to cut costs in new areas, funding for logistics training may be affected.

To address these concerns AF/A4L requested an investigation to determine which logistics courses provide value added learning and which courses have overlapping content. With an objective to determine which courses can be cut, combined, or identified for continued funding. Additionally, identifying which logistics topics are critical to logistics officer performance and when these courses should be taught will provide a critical career development planning tool for AF/A4L to insure current and future logisticians are trained and capable of meeting mission requirements.

Problem Statement

The logistics officer community, and specifically Aircraft Maintenance Officers, has an overabundance of education and training possibilities to develop their core logistics competencies. The Knowledge, Skills, and Abilities (KSAs) required of Aircraft Maintenance Officers (21As) at various points in their career, as described by Thompson (2013) further enforces the need for maintenance officer force development. However, the 21A community lacks a focused career path, one which outlines and prescribes the appropriate logistics courses required throughout an officer's time in the Air Force. Without a clear understanding of how force development influences not only organizational performance but individual competence, AF/A4L cannot design a focused, concise, and directed logistics force development program which meets the needs of the Air Force while similarly equipping the logistician with the tools necessary to accomplish the mission in today's restricted fiscal environment. Additionally,

AF/A4L would like to identify courses with little value added learning or overlapping content as candidates for deletion or to merge with other, more valuable, courses.

Research Objectives, Hypotheses, & Investigative Questions

Building upon the work conducted by Cherry (2014) on Logistic Readiness Officer (LRO) DCoL, similar research objectives have been developed to address the 21A DCoL. These objectives include; what types of jobs do 21As currently hold, how proficient do they need to be in various logistics competencies and how do they perceive the current logistics courses offered within the DoD? A determination of the relationship between the learning organization, human capital, and knowledge management of a 21A and perceived organizational performance will enable better force development (Cherry, 2014). The following research hypotheses have been developed to test these relationships:

Hypothesis 1: 21A human capital has a positive impact on organizational performance

Hypothesis 2: 21A learning culture has a positive impact on organizational performance

Hypothesis 3: 21A knowledge management has a positive impact on organizational performance

To adequately address the research objectives and hypotheses of this research, seven Investigative Questions (IQ) will be posed:

IQ1: What is the relationship between the learning organization, human capital, and knowledge management of a 21A and organizational performance?
IQ2: What are the competencies for which a 21A require proficiency?
IQ3: How proficient do 21As need to be in logistics competencies for them to do their jobs?
IQ4: What are the current Air Force Logistics centric course offerings?
IQ5: What courses have allowed 21A to perform their current jobs better?
IQ6: Among the courses that 21As have not taken, which courses do 21As feel would have allowed them to perform their current jobs better?
IQ7: How do 21As classify their duties (tactical, operational, or strategic)?

Research Focus

This research focused on the education and training of Aircraft Maintenance Officers. While Munitions and Missile Maintenance Officers are similar in many aspects, the lack of previously defined KSAs for the munitions specialty precludes the evaluation of their career development in this analysis. LROs will also be precluded from this study as an analysis of their career development has previously been conducted (Cherry, 2014). The research sponsor for this study is Brigadier General Kathryn J. Johnson, Director of Logistics (AF/A4L) at the Pentagon. Her office is responsible for the organization, training, equipping, and readiness of AF logistics officers. An assumption made by the research is that this office is responsible for logistics officer knowledge management, influences logistics officer learning culture, and is mainly responsible for how logistics officer human capital is utilized as a strategic resource (Cherry, 2014).

Theoretical Lens

The formation for this research is focused on the human capital, learning culture, and knowledge management practices for the 21A community. Several key theories were used to build upon the theoretical framework for this research. The remainder of this section briefly reviews these theories while a more detailed and descriptive review will be conducted in Chapter II.

The first theory, resource based view (RBV), used in this research implies an organization utilizes resources to achieve a sustainable competitive advantage against its competitors (Barney and Arikan, 2001). Branching from RBV is knowledge based view (KBV), which asserts knowledge that an organization possesses is a source of sustainable competitive

advantage, and can be regarded as a strategic resource (Grant, 1997). Finally, competence based view (CBV) further branches from RBV and KBV by postulating a firm's competitiveness in the market is due to the availability of various competences and resources (Sanchez, 2004).

The second theoretical framework in this research is developed from human capital theory (HCT). HCT can be defined as individuals possessing skills, knowledge, and experience that a firm can leverage for strategic purposes (Schultz, 1961). Thus, the aim of human capital theory is to increase performance, both at the individual and organizational level (Ployhart and Moliterno, 2011). The knowledge and experience possessed by individuals is often not enough to dramatically affect organizational performance. The concept of a learning organization has several definitions but can generally be summarized as an organization which fosters the learning of its employees and continuously transforms itself through the expansion of resources (people and knowledge) and the fostering of these resources.

Unlike the concept of a learning organization, Knowledge Management (KM) focuses on the results of learning and not the process of learning. KM refers to the process in which organizations assess the data and information that exist within them, and is a response to the concern that people must be able to translate their learning into usable knowledge (Aggestam, 2006).

Finally, a review of applicable AF logistics doctrine, education and training guidance, and AF logistics competencies grounds the research in terms of AF logistics organization and culture. An understanding of current 21A billets, previously identified KSAs, and the current courses available to the 21A community will be required to develop and test the research hypotheses.

Methodology

A web-based survey was utilized in a cross-sectional study to assess the perceptions of 21As and to build upon preexisting information on 21A KSAs. The web-based survey was self-administered and sent to 21A officer's email accounts, as provided by the Air Force Personnel Center (AFPC). A web-based survey allowed a low cost solution for contacting geographically separated personnel while maintaining a relatively high response rate.

The survey was used to gain an understanding of the perceptions aircraft maintenance officers have regarding their logistics competencies as well as the applicability of logistics training courses. The survey tested the relationship between human capital theory, learning culture, and knowledge management as they pertain to organizational performance. Finally, the survey provided the ability to capture insubstantial data from geographically separated maintenance officers in an expedient manner.

The population of interest is active duty Aircraft Maintenance Officers in the ranks of second lieutenant through colonel. The names of potential respondents will be provided by the research sponsor (AF/A4L) and AFPC. Through the Global Address List (GAL) personnel will be located as potential respondents and sent a link to the web-based survey.

The survey was developed by reviewing and revising a previous survey used to evaluate the LRO community (Cherry, 2014). The survey utilized Likert scale style questions to measure the hypothesis and investigative questions of this research. A full review thesis methodology, to include survey development and design, will be covered in Chapter III.

Assumptions & Limitations

The design of this study lends itself to two fundamental assumptions. First, the assumption is made that the sample of 21As who respond to the survey are representative of the Aircraft Maintenance Officer population. This assumption is critical to generalizing the results of the study to the entire 21A population as a whole and any implications to the nature and their education and training. The second assumption is that the KSAs identified by Thompson (2013), and confirmed by AF/A4L encompass the range of knowledge required by 21As in today's logistics environment. This assumption provides the framework for how the survey questions were developed and a baseline to which other guidance on competencies are compared.

The nature of this study also lends itself to several limitations. First, the intended population of study, active duty 21As, excludes two-thirds of the AF logistics community as well as any guard or reserve logisticians. Thus, the results will not be transferable to these other groups. Furthermore, the results of this study may not be extrapolated to other military services or to the civilian sector. Additionally, not all 21As will be able to respond due to circumstances outside the control of the researcher or subject, such as deployments or other mission obstructions. Finally, due to the dynamic nature of the AF and the logistics environment, coupled with the ongoing budgetary constraints, force reduction programs, and any possible shifts in AF alignment, the results of this study may become less relevant over time.

Implications

Results of this study will be used by AF/A4L in the development of a DCoL for the Aircraft Maintenance Officer community. Furthermore, this research further develops the education and training programs for the logistics community as a whole. The results of this

study can be used to aid AF/A4L and the logistics development team (DT) (comprised of 21X colonels) to mentor aircraft maintenance officers to better support their developmental needs. According to the Air Force Doctrine Document 1-1: Leadership and Force Development, a major responsibility of the DT is to identify the education, training, and experience appropriate for officers based on current and future requirements.

This study, joined with current DT planning tools, will be able to provide senior AF logisticians with a clear relationship between 21A human capital, learning culture, and knowledge management practices and how they relate to organizational performance. This understanding will provide useful information which can be used for better career field force development and the reduction of existing logistics education and training programs to provide a cost effective, narrow, and focused DCoL for the logistics officer community.

II. Literature Review

Overview

This chapter builds the foundation for the research being conducted by first exploring the preceding thesis work into the KSA development of the 21X logistics officer career field by Thompson (2013) and Roberts (2013). Next, the ground work for this research is established with the evaluation of the thesis work conducted on 21R force development (Cherry, 2014). The theoretical framework used in this study, will then be reviewed in depth to set the stage for the analysis of survey data to be discussed in Chapter IV. This framework consists of resource based view of a firm (RBV), human capital theory (HCT), the concept of the learning organization (LO), knowledge management (KM) theory, and organizational performance (OP) to build the relationships presented in this studies theoretical model. Finally, this chapter will conclude with the review of logistics competencies, relevant DoD and Air Force Guidance, Air Force Logistics Education and Training Courses, the Deliberate Continuum of Learning (DCoL), and end with a review of aircraft maintenance officer vectoring.

Foundational Research

In this section the joint research conducted by Thompson (2013) and Roberts (2013) and their development of the 21X logistics KSAs in their respective career fields are reviewed. This review focuses on the work conducted by Thompson (2013) on 21A KSAs which will flow into the development of the force development model developed in this research. Following this review the resultant research conducted by Captain Matt Cherry on Logistics Readiness Officer (LRO) force development, which will be the basis for the Aircraft Maintenance Officer Force development model, will be evaluated.

USAF Logistics Officer KSA Development

Thompson (2013) and Roberts (2013) investigated options to improve the 21X logistics community as a whole. Logistics education and training programs were validated against the Air Force's logistics mission sets as Deployment, Distribution, Supply Management, Repair Network Integration, Mission Generation, Lifecycle Logistics, and Joint Logistics. The specific focus of Thompson's (2013) research was the study of "21A Aircraft Maintenance Officer[s] and the KSAs required to perform in the mission sets related to repair network integration, mission generation, lifecycle logistics and joint logistics" (Thompson, 2013, p. 7). To address this objective, Thompson developed seven investigation questions shown in Table 1 below.

Table 1: Investigation Questions Used by Thompson (2013)

IQ 1.	What bachelor's courses/master's degree programs are beneficial to 21X Officers?
IQ 2.	What are the AFSC-specific mission sets?
IQ 3.	What are the primary KSAs for each mission set?
IQ 4.	What KSAs overlap into multiple mission sets?
IQ 5.	What KSAs do we currently lack and/or not teach well/at all?
IQ 6.	What problems are coming in the foreseeable future; what KSAs are needed to respond to them?
IQ 7.	What KSAs do other services Logistics Officers acquire that USAF Logistics Officers do not?

Conventional Content Analysis was utilized by Thompson (2013) to evaluate information collected through senior logistics officer interviews while Directed Content Analysis with focus groups were used to create mission-set specific KSAs. The initial data was collected during an AF/A4LF sponsored 21A/M Utilization and Training Workshop. This event included senior logistics colonels from the A4 staff and supporting subject matter experts from each of the Major Commands (MAJCOMS). Additional interview and focus group information was collected by the research team at eight installations including three Joint Bases, Sheppard AFB, Texas which

is responsible for initial Aircraft Maintenance Officer skills training, as well as information collected from Logistics Officers within J4, AF/A4/7, and DLA Headquarters.

Interviews were conducted with key senior logistics leaders at seven of the visited bases. These interviews were used to "report expert opinion on beneficial education opportunities, identify and understand the desirable logistics knowledge and business skills [21A] officers should possess, and assess needed KSAs lacked by [Aircraft Maintenance Officers]" (Thompson, 2013, p. 38). The seven investigation questions were posed to interviewees evaluating broad education and training down to directly assessing KSA needs.

Focus groups were also utilized at each of the visited bases to provide a wide cross section of input from across the field. Groups of 21X officers ranging in rank from second lieutenant to colonel were used to generate lists of KSAs for each of the given mission sets mentioned at the beginning of this section.

Finally, Thompson (2013) reviewed applicable USAF logistics education guidance as well as evaluating the similarities and differences amongst logistics officers in the Air Force, Army, Navy, and Marine Corps. Thompson (2013) and Roberts (2013) compiled the research information gathered from the interviews, focus groups, and DoD logistics force review to create a consolidated list of 63 Parent KSAs for the Aircraft Maintenance Officer career field, which is shown in Appendix A.

Thompson (2013) asserted the need for the USAF to develop "Aircraft Maintenance Officers who are able to serve in their primary role as Career Maintenance Officers, to serve as more general [Material Managers] and also to serve as capable Joint Logistics Officers" (Thompson, 2013, p. 93). To prepare the Aircraft Maintenance Officer Thompson suggests an evaluation of the overlaps in identified KSAs between the 21A and 21R officers and the

alignment of the 21X community's logistics courses where appropriate. Thus, it is this research which led to Cherry's (2014) research exploring the Deliberate Continuum of Learning (DCoL) for the Logistics Readiness Officer (21R) career field.

Logistics Readiness Officer Force Development

Building upon the research of Thompson (2013) and Roberts (2013) on the 21X logistics career field KSAs Cherry (2014) explored the direct implication of developing a Deliberate Continuum of Learning (DCoL) within the 21R career field. This section will review the research conducted by Cherry (2014), touch briefly on his research methodology, which will be explained in greater detail in Chapter III, and conclude with the resultant analysis of his research data.

Cherry (2014) utilized RBV theory to analyze the "…impact of Logistics Readiness Officer (LRO) human capital, learning culture, and knowledge management on organizational performance as a means to increase competitive advantage" (Cherry, 2014, p. iv). These concepts will be explored in greater detail in the following sections. However, it is important to note that they form the theoretical and practical implications used to create the LRO force development model. Cherry (2014) posed three hypotheses in his research, first that LRO human capital has a positive impact on organizational performance; second, LRO learning culture has a positive impact on organizational performance; and third, LRO knowledge management has a positive impact on organizational performance. Seven investigative questions were then developed to address the research objectives and are shown in Table 2.

Table 2: Investigation Questions Used by Cherry (2014)

IQ 1.	What is the relationship between the learning organization, human capital, and knowledge management of the LROs and organizational performance?
IQ 2.	What are the competencies for which LROs require proficiency?
IQ 3.	How proficient do LROs need to be in logistics competencies for them to do their jobs?
IQ 4.	What are the current Air Force logistics centric course offerings?
IQ 5.	What courses have allowed LROs to perform their current jobs better?
IQ 6.	Among the courses that LROs have not taken, which courses do LROs fell would have allowed them to perform their current job better?
IQ 7.	How do LROs classify their duties (tactical, operational, or strategic)?

To assess the research hypotheses and investigative questions amongst the 21R community at large, Cherry (2014) utilized cross-sectional web-based survey methodology to examine the latent variable data using multivariate regression. Survey data were collected from 617 LROs out of a possible 1,411, yielding a 43.7 percent response rate.

The results of Cherry's research showed a resource-based approach to the management of LRO human capital can "potentially yield higher returns in organizational performance" (Cherry, 2014, p. 89). Furthermore, Cherry (2014) states "LRO human capital is seen as a strategic resource [and] can become a source of competitive advantage" (Cherry, 2014, p. 89). Analysis of the 60 Parent KSAs specific to the LRO career field, as reported by Roberts (2013), and self-reported survey data analyzed by Cherry (2014), show force development initiatives, such as the DCoL can be seen as an investment in LRO human capital. However, further analysis of the survey data coupled with additional research is needed to provide a clear site picture of logistics courses meeting or falling to meet career LRO development needs.

This previous research work provides the appropriate theoretical framework to develop a similar line of research into a resource-based analysis of Aircraft Maintenance Officer human capital, learning culture, and knowledge management on organizational performance as a means

to increase competitive advantage within this branch of the Air Force logistics community. The following sections develop a foundational groundwork for each of the aforementioned theories.

Overview of Theoretical Concepts

The following sections review the relevant theories used to develop the research methodology in Chapter III. To establish the relationships depicted in the theoretical model a review of RBV of a firm, HCT, the concept of the LO, KM, and OP we be discussed. As identified by Cherry (2014, p. 11) "few studies have linked exact competencies, proficiencies, and KSAs to jobs in either military or civilian [careers fields]." Thus, it will be critically important to establish a link between the identified KSAs and theoretical concepts. Discussion is also given to the typical 21A career field assignments and the various logistics courses available. Finally, relevant DoD and Air Force logistics education and training guidance will be reviewed to assess the impact current organizational practice has on 21A development.

Resource Based View (RBV)

A RBV of a firm suggests that valuable, rare, and costly-to-imitate resources can be sources of sustained competitive advantage for a firm against its competitors (Barney and Arikan, 2001). These resources, as described by Barney and Arikan (2001), are the tangible and intangible assets firms use to conceive of and implement their strategies. A further distinction is presented by Amit and Schoemaker (1993) in which a firm's resources can be divided into resources and capabilities. By this definition, resources are tradable and non-specific to the firm, while capabilities are firm-specific and are used to engage the resources within the firm.

In his seminal article on RBV, Barney (1991) noted that resources must be valuable, rare, inimitable, and non-substitutable, to provide a continual source of competitive advantage for a firm. As noted by Barney (1991) resources are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness. Firms may have the other characteristics that could qualify them as sources of competitive advantage (e.g., rareness, inimitability, non-substitutability), but these attributes only become resources when they exploit opportunities or neutralize threats in a firm's environment (Barney, 1991). Rarity is another important attribute of a firm's resources. As defined by Barney (1991), valuable firm resources possessed by a large number of competing firms cannot be sources of competitive advantage. Rarity of a firm's resources provides a source of competitive advantage when it is implementing a value-creating strategy not simultaneously implemented by other firms. Thus, if a particular valuable firm resource is possessed by a large number of other firms, then each of these firms have the capability to exploit the resource in the same way, thereby implementing a common strategy that gives no one firm a competitive advantage (Barney, 1991). Valuable and rare resources are only a source of sustained competitive advantage if firms that do not possess these resources cannot obtain them. Then, the third attribute of a resource providing a sustained competitive advantage to a firm is its inability to be easily duplicated. Resources can be imperfectly imitable for one or a combination of the following three reasons: (a) the ability of a firm to obtain a resource is dependent upon unique historical conditions, (b) the link between the resource possessed by a firm and a firm's sustained competitive advantage is casually ambiguous, or (c) the resource generating a firm's advantage is socially complex (Barney, 1991). The last requirement for a firm resource to be a source of sustained competitive advantage is that there must be no strategically equivalent valuable resources that are themselves either not rare or

imitable (Barney, 1991). Resources are strategically equivalent to each other when they each can be exploited separately to implement the same strategic outcome.

Barney (1991) provides definitions of competitive advantage and sustained competitive advantage to clearly distinguish these two similar but distinct concepts. A firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors (Barney, 1991). While a firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy (Barney, 1991). Basically, a competitive advantage only becomes a sustained competitive advantage when the possibility of duplication or substitution does not exist.

A strategy, within the context of RBV, is a firm's theory of how it can gain superior performance in the marketplace (Barney and Arikan, 2001). Resources and capabilities provide the basic direction for a firm's strategy. Furthermore, an effective strategy makes the most effective use of core resources and capabilities to achieve competitive advantage (Grant, 1991). A distinction must be made between resources and capabilities. Resources are inputs into the production process, while capabilities are what a firm can do as a result of its resources (Grant, 1991). Then, the essence of strategy formulation is to design a strategy which makes the most effective use of resources and capabilities (Grant, 1991).

Both Grant (1991) and Yew Wong and Karia (2010) extend RBV theory by exploring theoretical frameworks which firms might use to better leverage their resources for strategy formulation and utilization of resources to gain a competitive advantage in the marketplace. Grant (1991) focuses on a cyclical process of evaluating a firm's strategy and the missing gaps

between the strategy and the firm's resources. Grant's five step process involves: analyzing the firm's resource-base, appraising the firm's capabilities, selecting a strategy, and extending and upgrading the firm's pool of resources and capabilities. Yew Wong and Karia (2010) recognize that resources are not of much use by themselves but argue that firms must process raw resources to make them useful. A firm achieves a competitive advantage not because it has better resources, but rather the firm's distinctive competence involves making better use of its resources (Yew Yong and Karia, 2010). The importance of "resources exploitation" versus "resources possession" is a common theme in RBV literature (Barney and Arikan, 2001; Priem and Butler, 2001; Yew Wong and Karia, 2010). Yew Wong and Karia (2010) examined five resource areas (physical, human, information, knowledge, and relational), a firm's resource bundling practices, and their financial performance measures in a content analysis of 15 large global firms. Yew Wong and Karia (2010) concluded resource structuring and bundling are the pathway to competitive advantage and can transform a firm's resources to become more competitive.

These studies highlight the necessity for firm's to develop a structured framework of their resources and capabilities to develop strategies to gain a sustained competitive advantage in the marketplace. However, RBV is multifaceted and requires further discussion into two other branches within this theory. Next KBV will be discussed followed by a review of CBV which are further permutations of RBV theory.

Knowledge-Based View (KBV)

The KBV view of a firm is an extension of RBV theory where corporate knowledge is considered to be the most strategically significant resource of a firm. KBV proponents believe knowledge-based resources are usually difficult to imitate amongst firms and are the major

determinates of sustained competitive advantage for a firm. Discussion of KBV concepts are a common throughout the strategic management literature (Barney, 1991; Grant, 1991, 1996, & 1997; Kiessling et al., 2009), however, as noted by Grant (2002, p. 135) "the emerging knowledge-base view of the firm is not a theory of the firm in any formal sense." In his 1997 article "The Knowledge-base View of the Firm: Implications for Management Practice" Grant provides a succinct overview of KBV. Grant explains KBV relies on four main assumptions. First, that a firm's knowledge is an overwhelmingly important productive resource in terms of its contribution to value added and its strategic significance (Grant, 1997). Second, different types of knowledge vary in their transferability and a critical distinction should be made between 'explicit knowledge' and 'tacit knowledge' (Grant, 1997). Additionally, the ease in which knowledge can be transferred depends upon the capacity of the recipient to aggregate units of knowledge. Third, individuals within a firm are the primary agents of knowledge creation and, in the case of tacit knowledge, are principal repositories of knowledge (Grant, 1997). Finally, Grant (1997) explains knowledge is subject to economies of scale and scope, especially in the case of explicit knowledge.

A KBV theory of a firm additionally states individuals' knowledge can be integrated by means of different mechanisms, the most prominent being: transfer, direction, sequencing, and routine (Grant, 1997). The sustainable competitive advantage realized by a firm depends, in part, upon the efficiency of knowledge integration (Grant, 1996). Knowledge transfer is the primary means in which organizations manage knowledge but this mechanism alone is insufficient to sustain a competitive advantage. Knowledge can be transferred more efficiently through some kind of reduced form such as direction. Direction involves specialists in one area of knowledge issuing rules, directives, and operating procedures to guide the behavior of non-specialists

(Grant, 1997). At a basic level sequencing suggests individuals coordinate the transfer of knowledge without direct transfer taking place. At a more complex level, organizational routines are regular patterns of coordinated activity involving multiple individuals (Grant, 1997). Uncovering the mechanisms through which knowledge is integrated helps us to understand the challenges inherent in building new capabilities (Grant, 1997). The efficiency of integration, scope of integration, and flexibility of integration all dictate the ability of knowledge to be a source of competitive advantage (Grant, 1996).

A KBV of a firm indentifies the processes through which firms integrate specialized knowledge as being fundamental to their ability to create and sustain competitive advantage (Grant, 1996). This knowledge is embedded within a firm and carried through an organization's culture, identity, policies, routines, and employees. KBV of a firm originates from the RBV theory of strategic management literature and builds upon and in some areas extends RBV theory. Specifically, while the RBV treats knowledge as a generic resource, KBV identifies knowledge a having special characteristic and distinguishes between different types of knowledge-based capabilities which are believed to be primary sources of a firm's sustained competitive advantage in the marketplace.

Competence-Based View (CBV)

A CBV of a firm, like the KBV, is in many ways an extension of RBV theory. While RBV characterized firms as having unique bundles of resources with specific characteristics giving them a competitive advantage in the marketplace and the KBV of a firm focuses on the processes firms develop to gain and sustain specialized knowledge in the marketplace to achieve a competitive advantage a CBV of a firm focuses on the ability of a firm to sustain the coordinated deployment of assets, capabilities, and skills in ways to help a firm achieve a

competitive advantage. Though simple, this definition embodies essential aspects of the "four cornerstones" of competence theory, which aspires to recognize and capture the dynamic, systemic, cognitive, and holistic nature of organizational competences (Sanchez, 2004, p. 521). Each of these four aspects of organizational competence will now be discussed.

First, organizational competence requires the ability to respond to the dynamic nature of the marketplace and its own internal processes. A firm requires competencies to maintain its ability to create value in the marketplace even as changes take place in the market preference and available technologies (Sanchez, 2004). The above definition of CBV places a requirement of sustainability on the competence of firms to maintain a competitive advantage. Not only must a firm be able to sustain a competitive advantage as the market changes but it must also adapt to internal organizational dynamics and as noted by Sanchez (2004) overcome organizational entropy.

Second, competence must include an ability to manage the systemic nature of organizations and of their interactions with other organizations (Sanchez, 2004). An element of coordination of assets is required of a firm to first, coordinate its own firm-specific assets, and second, accesses and coordinate import firm-addressable assets of other organizations. Firm-addressable assets include material suppliers, distributors, consultants, financial institutions, and customers.

Third, competence must manage the cognitive processes of an organization (Sanchez, 2004). Firms must manage the deployment of assets—directing organizational assets to specific value-creating activities (Sanchez, 2004). Thus, managers must be able to direct a firm's operations and select strategies to ensure the efficient and effective use of an organization's assets.

Fourth, competence must include the ability to manage the holistic nature of an organization as an open system (Sanchez, 2004). An element of goal achievement in the definition of CBV addresses the need for organizations to achieve goals that managers are able to define in terms of organizational strategy and that promise a satisfactory level of goal achievement for all individuals within the firm as well as outside stakeholders. Thus, the definition of organizational competence recognizes the existence of multiple stakeholders and the importance of meeting the expectations of all providers of essential resources in sustaining the value-creating processes of an organization (Sanchez, 2004).

As described by Sanchez (2004), a CBV of a firm recognizes three areas of organizational management required within an organization to achieve competence and a competitive advantage in the marketplace. These areas include: assets, capabilities, and skills. At the highest level assets include all tangibles and intangibles useful to a firm, including capabilities which are a special category of intangible asset because they use or "operate on" other tangible or intangible assets (Sanchez, 2004). Capabilities then consist of repeatable patterns of action in the use of a firm's assets. Capabilities in turn require individual and team skills in the use of assets to perform the specialized tasks that collectively generate organizational action (Sanchez, 2004).

Another perspective of CBV taken by Lado and Wilson (1994) focuses on four organizational competencies: Managerial, input-based, transformational, and output-based which are presumed to yield sustained competitive advantage for a firm. Managerial competencies include (a) the unique capabilities of the organization's strategic leaders to articulate a strategic vision, communicate the vision throughout the organization, and empower organizational members to realize that vision and (b) the unique ability to enact a beneficial firm-environment

relationship (Lado and Wilson, 1994). Input-based competencies encompass all physical firm resources to include capital, human resources, knowledge, skills and capabilities. Input-based competencies enable a firm's transformational processes to create a competitive advantage. Transformational competencies are a firm's ability to convert inputs into outputs and include innovation and entrepreneurship, organizational culture, and organizational learning. Output-based competencies include all knowledge-based, invisible strategic assets, such as corporate reputation or image, product or service quality, and customer loyalty (Lado and Wilson, 1994). Thus, organizational competencies, as defined by Lado and Wilson (1994), include all firm-specific assets, knowledge, skills, and capabilities embedded in the organization's structure, technology, processes, and interpersonal relationships. As described earlier in RBV, Lado and Wilson (1994), hold that firm's competencies must be heterogeneous (valuable and rare), immobile (inimitable), and non-substitutable in order to be a source of sustained competitive advantage.

As described by Freiling, et al. (2008) CBV's epistemological aim is therefore the explanation of current and future firm competitiveness in markets due to inhomogeneous availability of competences and resources. Furthermore, Freiling, et al. (2008) describes a firm's competencies to provide a repeatable, non-random ability to render competitive output. This ability is based on knowledge, channeled by rules and patterns established within a firm. In conclusion, CBV looks not only at the resource-base of a firm but also to its competencies to improve competitive advantage in the marketplace. Improving organizational competence does not depend simply on achieving excellence in one or two key success factors, but rather on developing an interrelated and balanced set of success factors that in turn depend on achieving proper balance and alignment among a firm's competence areas and managerial processes.

RBV Summary

Resourced-based view theory is multifaceted with permutations focusing on firm specific knowledge management (KBV) as well as the employment of competencies (CBV) to gain a competitive advantage in the marketplace. While the bulk of empirical research on the resource-based view of the firm focuses on strategic management implications of the theory, the theory has had implications in related fields as well (Barney and Arikan, 2001). Most notably RBV has bridged the gap in the field of human resource management and corporate strategy (Barney and Arikan, 2001; Wright, et al., 2001). Human resources are examples of socially complex resources and thus it is not surprising that human resource theorists have drawn heavily on resource-based logic to examine the impact of human resources and human resource policies on firm performance (Barney and Arikan, 2001). This area of research has focused on various bundles of human resource practices that can have the effect of creating significant firm-specific human capital investments (Barney and Arikan, 2001). Not only must the Air Force possess strategic human capital resources, it must be able to maximize utilization of these resources and their competencies to achieve sustainable competitive advantage through proper force development initiatives (Cherry, 2014).

Human Capital Theory (HCT)

Although it is obvious that people acquire useful skills and knowledge, it is not obvious that these skills and knowledge are a form of capital, that this capital is in substantial part a product of deliberate investment, that it has grown in Western societies at a much faster rate than conventional (nonhuman) capital, and that its growth may well be the most distinctive feature of the economic system (Schultz, 1961). The concept of human capital as a source of competitive

advantage began in the study of economics. An early economist, Adam Smith (1776), argued wage rates would be higher for trades that were more difficult to learn, because people would not be willing to learn them if they were not compensated by a higher wage. Smith's thoughts gave rise to the modern notion of human capital. What economists have not stressed is the simple truth that people invest in themselves and that these investments are very large (Schultz, 1961). For many reasons outside the scope of this analysis economists since the time of Smith have not focused succinctly on this abstract form of investment.

It was not until economist Theodore W. Schultz (1961) formally introduced and coined the concept of human capital theory that specific attention was given to expenditures in education, health, and internal migration as avenues to leverage organizational and/or personal benefits. While varying definitions of human capital exist it is generally assumed to be the collection of resources—knowledge, skills, abilities, experiences, intelligence, training, and wisdom that can be leveraged for organization and/or personal benefit (Ployhart and Moliterno, 2011). A basic premise of human capital theory, as noted by Wright et al. (2001), is that firms do not own it; individuals do. Firms may have access to valuable human capital, but either through the poor design of work or the mismanagement of people, may not adequately deploy it to achieve strategic impact (Wright et al., 2001). Therefore, the next section will discuss the importance on return on human capital investment.

Return on HC Investment

Blundell et al. (1999) propose three main components of human capital—early ability (whether acquired or innate); qualifications and knowledge acquired through formal education; and skills, competencies and expertise acquired through training on the job. As in investments in physical capital, human capital investment will only be undertaken by the individual or firm if

the expected return from the investment is greater than the market rate of interest (Blundell et al., 1999). Additionally, human capital investments involve an initial cost (tuition and training course fees, forgone earnings while at school and reduced wages and productivity during the training period) which the individual or firm hopes to gain a return on in the future (for example, through increased earnings or higher firm productivity) (Blundell et al., 1999). It is difficult to analyze an individual's innate knowledge as a source of HC, and outside the scope of this research, however, discussion on investments in education and training as sources of HC providing a competitive advantage is required.

In most empirical studies, training is distinguished from formal school and post-school qualifications (which are viewed as education) and is generally defined in terms of courses designed to help individuals develop skills that might be of use in their job (Blundell, et al., 1999). Gary S. Becker (1962) in his seminal article on investments in HC described human capital gained through on-the-job training as either general or specific. Completely general training increases the marginal productivity of trainees by exactly the same amount in firms providing the training as in other firms (Becker, 1962). Conversely, completely specific training can be defined as training that has no effect on the productivity of trainees that would be useful in other firms (Becker, 1962).

In a military context, an aerospace maintenance airmen (AFSC 2A5) would find his general skills of value working in a civilian airline company while a munitions loader's (AFSC 2W1) specific skill set would be nontransferable to a civilian airline company. As training builds firm-specific human capital it speeds up the rate at which human resources learn their duties, thereby improving their productivity (Hatch and Dyer, 2004). As in the RBV context, HC investments in specific training that are valuable, rare, inimitable, and non-substitutable will

provide firms with a greater competitive advantage in the marketplace (Wright, et al., 2001). On-the-job training, therefore, is a process that raises future productivity and differs from school training in that an investment is made on the job rather than in an institution that specializes in teaching (Becker, 1962). Future productivity gains can only be achieved at a cost; otherwise, there would be an unlimited demand for on-the-job training. Training then, increases the future marginal product of workers at a cost to present productivity. Employers fully or partially fund the training of workers in the hope of gaining a return on this investment in terms of being more productive, more competitive and consequently more profitable firm in the future (Blundell, et al., 1999). Training, too, has shown to result in significant wage returns for the individual and appears to offer further benefits in terms of higher employment stability (Blundell, et al., 1999). In HCT training has been shown to be a source of competitive advantage for firms providing significant return on investment at both the individual level and the organizational level (e.g. Becker, 1962; Blundell, et al., 1999; Wright, et al., 2001; Hatch and Dyer, 2004) but training is not the only HC investment organizations can make to garner a competitive advantage in the marketplace.

Based upon the work of Schultz (1971), Sakamoto and Powers (1995) and Psacharopoulos and Woodhall (1997), human capital theory rests on the assumption that formal education is highly instrumental and even necessary to improve the production capacity of a population (Olaniyan and Okemakinde, 2008). Human capital theory also emphasizes how education increases the productivity and efficiency of works by increases the level of cognitive stock of economically productive human capability which is a product of innate abilities and investment in human beings (Olaniyan and Okemakinde, 2008). According Olaniyan and

Okemakinde (2008), the rationality behind investment in human capital is based on three arguments:

> The new generation must be given the appropriate parts of the knowledge which has already been accumulated by previous generations.
>
> New generation should be taught how existing knowledge should be used to develop new products, to introduce new processes and production methods and social services.
>
> People must be encouraged to develop entirely new ideas, products, processes and methods through creative approaches.

Positive economic returns to education at the individual level have been consistently found, with such returns varying by the type and level of the qualification obtained, by subject are for higher education and over time (Blundell, et al., 1999). As training has been positively shown to increase HC in a firm education has also shown a positive return on investment for individuals and firms (e.g. Blundell, et al., 1999; Wright, et al., 2001; Hatch and Dyer, 2004). Early achievement and qualifications are important determinants of future educational attainment, individuals with higher education attainment in turn undertake more training on the job, and those who have undertaken training previously are more likely to participate in further training (Blundell, et al., 1999). Additionally, Blundell, et al. (1999) has shown education and even previous informal training to substantially increase an employee's ability to be innovated on the job. The theoretical and empirical evidence that HC in the areas of education and training provides positive returns on investment and possibly a competitive advantage is an incentive for individuals and firms to make such investments. Thus, strategic management of HC is of vital importance for any organization looking to improve their competitive advantage in the marketplace.

Strategic Human Capital Management

There is broad agreement that a strategic approach to human resource management (HRM) involves designing and implementing a set of internally consistent policies and practices that ensure a firm's human capital (employee's collective knowledge, skills, and abilities) contributes to the achievement of its business objectives (Baird & Meshoulan, 1988; Jackson & Schuler, 1995; Schuler & Jackson, 1987) (cited in Huselid, et al. 1997). Huselid, et al. (1997) note a fundamental assumption of strategic HRM perspective is that firm performance is influenced by the set of HRM practices firms have in place. Critical to achieving a competitive advantage a firm's strategic HRM activities help ensure its HC resources are not easily imitated. Specifically, a firm's strategic HRM practices insures competitors can neither easily copy these practices nor readily replicate the unique pool of human capital that such practices help to create (Huselid, et al., 1997). Huselid, et al. (1997) performed a study of 293 U.S. firms from varying industries and found strategic HRM effectiveness was significantly associated with firm performance.

This significant relationship between strategic HRM effectiveness and employee productivity was found to be consistent with institutional theory and the resource-based view of the firm (Huselid, et al., 1997). Human resources, as recognized by Griffith (2006), are one of a firm's most common means to build and maintain dynamic capabilities. Furthermore, he argues the perspective of the firm's personnel is leveraged by the specific human capital that the individual possesses which determines the strategic path of the firm. Additionally, in order for a firm's personnel to be able to effectively operate, the embodied human capital of these individuals needs to appropriately match the tasks embedded within the job (Griffith, 2006). It is widely acknowledge that human capital is the foundation for business success in the modern

marketplace (e.g. Huselid, et al., 1997; Griffith, 2006, Barnes and Liao, 2012; Lengnick-Hall, et al., 2012).

HRM system design, then, should be managed strategically to fit the characteristics of the firm and its environment and to facilitate a firm's ability to achieve its intended outcomes (Lengnick-Hall, et al., 2012). Clearly, strategic HRM practices aimed at leveraging HC contribute to creating and capitalizing on strategic benefits for the organization. From this strategic perspective, the idea has expanded at the firm level to include "core" competencies as the unique intellectual, process or product competencies that give a firm a competitive advantage, and where the collective learning and performance capabilities of the organization contribute to overall firm success (Barnes and Liao, 2012). These intellectual competencies include both the tacit and explicit knowledge of individuals within the firm. Successful firms, then, must view their information as a strategic asset and a source of competitive advantage and that the knowledge and skills an organization accumulates over time are the most fundamental strategic resourced possessed (Barnes and Liao, 2012).

DoD and Air Force Human Capital

The 2001 Government Accountability Office (GAO) report states strategic human capital management is a pervasive challenge throughout the federal government (Cherry, 2014). Strategic human capital management in the DoD and across the federal government continues to be a GAO high-risk area because critical skill and competency gaps could undermine agencies' abilities to accomplish their mission (US Government Accountability Office, 2013). The human capital problems of the Department of Defense and the Department of State can be seen as a broader pattern of human capital weaknesses that have eroded mission capabilities across the

federal government (US Government Accountability Office, 2001). Specifically, an area of concern for the GAO is highlighted below:

> **Strategic human capital planning:** Integrating succession planning and management efforts that focus on strengthening both current and future organizational capacity to obtain or develop the knowledge, skills, and abilities agencies need to meet their missions continues to be important. For example, GAO has reported on a challenge in the acquisition workforce where the workload and complexity of responsibilities have been increasing without adequate attention to the workforce's size, skills and knowledge, and succession planning (US Government Accountability Office, 2009).

As noted by Cherry (2014), if the Air Force is to keep its valuable stock of human capital and reverse the trends identified by the GAO, the importance and impact of human capital must be studied. To do this human capital competencies specific to individual career fields must be identified and studied in order to create strategic management practices to leverage HC investments and create positive returns on investment for sponsoring education and training programs.

HC Summary

A firm's competitiveness is tied to enhancing its human capital through the development of the competencies of its employees and by creating unique, distinctive and difficult to imitate core competencies (Barnes and Liao, 2012). A firm's HRM should consider employees as strategic assets and a critical investment in a firm's performance, and create an atmosphere in which these competencies can thrive. Investments in human capital [namely education and training] can yield substantial benefits to organizations that recognize the power of sound human capital management practice (Cherry, 2014). As noted in AFDD 1-1, education and training are critical components of the force development construct and represent a large investment of resources and are the primary tools for developing airmen. Current issues affecting 21A force development has necessitated the career field to review current education and training

opportunities in order to identify the requisite knowledge, skills, and abilities required to execute the full spectrum of Air Force missions required within the AFSC.

Learning Organization (LO)

The learning organization concept was coined through the work and research of Peter Senge in his seminal book entitled *The Fifth Discipline*. A simple definition of a LO is presented by Marsick and Watkins (2003) to be "[an organization] that has embedded the capacity to adapt or to respond quickly and in novel ways while working to remove barriers to learning." This definition generally captures the many facets of the LO concept, however, several varying definitions of the term exist. In Kontoghiorghes, et al. (2005) several other definitions for the LO concept are provided. As described by Senge (1990) a LO involves five disciplines of organizational thinking: systems thinking, personal mastery, mental models, shared vision, and teaming learning. These disciplines will next be briefly explained.

In LO literature a firm's system thinking states that organizations are a system of interrelationships. For an organization to become more successful the firm needs to analyze these relationships to identify problems areas. Identifying problem areas will allow an organization to eliminate obstacles to learning. Additionally, Senge (1990) states organizations need to develop a level of personal mastery. Here, LO theory holds that organizational employees are of great importance to the overall success of the firm. It states organizations should foster continuous self-improvement as much as emphasizing organizational and work commitment. Essentially, employees need to grow and work on their own goals as much, if not more, than those of the organization they work for. Senge (1990) also states organizations have unique cultures and diverse theories that serve as a framework for the functioning of the

organization. LO's then analyze their own culture and operating theories to understand how their common practices affect organizational development. In addition to the mental models organizations develop over time a LO must also cultivate a shared vision. Through careful analysis a LO insures the personal goals of individual employees and the goals and vision of the firm are in sync. Finally, LO theory as defined by Senge (1990) states a learning organization fosters an open dialogue and group discussion within the firm. For organizational learning to take place employees must communicate and reach agreement.

Learning organizations should not be confused with the concept or organizational learning (OL). Learning organizations as described above use active processes to evaluate and change organizational processes and systems to facilitate knowledge creation, transfer, and retention. The study of organizational learning provides the theoretical basis for the specific actions taken by a LO to enact organizational learning. Specifically, it is concerned with the process of creating, retaining, and transferring knowledge within an organization. The concept of LO focuses on an organization as an entity, a form of organization and OL on the processes of learning, learning activities or processes in the organization (Aggestam (2006). Garvin (1993) summarizes several varying definitions for organizational learning found in current literature.

The view that learning increases competitive advantage has stimulated interest in developing organizations that foster and promote learning (Kontoghiorghes, et al., 2005). Additionally, as noted by Marsick and Watkins (2003), leaders who learn from their experience and influence the learning of others build an organization's climate and culture. Furthermore, learning organizations are skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (Garvin, 1993). Learning and knowledge are then seen as direct outcomes of activities performed commensurate with the

organization's central mission and core competencies (McInerney and Koenig, 2012). The link between learning organizational characteristics and organizational performance has been seen in several recent studies including Ellinger, et al. (2002), Jashapara (2003), and Kontoghiorghes, et al. (2005). Additionally, Marsick and Watkins (2003) developed a seven construct multidimensional survey instrument to measure an organization's learning culture. Skerlavaj, et al., (2007), conversely, measured organizational learning culture using three constructs: information acquisition, information interpretation, and behavior.

Organizational learning and learning organization share ideas and both are concerned with processes for acquiring information, interpreting data, developing knowledge, and sustaining learning (Kezar, 2005 cited in Aggestam, 2006). How an organization manages its knowledge is therefore critical to overall organizational success and a firm's ability to maintain a competitive advantage in the marketplace. Knowledge management literature, thus, deserves discussion in the next section.

Knowledge Management (KM)

Knowledge Management (KM) is a divergence from the literature on the LO (Wong and Aspinwall, 2005). Simply, KM is concerned with managing knowledge and includes activities such as creating, organizing, sharing, and using knowledge within an organization. In the business context, organizational knowledge is knowledge independent of specific members in the organization, e.g. knowledge in knowledge repositories, and knowledge embedded in policies, and routines (Aggestam, 2006). Learning in organizations requires individual personal knowledge to transform into information that other members of the organization can use (Jensen, 2005). In the context of knowledge management literature, KM is the process organizations use

to assess information contained within the organization and the translation of organizational learning into usable knowledge. According to Aggestam (2006) organizations learn and build knowledge through different purposes and methods over time and knowledge is captured in one or a combination of three ways:

> In people: Train and educate people in order to transfer skills and know-how, improve ways of performing tasks (Aggestam, 2006)
>
> In repositories outside people: Document knowledge and build databases in order to distribute knowledge (Aggestam, 2006)
>
> By embedding: embed knowledge in standards, technology, and operating practices in order to improve technology and the way it is used (Aggestam, 2006)

Additionally, according to Nonaka (1991) there are two types of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge is formal, systematic, easily communicated and shared within an organization. This type of knowledge can be expressed in words and numbers and shared in the form of data, manuals and other tangible methods (Nonaka, 1991). The second type of knowledge, tacit knowledge, is not as easily expressed and is highly personal, hard to formalize and, therefore, difficult to communicate to others (Nonaka, 1991). Tacit knowledge is also deeply rooted in action and the technical skills developed through years of experience.

The importance of knowledge management has been equated to the importance of natural resources in previous generations wherein strategies that companies once devoted to optimizing capital and labor are now being applied to maximize the productivity of knowledge resources (Silver, 2001). Knowledge is also a critical component of military operations, and the military has been an early adopter of knowledge management (KM) technologies (Maule, 2011). Common to both the military and private sector is research into mechanisms to consolidate data and information into knowledge, and once integrated, to understand strategic options and cause-

effect relationships (Maule, 2011). Furthermore, military knowledge applications are often designed to support specific strategic, operational, or tactical decision-making processes (Maule, 2011). Military knowledge systems may be called upon to integrate information and knowledge output with current situational data to form and understanding in the mind of the decision maker (Maule, 2011). As noted by Maule (2011), in corporate knowledge management, a dynamic situational assessment for a real-time attack is not a typical objective. The difference between a corporate and military knowledge management system is modeled in Figure 1.

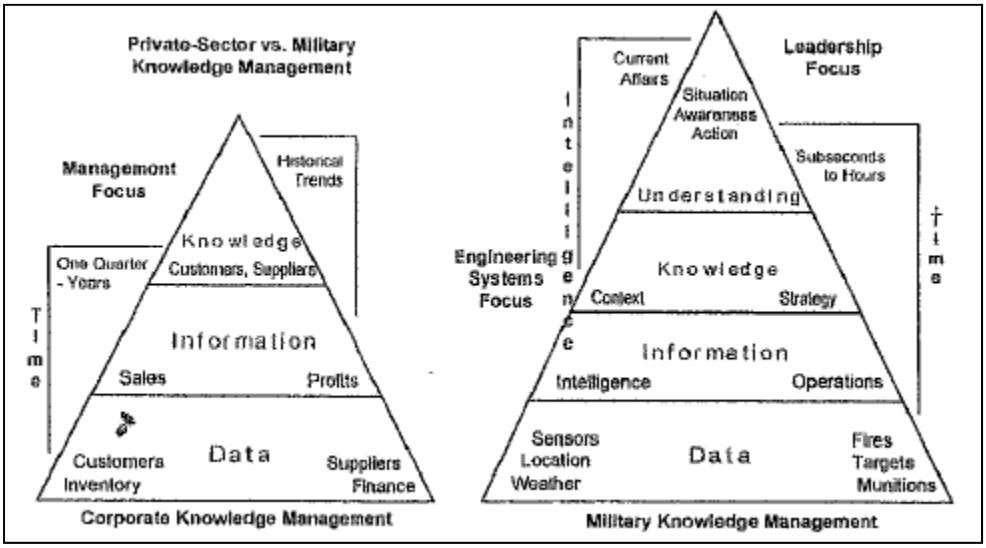


Figure 1: Corporate vs. Military Knowledge Management (Maule, 2011)

Knowledge has become a major resource for fighting from the individual level to strategic command (Ariely, 2011). The skills of managing and implementing methodologies relating to knowledge are now critical fighting skills (Ariey, 2011). [Aircraft Maintenance Officers] require knowledge management practices that aid them in their learning and synthesis of information so they can make sound decisions; they also need an understanding of the ramifications of their decisions as they affect the [AF] logistics enterprise (Cherry, 2014). Thus, the USAF should recognize the knowledge, both tacit and explicit, contained within the 21A

logistics career field, whether in the airmen directly, in repositories, or embedded in their operating practices is a source of competitive advantage. As noted by Ariely (2011), knowledge management may become not only a mission-improving vehicle, but also the very difference between defeat and victory.

Logistics Competencies (or equivalent) – Related Guidance

To answer investigative questions 2 and 3 posed in Chapter I a review of AF logistics guidance is required. Figure 3 summarizes the different verbiage and prescribed competencies (or equivalent) for aircraft maintenance officers found in the DoD Logistics Human Capital Study (HCS), Joint Publication (JP) 4-0 Joint Logistics, and Air Force Doctrine Document (AFDD) 4-0 Combat Support.

Table 3: Prescribed Competencies (or equivalent)

Source	Terminology for Competencies	Competency (or equivalent)
DoD Logistics HCS	Workforce Categories	Supply Management Maintenance Support Deployment/Distribution/Transportation Life Cycle Logistics
JP 4-0	Core Capabilities	Deployment and Distribution Supply Maintenance Logistics Services
AFDD 4-0	Functional Communities	Distribution Logistics Planning Maintenance Materiel Management

For purposes of this research it was confirmed through HAF/A4LF that aircraft maintenance officers require proficiency in a combination of the functional areas outlined in AFDD 4-0. These functional areas are broken down into specific aircraft maintenance duties and

responsibility categories in the AFSC 21AX Aircraft Maintenance Officer Career Field Education and Training Plan. In total the 21A CFETP outlines seven distinct duty and/or responsibility areas in which aircraft maintenance officers may be required to hold proficiency in. The seven areas are shown below in Table 4:

Table 4: 21A Duties and Responsibilities

	Duties and Responsibilities
1.	Directs aircraft maintenance –mission generation and repair network- activities
2.	Develops, coordinates, and executes flying and maintenance schedules
3.	Directs maintenance activities that may include aircraft propulsion, pneudraulics, egress, fuel systems, electro-environmental, Precision Measurement Equipment Laboratory (PMEL), and avionics systems
4.	Manages quality assurance, maintenance training, budget and resource management, analysis, facilities, shared resource to include end-of-runway and weapons load training
5.	Formulates maintenance plans and policies to meet unit taskings
6.	Coordinates key core logistics requirements supporting aircraft maintenance operations
7.	Directs and manages wholesale logistics life cycle sustainment support

Source: Department of the Air Force, 2013

Air Force Logistics Education and Training Courses

General Curtis E. Lemay, former Chief of Staff of the Air Force, believed strongly in developing airmen, he was, "firmly convinced that leaders are not born; they're educated, trained, and made, as in every other profession" (Department of the Air Force, 2011). The Air Force believes education and training are critical components of the force development construct (Department of the Air Force, 2011). Air Force Doctrine 1-1 (AFDD1-1), Leadership and Force Development, states education provides critical thinking skills, encouraging exploration into unknown areas and creative problem solving. Conversely, training is focused on a structured skill set, and the results of training performance should be consistent (Department of the Air Force, 2011). It is the view of the Air Force that education prepares individuals for

unpredictable scenarios while training provides individuals with skill expertise (Department of the Air Force, 2011). Together education and training provide the tools for developing airmen.

There are a plethora of education and training courses available to 21As. The Air Force Institute of Technology's (AFIT) School of Systems and Logistics alone provides over 25 courses specific to logistics and maintenance. Additionally, Defense Acquisition University, which offers hundreds of courses in acquisition, auditing, contracting, and engineering fields provides over 70 logistics related educational courses. The Air Force provides another 19 training programs designed for aircraft maintenance officers from the basic Aircraft Maintenance Officers Course (AMOC), required prior to award of the 21A AFSC, to the specific Jet Engine Mishap Investigation Course (JEMIC). The courses that 21As are intended to take to improve their knowledge, skills, and abilities utilize both educational and training techniques. For example, the Advanced Maintenance and Munitions Operations School (AMMOS) provides students with both classroom instruction as well as hand's on training to develop specific skills. Therefore, this research will not distinguish between whether a logistics course provides education or training.

For the purposes of this research a list of key logistics courses for 21As was furnished by A4LF. This list was used to create survey questions designed to answer two investigation questions.

Deliberate Continuum of Learning (DCoL)

The 21A CFETP defines the concept of a deliberate continuum of learning (DCoL) as a purposeful education and focused training roadmap that supports career path progression across key logistics mission sets to include deployment & distribution, supply chain, repair network

integration, life cycle logistics, and joint logistics (Department of the Air Force, 2013). This training roadmap includes all courses available to maintenance officers at the appropriate time in their career. In respect to aircraft maintenance officers the DCoL insures quality training and timely progression through the prescribed maintenance skill levels. Therefore, it is essential that senior leaders involved in training do their part to plan, develop, manage, conduct, and evaluate an effect and efficient training program (Department of the Air Force, 2013). The guidance outlined in the 21A CFETP is used to insure aircraft maintenance officers receive focused and appropriately-timed education and training as the progress from a basic understanding of logistics as a second lieutenant to a strategic level of logistics and enterprise management as colonels. Figure 2 is a visual depiction of the building blocks for the aircraft maintenance officer's DCoL.

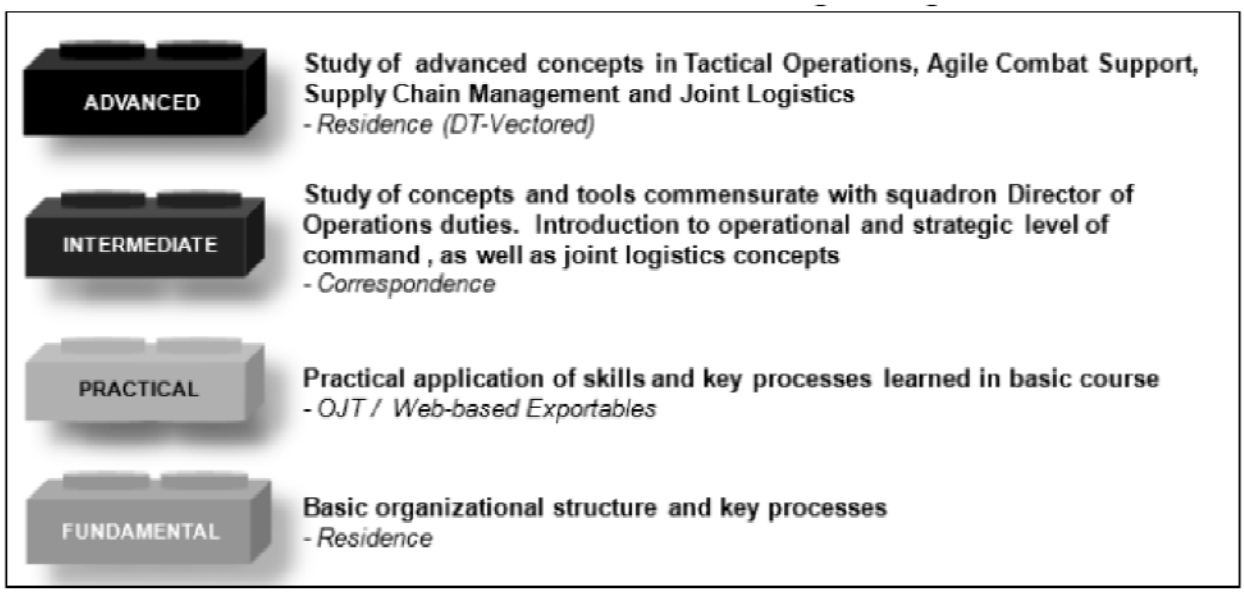


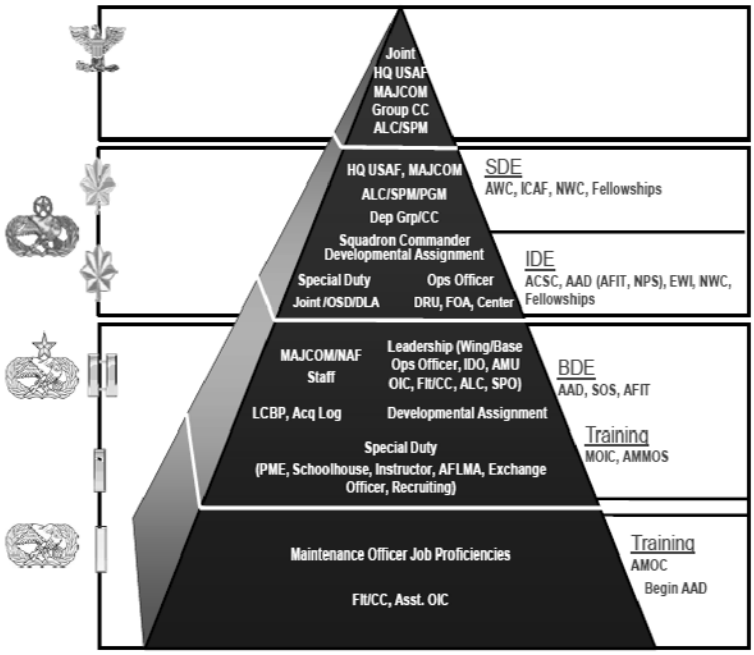
Figure 2: 21A DCoL Building Blocks (Department of the Air Force, 2013)

This research will be used to assist A4LF in the continued development of the DCoL concept and the specific DCoL training roadmap required for aircraft maintenance officers. As

shown earlier in Table 4, the 21A CFETP lists seven duty and responsibility categories 21As are expected to hold proficiency in. 21As may require proficiency in a specific category or combination of categories while assigned to a particular unit or mission while not using, and thus requiring little to no proficiency, in other categories. This research will attempt to answer how proficient 21As need to be in each of the seven logistics competencies for them to do their jobs.

Aircraft Maintenance Officer Vectoring

Aircraft maintenance officers have a variety of assignments and billets they can hold throughout their career. A review of the complete list of authorized billets for the 21A career field for the ranks of second lieutenant through colonel is far too extensive for this research. However, contained within the 21A CFETP an Air Force Career Path Tool (CPT) outlines a pyramid structure which notionally represents what are considered to be traditional duty titles for the career field, e.g. Flight Commander (Flt/CC), Officer in Charge (OIC), Aircraft Maintenance Unit (AMU) OIC, Operations (Ops) Officer, Squadron Commander, Group Commander (CC). Figure 3, shown below, is the CPT pyramid structure for the 21A AFSC. While not specifically identified in the pyramid as an officer progresses from second lieutenant through colonel there is a shift from tactical, to operational, to strategic focus. This research will attempt to answer how 21As categorize their duties, e.g. tactical, operational, or strategic.



Source: Department of the Air Force, 2013

Figure 3: Aircraft Maintenance Officer Career Progression

Summary

The resource-based view of a firm and its specific sub-theories (e.g. KBV and CBV) studied in conjunction with the concepts of human capital, learning culture, and knowledge management provide the theoretical framework to explore the competencies specific to the aircraft maintenance officer community and perceived organizational performance. As seen in the relevant research, maximizing organizational investment in human capital, fostering an organizational learning culture, and establishing sound knowledge management practices, can yield significant returns on investment, a competitive advantage in the marketplace, and increased organizational performance. In the next chapter these theories will be used to develop a survey instrument to answer the hypotheses and investigative questions posed in Chapter 1.

III. Methodology

Overview

This chapter presents the theoretical justification for hypotheses question construction based on extant literature as well as the methodology used in designing the survey instrument all of which mirror the survey developed by Cherry (2014). This chapter will also discuss the development of survey questions used to answer the investigative questions. Survey design, survey population, sampling methods, data collection, data preparation, data analysis, and method of administration are also discussed.

Theoretical Models and Hypotheses Development

This section introduces the theoretical justification for how the research hypotheses test questions were developed. Additionally, this section references the extant literature used to develop specific survey questions and instrument scales. Furthermore, a visual representation of the theoretical model will be presented later in this Chapter. The complete survey instrument used in this study can be found in Appendix C.

Human Capital and Organizational Performance

The relationship between human capital and organizational performance has long been established in extant literature (e.g. Hitt, et al., 2001; Hatch and Dyer, 2004; Hsu, 2008). Notably in the work of Hitt, et al. (2001) and Hsu (2008) the relationship between human capital and its positive association with organizational performance has been explored. This methodology was used by Cherry (2014) to explore the human capital relationship to the LRO career field and was likewise used in this thesis to test the direct relationship of 21A human capital and organizational performance through the first research hypothesis:

Hypothesis 1: 21A human capital has a positive impact on organizational performance

To test the first hypothesis this study used a five-item scale originally developed by Subramaniam and Youndt (2005) and modified to fit the Air Force context by Cherry (2014). Subramaniam and Youndt (2005) developed the five items used in assessing human capital from the work of Schultz (1961) surrounding human capital as well as Snell and Dean's (1992) work on contemporary strategic human resource management. The original survey consisted of a seven-point Likert scale using a range of strongly disagree to strongly agree and had a measured Cronbach's alpha greater than 0.70. Cherry (2014) determined one of the five questions used was double-barreled and was consequently divided into two separate questions. Cherry (2014) also reworded the questions to fit the Air Force context. The adapted questions used in this study to test the relationship between human capital and organizational performance can be found in Table 5 below.

Table 5: Human Capital Scale

Human Capital: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) 21As. ***Human Capital is defined as the knowledge, skills, attitudes, and abilities possessed by individuals.**
HC1: 21As in my organization are very intelligent
HC2: 21As in my organization are very creative
HC3: 21As in my organization are very talented
HC4: 21As in my organization are specialized in their jobs
HC5: 21As in my organization are producing new ideas and knowledge
HC6: 21As in my organization are the best performers

Notes: Adapted from Subramaniam and Youndt (2005) and Cherry (2014). Original Cronbach's alpha was >0.70

The Learning Organization and Organizational Performance

Marsick and Watkins (2003) provide the necessary theoretical link between organizational learning and the performance of a firm through the development of the *Dimensions of the Learning Organization Questionnaire*, or DLOQ. The DLOQ "measures important shifts in an organization's climate, systems, and structures that influence whether individuals learn" (Marsick and Watkins, 2003). Yang (2003) and Kontoghiorghes et al. (2005) have used the DLOQ for several years to demonstrate the link between organizational learning and performance. Therefore, this thesis developed the second hypothesis question to test the link between organizational learning and performance.

Hypothesis 2: 21A learning culture has a positive impact on organizational performance

The full DLOQ consists of a 43-item, seven construct instrument , however, Yang (2003) developed a short form of the survey, DLOQ-A, with 21-items and a separate seven item survey which can be used to measure a single scale of learning culture. Using one representative item from each of the seven dimensions, as shown in Appendix D, a concise version of the DLOQ can be achieved and the succinct measurement of a learning culture retains an acceptable reliability estimate or Cronbach's alpha of 0.84 (Yang, 2003). Cherry (2014) further adapted the seven-item scale to be consistent with Air Force terminology for use measuring the LRO learning culture. This study used the scale as adapted by Cherry (2014), presented in Table 6.

Table 6: Learning Organization (Culture) Scale

Learning Culture: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) learning culture. ***Learning Culture is defined as the value the organization places on learning.**
LO1: In my organization, people are rewarded for learning
LO2: In my organization, people spend time building trust with each other
LO3: In my organization, teams/groups revise their thinking as a result of group discussions or information collected
LO4: My organization makes its lessons learned available to all employees
LO5: My organization recognizes people for taking initiative
LO6: My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs
LO7: In my organization, leaders ensure that the organization's actions are consistent with its values

Notes: Adapted from Yang (2003) and Cherry (2014). Original Cronbach's alpha was 0.84

Knowledge Management and Organizational Performance

The final hypothesis explored in this research tested the relationship between 21A knowledge management and organizational performance. Knowledge management, as explored by Gold et al. (2001) and Kiessling et al. (2009) found a positive relationship between an organizations knowledge management and organizational outcomes. Additionally, Zack et al. (2009) found a positive relationship between the two variables. Cherry (2014) tested the link between knowledge management and organizational performance in the military context and successfully found a positive relationship within the LRO career field. Accordingly, this research developed the following hypothesis.

Hypothesis 3: 21A knowledge management has a positive impact on organizational performance

Gold et al. (2001) developed a survey using a seven-point Likert scale to test the relationship between a firms knowledge management practices and its performance. Kiessling et al. (2009) further refined this work by condensing the questions to five items with an original

Cronbach's alpha of 0.92. Both studies concluded there is a positive relationship between knowledge management practices and organizational effectiveness. Cherry (2014) further adapted the five knowledge management questions to ensure consistency with Air Force terminology. The five questions used to test Hypothesis 3 are presented below in Table 7.

Table 7: Knowledge Management Scale

Knowledge Management: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) knowledge management practices. ***Knowledge is defined as the awareness or familiarity gained by a fact or situation.**
KM1: My organization has processes for integrating different sources and types of knowledge
KM2: My organization has processes for converting competitive intelligence into plans of action
KM3: My organization has processes for taking advantage of new knowledge
KM4: My organization has processes for acquiring knowledge about organizational partners
KM5: My organization has processes for exchanging knowledge with our organizational partners

Notes: Adapted from Kiessling et al. (2009) and Cherry (2014). Original Cronbach's alpha was 0.92

Dependent Variable: Perceived Organizational Performance

As developed by Cherry (2014) the dependent variable for this study was perceived organizational performance. Adapting the work of Delaney and Huselid (1996) Cherry was able to create a seven-point Likert scale to test LRO perceptions of organizational performance. Delany and Huselid (1996) found 7-items of perceptual measures permitted the analysis of perceived organizational performance with an original Cronbach's alpha of 0.85 (using a four-point scale). The questions used to measure perceived organizational performance for this study can be found below in Table 8.

Table 8: Perceived Organizational Performance Scale

Organizational Performance: On a scale from 1 (Much Worse) to 7 (Much Better) how would you compare your organization's (squadron or equivalent) performance over the past 3 years to that of other organizations that do the same kind of work? What about in relation to...
OP1: Quality of products, services, or programs?
OP2: Development of new products, services, or programs?
OP3: Ability to attract essential employees?
OP4: Ability to retain essential employees?
OP5: Satisfaction of customers or clients?
OP6: Relations between management (leadership) and other employees?
OP7: Relations among employees in general?

Notes: Adapted from Delaney and Huselid (1996) and Cherry (2014). Original Cronbach's alpha was 0.85

Thus, the three hypotheses explored in this study test the independent variables of human capital, learning culture, and knowledge management against the dependant variable—perceived organizational performance. As shown in Figure 4, below each hypothesis is attempting find a positive relationship between the independent and dependent variables.

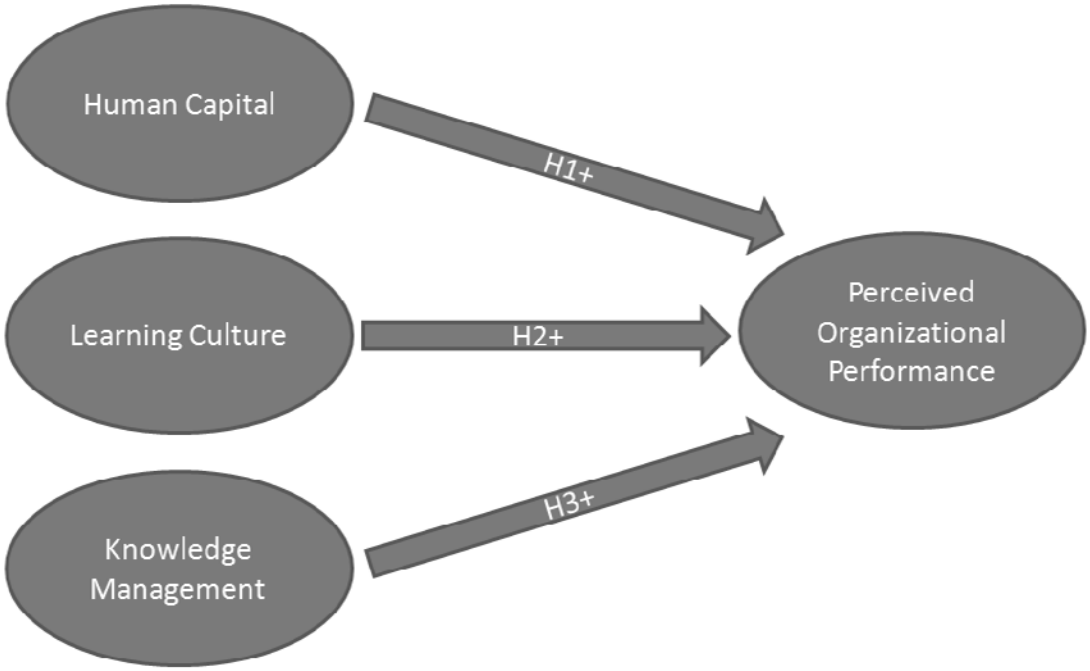


Figure 4: Proposed Theoretical Model with Hypotheses

Research Design

To develop an understanding of Aircraft Maintenance Officer perceptions of the core education, training, and job proficiency levels, a cross-sectional web-based self-administered survey was used. This instrument provided empirical data to assess the relationships between human capital, learning culture, and knowledge management to organizational performance specific to the 21A career field. A survey methodology was chosen because of its ability to collect qualitative information from a globally dispersed population. Furthermore, the selection of a web-based survey allowed for rapid dissemination of the test instrument at no cost to the Air Force. The survey was administered between 28 October and 21 November, 2014. The link to the web-based survey was sent through automated mail robot and was sent out to the entire population of 21As in the rank of second lieutenant through colonel as tracked by the Aircraft Maintenance Assignment Officer at the Air Force Personnel Center (AFPC).

Institutional and Air Force Approval

The research sponsor is the Air Force Directorate of Logistics (AF/A4) and officially received on 30 July 2014 (Appendix B1). The AFIT Exempt Determination Official granted approval for exemption from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) on 19 September 2014 (Appendix B2). Finally, the Air Force Survey Office granted approval to send the survey out on 6 October, 2014 (Appendix B3).

Population and Sample

This study examined active duty Aircraft Maintenance Officers in the ranks of second lieutenant through colonel. To obtain the best possible results, the entire population of 21As was

targeted in order for generalizable statements to be made about the career field. Again, a web-based survey allowed the entire population of 21As to be targeted from geographically separated units without incurring costs to the Air Force. The Aircraft Maintenance Assignment Officer at the Air Force Personnel Center supplied the list of 21As in the aforementioned ranks to be 1,337 individuals as the population.

Instrument Development

This section will describe how the instrument used in the survey was designed and how specific questions were constructed to answer the investigative questions. Following the hypothesis and IQ section of the survey demographic questions were also asked of the surveyed population. The complete survey instrument can be seen in Appendix C.

Survey Design

The survey used to gather empirical data for this study was a cross-sectional self-administered web-based survey consisting of 31 questions as shown in Appendix C. An online survey tool, Survey Monkey®, was used to administer the survey to the sample population. When respondents clicked on the link to open the survey they were greeted with a page explaining the purpose of the survey, a confidentiality statement, a survey participation statement, instructions for completing the survey, and contact information for the researcher. The second portion of the survey consisted of four pages of Likert scale questions designed to test the relationship between the independent and dependant variables. The third section of the survey included questions concerning aircraft maintenance officer competencies as prescribed in the 21A CFETP. The forth section of the survey asked respondents questions about logistics education and training courses. The next section provided respondents the opportunity to

provide additional comments pertaining to the 21A education and training. Comments in this section were optional. The final section of the survey collected demographic information from the survey respondent. The demographical information was intentionally placed at the end of the survey to help reduce respondent fatigue as they completed the survey.

Survey participants were kept completely anonymous and were allowed to stop the survey and resume at a later time without the survey resetting. Additionally, no participant was allowed to complete the survey more than once.

Theoretical Model Construct Scales

As described earlier in this chapter, four areas of extent literature and survey design were used to develop the survey questions needed to test the three hypotheses explored in this study. The first independent variable tested was Human Capital. The survey design of Subramaniam and Youndt (2005) as modified by Cherry (2014) was used to develop six questions to test the relationship between Human Capital and the dependant variable, organizational performance. The second independent variable, Learning Culture, was tested through the seven construct modified DLOQ as originally created by Yang (2003) and modified by Cherry (2014) to be consisted with military jargon. The final independent variable, Knowledge Management, was developed from the work of Kiessling et al. (2009). The dependent variable, organizational performance, was adapted from the work of Delaney and Huselid (1996).

Non-Theoretical Model Questions

Questions designed to answer investigative questions two through seven were constructed with information about competencies and education and training courses available to the Aircraft Maintenance Officer. The specific 21A KSAs identified by Thompson (2013), as shown in

Appendix A, were used to aid the Air Force Directorate of Logistics in developing the core 21A competencies as currently prescribed in the 21A CFETP. These competencies, along with current Air Force logistics courses were used to satisfy the research objectives of this study. Demographic questions were designed to collect information on respondents to assess trends in the data based on various attributes.

Survey Biases

Utilizing a web-based self-administered study has several advantages to this research but also introduces several biases to the validity of the results. Specific biases to this study are common-method bias, non-response bias, and coverage error.

Common-method bias is the false variance that is attributable to the measurement method rather than to the constructs the measures are assumed to represent (Podsakoff, et al., 2003). Method refers to the form of measurement used, such as the content of specific items, scale type, and response format. Preventing common-method bias requires careful assessment of potential sources of bias and implementing procedural and statistical control methods. Podsakoff et al. (2003) note that in the case of behavioral research, common-method bias can be prevalent where the data for both the dependent and independent variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics. Analysis of common-method bias for this study is presented in Chapter 4.

Non-response bias results when the researchers conducting a survey or study are unable to obtain data on all experimental units selected for the sample (McClave, et al., 2011). Non-response by the selected sample population may lead to very biased results. McClave, et al. (2011) note that if a sampling plan calls for a specific collection of sampling units, failure to

acquire the response from those units may violate your sampling plan and lead to biased estimates. Of concern for this study is non-response from specific sub-groups of the population. Specifically, the population sample included multiple ranks, MAJCOMs, etc. which might lead to specific biases (e.g. non-response from colonels or from 21As in a specific MAJCOM). Theoretically, however, the constructs of this survey do not depend on the completion of the survey; therefore non-response bias was not predicted. Results of non-response bias testing are shown in Chapter 4.

Coverage error results when all units of a population do not have a probability of inclusion in the sample. In order to insure coverage error was not an issue in this study the AFPC automated email system was used to contact the population. AFPC uses this system to contact personnel for various force management requirements, such as notification of assignment, force shaping, and to send out career specific information. It was assumed that the AFPC automated email system contained accurate email addresses for all 21As in the population. Because every potential respondent contacted had access to email and every potential respondent was contacted coverage error was assumed to be zero.

Pre-Test, Data Collection, and Data Preparation

This section describes how a pre-test was used to refine the final survey instrument as well as how the data for this study was collected and analyzed.

Pre-Test

A pre-test was used to ensure question specificity, readability, representativeness and face validity. The pre-test provided specific feedback to the researcher from selected respondents. The pre-test was sent out to 19 individuals and 10 individuals responded for

response rate of 53%. Of the 10 respondents eight were graduate students, of which four were LROs, two were 21Ms, one was a 21A, and one was a 41A (Hospital Administration). The remaining two pre-test respondents were both 21A PhD professors at the AFIT. Based on pre-test respondent feedback several questions were edited to provide clearer instructions, removed duplicated information between instructions and questions, and fix grammatical errors. As only minor changes were made to the survey only one round of pre-testing was conducted.

Data Collection

An a priori sample size estimate for multiple regression indicated a minimum of 76 respondents were required for a desired statistical power level of 0.80, a significance level of 0.05, and a median effect size of 0.15 (Soper, 2014). To achieve the minimum 76 responses, survey data was collected using a web-based questionnaire. Survey response data was password protected within the online software system with access provided only to the primary researcher. The survey was sent out initially on 28 October 2014 and continued through 19 January 2015. Automated email messages were sent directly to the population of 21As in the rank of second lieutenant through colonel through AFPC. Follow-up reminder emails were sent on 4 November 2014, and 12 November 2014 in order to increase the survey response rate. Because survey request emails were sent out through using the AFPC automated email system it was assumed every one of the 1,337 21As were contacted. A copy of the initial survey request email sent to the 21A population can be found in Appendix D. The response rate for this study was 42.9%

Data Preparation

Satisficing, defined by Daniel (2012) to be a decision-making strategy in which the easiest adequate solution is chosen, was a concern for this research. Respondents who satisfice

the responses rather than optimize may be prone to choosing the same response for every question on a Likert scale (Groves, et al. 2004; Daniel, 2012). Krosnick et al. (2002) identified several risk factors for satisficing to include time pressure, motivation, anonymity, cognitive skills, task difficulty, and survey length. The survey design intentionally placed the construct questions at the beginning of the survey to reduce respondent fatigue and mitigate some of these potential risk factors. Of the 475 completed surveys, in which there were no missing data, one was removed as being hostile.

An ordinal seven-point Likert scale was used for each of the construct questions. Each of these questions in a particular construct were added together and divided by the total number of questions to find the mean value of the construct as suggested by Boone Jr. and Boone, 2012. As noted by Norman (2010) this process ensured the construct was continuous and could be analyzed using parametric statistics.

Only complete survey responses were used to answer the investigative questions not dealing with the theoretical model. Of the 574 respondents who attempted the survey, 475 fully completed the survey. The abandonment rate for this survey was calculated to be 17.43%. To properly segment and analyze the various demographic characteristics of the sample completed surveys were required.

Specific treats to validity were asses to determine possible negative impact to this study. Incomplete surveys had no affect on the statistics or analysis of the theoretical model because only complete surveys were used. Of the 574 attempted surveys 475 were complete with no missing information yielding an abandonment rate of 17.43%. Only completed surveys were used analysis and conclusions of Investigative Question 1 through 7. Additionally, non-response bias was assessed using two methods suggested by Rogelberg and Stanton (2007). First, after

sending the initial survey email to the identified population follow-up emails were sent to increase overall survey participation and reduce concerns of non-response bias. Second, a comparison between each wave of survey response was conducted by calculating the mean value for each construct between each wave of responses using two-way t-tests. Analysis of each wave of responses after the initial, follow-ups, and final survey email suggested no significant difference in the means.

Data Analysis

Four scales were developed from extant literature to test the theoretical model presented in Chapter 1. This study, then, utilized various statistical tools for data analysis and to confirm the scales used and individual constructs of the model were valid. Exploratory factor analysis (EFA) was used in determining the number and nature of common factors needed to account for the pattern of correlations among the variables in this study (Fabrigar et al., 1999). EFA was additionally used to determine if the scales used in the survey were consistent and representative of the latent constructs they were designed to measure. Finally, EFA was used to explore the theoretical model's latent factors and the interrelationships between construct questions in order to insure model reliability and validly. The statistical software used for EFA was SPSS® 18.0

Multivariate regression was also used to examine the relationships between the dependant variable and the three independent variables depicted in the theoretical model. Again, SPSS® 18.0 statistical analytical software was used in performing assumption checks as prescribed by (Hair, et al., 2006) and for performing the multivariate regression analysis. More discussion regarding the assumption checks performed are presented in Chapter 4.

Using regression analysis, the independent variables: human capital, learning organization (culture) and knowledge management were analyzed to determine statistical relation

to the dependant variable: organizational performance. Finds of multivariate regression are presented in Chapter 4.

Descriptive and summary statistics were used to evaluate and analyze the non-theoretical survey questions to answer Investigative Questions 2 through 7. Finally, keyword analysis was conducted to evaluate the open-ended comments provided by survey respondents concerning their thoughts and perceptions of the 21A DCoL as well as career field education and training. These findings are presented in Chapter 4.

Summary

This chapter developed the hypotheses questions, research design, and instrument of the survey while presenting the data collection, preparation, and analysis techniques. In Chapter 4, analysis of the survey data will be presented to include descriptive statistics, discussion of analysis methods, and conclude by answering the investigative questions posed in Chapter 1.

IV. Results and Analysis

Overview

This study surveyed active duty aircraft maintenance officers in the ranks of second lieutenant through colonel in order to answer the seven investigative questions presented in Chapter 1. This chapter will review the survey demographics followed by a sequential analyses and results for each of the seven investigative questions and will conclude with analysis of respondent comments.

Participant Demographics

This study collected demographic information from survey respondents to provide a clearer site picture of the aircraft maintenance officer career field. Table 9 below summarizes survey respondent rank, time in service, time in job, and prior enlistment status. The majority, or 30.17%, of the 474 completed survey respondents were Captains. Partitioning by rank category, Company Grade Officers (CGO) accounted for 48.95% of responses, Field Grade Officers (FGO) accounted for 42.19%, and Colonels accounted for 8.86% of all responses.

Table 9: Demographic Information

Rank	Count (%)	Time in Service	Average	Prior Enlisted	Count (%)
Second Lieutenant	40 (8.44%)	Years	10	Yes	175 (36.92%)
First Lieutenant	49 (10.34%)	Months	6	No	299 (63.08)
Captain	143 (30.17%)	**Time in Job**	**Average**		
Major	107 (22.57%)	Years	1		
Lieutenant Colonel	93 (19.62%)	Months	0.89		
Colonel	42 (8.86%)				

Notes: n=474 for completed surveys

The average time in service for respondents was approximately 10.5 years while the average time in job was approximately 13 months. Over a third of the respondents indicated that they had spent time as an enlisted member; however, they were not asked to distinguish between their time spent enlisted and time as an officer. Survey demographic questions also collected information about respondent's current job, including their duty title and level of primary duties. Table 10 summarizes this information below.

Table 10: Demographic Information

Duty Title	Count	Level of Primary Duties	Count
Student	7	Section	3
Instructor	12	Flight	76
AMU OIC	68	Squadron	210
Assistant AMU OIC	10	Group	77
QA OIC	3	Wing	21
Other OIC (Not Specified)	4	NAF	5
Section Chief	1	MAJCOM	32
Flight/Det Commander	35	DRU	9
Executive Officer (Mx Org Only)	10	FOA	2
Executive Officer (Outside of Mx)	6	Air Staff	15
Operations Officer	86	Joint Staff	6
Squadron Commander	78	Other (Please Use Comment Box)	18
Deputy Group Commander	30		
Group Commander	28		
Wing Commander	1		
NAF, MAJCOM, DRU, FOA, or Air Staff	47		
Foreign Exchange Officer	4		
LCBP Exchange Officer	3		
ALC Level Maintenance	8		
Acquisitions Duty	9		
Joint Logistics Duty	4		
Other Logistics AFSC (21M, 21R)	2		
Other (No Common Theme)	18		

Notes: n=474 for completed surveys

Additionally, respondents were asked to indicate their area of responsibility and assigned Major Command (MAJCOM). Table 11 presents the counts for how respondents categorized their area of responsibility and MAJCOM.

Table 11: Demographic Information

MAJCOM	Count	Area of Responsibility	Count
ACC	131	Directs Aircraft Maintenance	219
AETC	56	Develops, Coordinates, and Executes Flying and Maintenance Schedules	32
AFGSC	12	Directs Off Aircraft Maintenance Activities	55
AFMC	33	Manages Quality Assurance	7
AFSC	1	Formulates Maintenance Plans and Policies	24
AFSOC	31	Coordinates Key Core Logistics Requirements	14
AMC	78	Directs and Manages Wholesale Logistics Life Cycle Sustainment Support	25
PACAF	49	All of the Above	11
USAFE or Air Forces Africa	35	Other (No Common Theme)	46
DRU	8	Executive Officer	10
FOA	0	Instructor/Training	18
NAF	1	Staff	9
HAF	17	Student	4
Other	22		

Notes: n=474 for completed surveys

Respondent educational background information was also collected. Specifically, respondents were asked to provide their highest level of education completed as well as undergraduate, graduate, and post-graduate degree emphasis area. Table 12 displays educational related demographic information.

Table 12: Demographic Information

Highest Level of Education Completed	Count (%)
Bachelor's Degree	134 (28.27%)
Master's Degree	337 (71.10%)
PhD	3 (0.63%)

Bachelor's Degree	Count	Master's Degree	Count
Business-related (e.g. Accounting, Finance, Management)	151	Business-related (e.g. MBA)	157
Science-related (e.g. Biology, Chemistry, Psychology, Physics)	172	Logistics- or Supply Chain-related (e.g. Logistics & Supply Chain Management)	93
Other	16	Science-related (e.g. Biology, Chemistry, Psychology, Physics)	50
Education	7	N/A	48
Engineering/Aeronautics/Aviation	29	Other	68
Humanities	64	Aeronautical/Aerospace/Aviation	19
Political Science/International Relations	35	Education	6
		Humanities	12
		Political Science/International Relations	21

Notes: n=474; PhD responses included: Aeronautical Science, Logistics (minor in Operations Management), and Supply Chain Management

IQ 1: What is the relationship between LO, HC, and KM & Organizational Performance?

Investigative Question 1 was postulated to examine the relationship between human capital, learning organization (culture), and knowledge management of aircraft maintenance officers and their perceived organizational performance. The following sections present the analysis and results of Investigative Question 1.

Descriptive Statistics

Item Level Statistics

The mean and standard deviation across all 474 respondents are presented below in Table 13. There were no missing values for any item.

Table 13: Item Details

Item	Statement	Mean	Std
HC1	21As in my organization are very intelligent	5.82	1.07
HC2	21As in my organization are very creative	5.33	1.36
HC3	21As in my organization are very talented	5.71	1.14
HC4	21As in my organization are specialized in their jobs	4.92	1.51
HC5	21As in my organization are producing new ideas and knowledge	5.00	1.40
HC6	21As in my organization are the best performers	5.39	1.33
LO1	In my organization, people are rewarded for learning	5.15	1.44
LO2	In my organization, people spend time building trust with each other	5.09	1.52
LO3	In my organization, teams/groups revise their thinking as a result of group discussions or information collected	5.23	1.40
LO4	My organization makes its lessons learned available to all employees	4.96	1.59
LO5	My organization recognizes people for taking initiative	5.39	1.41
LO6	My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs	5.52	1.36
LO7	In my organization, leaders ensure that the organization's actions are consistent with its values	5.63	1.40
KM1	My organization has processes for integrating different sources and types of knowledge	4.94	1.39
KM2	My organization has processes for converting competitive intelligence into plans of action	4.70	1.45
KM3	My organization has processes for taking advantage of new knowledge	4.86	1.45
KM4	My organization has processes for acquiring knowledge about organizational partners	4.78	1.41
KM5	My organization has processes for exchanging knowledge with our organizational partners	4.91	1.43
OP1	Quality of products, services, or programs?	5.06	1.30
OP2	Development of new products, services, or programs?	4.74	1.30
OP3	Ability to attract essential employees?	4.28	1.36
OP4	Ability to retain essential employees?	4.05	1.49
OP5	Satisfaction of customers or clients?	4.88	1.33
OP6	Relations between management (leadership) and other employees?	4.86	1.45
OP7	Relations among employees in general?	4.93	1.31

Notes: n=474

Construct Level Statistics

Descriptive information for each construct is listed below in Table 14. The number of items, mean, standard deviation, and Cronbach's alpha are presented. All four constructs had a reliability measure greater than 0.70, indicating adequate reliability (Hair et al. 2006).

Table 14: Construct Descriptives

Construct	Number of Items	Mean	Standard Deviation	Cronbach's Alpha
Human Capital	6	5.36	1.06	0.89
Learning Organization (Culture)	7	5.28	1.14	0.90
Knowledge Management	5	4.84	1.26	0.93
Organizational Performance	7	4.69	1.12	0.92

Notes: n=474

Exploratory Factor Analysis

An exploratory factor analysis (EFA) was conducted using Principal Components Analysis as the extraction method and Promax as the rotation method. Prior to exploratory factor analysis, however, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's Test of Sphericity (BTS) were conducted to assess the suitability of the respondent data for factor analysis as indicted by Williams, et al. (2012). The KMO index ranges from 0 to 1, with 0.50 considered suitable for factor analysis, and the BTS should be less than 0.50 (Williams, et al., 2012). The KMO index was measured as 0.938 and the BTS was significant at <.001, therefore, it was concluded the data were suitable for EFA.

During EFA, principal components analysis analyzes the matrix of correlations among measured variables with 1.0s on the main diagonal and attempts to represent all of the variance of the observed variables (Floyd and Widaman, 1995). Oblique rotation, such as Promax, produce factors that are correlated, which is often seen as producing more accurate results for research involving human behaviors (Williams, et al., 2012). Additionally, when using well-formulated rotations such as Promax the oblique simple structure may be more compelling than the orthogonal solution for the data variables (Floyd and Widaman, 1995). For oblique rotations,

where the factors are allowed to correlate the loadings and correlations are distinct and the pattern matrix holds the loadings (IMB, 2014). The structure matrix then holds the correlations between the variables and the factors loadings (IMB, 2014). As noted by Henson and Roberts (2006), both the structure and pattern matrices are required to allow independent interpretation of the final results for oblique solutions.

According to Hair, et al. (2006), factors with eigenvalues greater than 1.0 should be retained and enough factors should be retained to insure a cumulative percentage of variance explained is greater than 60%. Additionally, factor loading of 0.50 or greater is considered practically significant, while loadings exceeding 0.70 are considered indicative of well-defined structure and are the goal of any factor analysis (Hair, et al., 2006). Finally, variables that cross-load (load on two or more factors with values of 0.50 or greater) are usually deleted unless theoretically justified (Hair, et al., 2006). The results of the EFA are provided in Table 15. Exploratory factor analysis indicated four factors had eigenvalues greater than 1.0 and the cumulative percent of variance explained was greater than the 60% threshold (Hair, et al., 2006). The pattern matrix showed the majority of the factor loadings to be greater than 0.70 indicating a well-defined structure (Hair, et al., 2006). EFA showed LO4 did not load significantly on any factor. Additionally, OP6 was eliminated because of unfavorable cross loading. Significant factor loadings are bolded and the two removed constructs are lined out in Table 15. Eigenvalues, percentage of variance, and cumulative percentage of variance are also reported at the bottom of Table 15. The correlations between variables and factor loadings are presented in the structure matrix portion of Table 15.

The number of factors retained was determined a priori based on the formulation of the theoretical model with constructs developed from extant literature, however, the constructs were

confirmed through Kaiser's "eigenvalues greater than one rule" (Conway and Huffcutt, 2003; Hair, et al., 2006). Thus, the human capital, learning organization, knowledge management, and organizational performance constructs were proven valid.

Table 15: Exploratory Factor Analysis Results

	Pattern Matrix					Structure Matrix			
	1	2	3	4		1	2	3	4
HC1	-0.082	**0.829**	-0.077	0.18	**HC1**	0.311	**0.857**	0.421	0.547
HC2	-0.06	**0.845**	-0.008	0.101	**HC2**	0.328	**0.872**	0.458	0.531
HC3	-0.093	**0.901**	-0.065	0.119	**HC3**	0.301	**0.896**	0.425	0.526
HC4	0.118	**0.724**	0.098	-0.269	**HC4**	0.308	**0.672**	0.352	0.256
HC5	0.087	**0.728**	0.067	0.009	**HC5**	0.414	**0.802**	0.484	0.501
HC6	0.119	**0.782**	0.003	-0.044	**HC6**	0.409	**0.806**	0.428	0.454
LO1	-0.064	0.07	0.072	**0.71**	**LO1**	0.379	0.473	0.524	**0.759**
LO2	0.065	0.115	-0.019	**0.714**	**LO2**	0.486	0.526	0.519	**0.800**
LO3	0.004	0.034	0.139	**0.709**	**LO3**	0.463	0.498	0.604	**0.817**
~~LO4~~	~~-0.023~~	~~-0.081~~	~~0.499~~	~~0.395~~	~~LO4~~	~~0.389~~	~~0.383~~	~~**0.696**~~	~~**0.652**~~
LO5	-0.007	-0.039	0.098	**0.815**	**LO5**	0.461	0.458	0.587	**0.851**
LO6	0.004	-0.044	0.159	**0.654**	**LO6**	0.412	0.400	0.549	**0.731**
LO7	0.004	-0.014	0.035	**0.802**	**LO7**	0.446	0.449	0.534	**0.818**
KM1	-0.061	0.107	**0.776**	0.071	**KM1**	0.381	0.518	**0.847**	0.586
KM2	0.03	0.087	**0.777**	0.049	**KM2**	0.452	0.522	**0.866**	0.602
KM3	0.032	0.019	**0.783**	0.135	**KM3**	0.476	0.505	**0.893**	0.655
KM4	0.012	-0.054	**0.933**	-0.015	**KM4**	0.415	0.417	**0.902**	0.548
KM5	0.046	-0.063	**0.839**	0.088	**KM5**	0.458	0.432	**0.884**	0.606
OP1	**0.899**	0.044	-0.042	-0.084	**OP1**	**0.852**	0.336	0.345	0.397
OP2	**0.805**	0.059	0.157	-0.175	**OP2**	**0.807**	0.363	0.450	0.388
OP3	**0.796**	0.03	0.147	-0.11	**OP3**	**0.817**	0.362	0.462	0.427
OP4	**0.782**	-0.005	0.148	-0.093	**OP4**	**0.798**	0.331	0.449	0.417
OP5	**0.839**	0.011	-0.072	0.066	**OP5**	**0.845**	0.346	0.364	0.478
~~OP6~~	~~**0.684**~~	~~-0.082~~	~~-0.15~~	~~**0.405**~~	~~OP6~~	~~**0.800**~~	~~0.340~~	~~0.381~~	~~**0.634**~~
OP7	**0.731**	-0.041	-0.2	0.362	**OP7**	**0.817**	0.350	0.347	0.607

Extraction Sums of Squared Loadings					
	1	2	3	4	
Extracted Eigenvalues	**11.68**	**2.553**	**1.962**	**1.195**	**Cumulative % of Variance**
Extracted % of Variance	**46.721**	**10.212**	**7.848**	**4.779**	**69.560**

Notes: Extraction Method = Principal Component Analysis, Rotation Method = Promax with Kaiser Normalization

Reliability, Validity, and Dimensionality

Reliability is the extent to which a variable or set of variables is consistent in what it is intended to measure (Hair, et al., 2006). Validity on the other hand is the extent to which a measure or set of measures correctly represent the concept of study—the degree to which it is free from any systematic or nonrandom error (Hair, et al., 2006). Furthermore, construct validity is the extent to which a set of measured variables actually represent the theoretical latent construct they are designed to measure (Hair, et al., 2006). Finally, dimensionality assesses an underlying and essential requirement that a summated scale is unidimensional, meaning individual construct questions are associated with each other and represent a single concept. This section discusses reliability, validity, and dimensional measures used to confirm the study's constructs.

Because no single item is a perfect measure of reliability, two diagnostic measures were used to assess internal consistency. First, to determine item-to-total correlation (the correlation of the item to the summated scale score) and the inter-item correlation (the correlation among items) Hair, et al. (2006) suggest item-to-total correlation exceed 0.50 and the inter-item correlations exceed 0.30. As shown in Table 15 the pattern matrix represents the item-to-total correlations and the structure matrix represents the inter-item correlations. All correlations, with the exception of LO4 under the pattern matrix, exceed the suggested lower limits set forth by Hair, et al. (2006). The second diagnostic used was Cronbach's alpha. As discussed earlier, individual construct reliability was measured by calculating Cronbach's alpha. The generally agreed upon lower limit of acceptability are values of 0.60 (Hair, et al., 2006). All four constructs, as shown in Table 14, had a Cronbach's alpha greater than 0.89 providing evidence of strong internal consistency and reliability.

Validity is measured empirically by the correlation between theoretically defined sets of variables (Hair, et al., 2006). Convergent and discriminate validity measures were calculated to satisfy model validity. Convergent validity assesses the degree to which two measures of the same concept are correlated while discriminate validity is the degree to which conceptually similar concepts are distinct (Hair, et al., 2006). Exploratory factor analysis showed all items had factor loadings greater than 0.50 except LO4 and each construct loaded on a separate factor, with the exception of OP6 illustrating both convergent and discriminate validity.

As described by Hair, et al. (2006), construct unidimensionality ensures that each summated scale consists of items loading highly on a single factor. Unidimensionality was assessed through EFA. Table 15 shows that each construct loaded onto a single factor with the exception of LO4 and OP6 which loaded on two factors. Each was subsequently removed before final analysis.

Multiple Regression Analysis

Multiple regression analysis is a statistical technique that can be used to analyze the relationship between a single dependent variable and several independent variables (Hair, et al., 2006). The objective of multiple regression analysis is to use the independent variables whose values are known to predict the single dependent value selected. (Hair, et al., 2006) This research hypothesized three independent variables; human capital, learning organization (culture), and knowledge management has a positive influence to the perceived organizational performance of the 21A career field. This section focuses on examining the independent variables and the relationship with the dependent variable for meeting the assumptions of multiple regression analysis.

Regression Assumption Checks

While analysis of regression assumption checks is actually performed after the regression model has been estimated the findings are presented first to ensure accurate results are reported. As noted by Hair et al. (2006), if model assumptions are severely violated, tests of predicative significance cannot be trusted. For multiple linear regression, the assumption checks include linearity, constant variance (homoscedasticity), independence, and normality.

Methods of Diagnosis

The principle measure of prediction error for the variate is the residual—the difference between the observed and predicted values for the dependent variable (Hair, et al., 2006). Plotting the residuals versus the independent or predicted variables is a basic method of identifying assumption violations for the overall relationship (Hair, et al., 2006). The most common residual plot involves the residuals versus the predicted dependent values (Hair, et al., 2006). Violations of each assumption can be identified by specific patterns of the residuals (Hair, et al., 2006). One plot of special interest is the null plot, the plot of residuals when all assumptions are met (Hair, et al., 2006). The null plot shows the residuals falling randomly, with relatively equal dispersion about zero and with no discernible pattern. Figure 5 shows the null plot calculated from the regression.

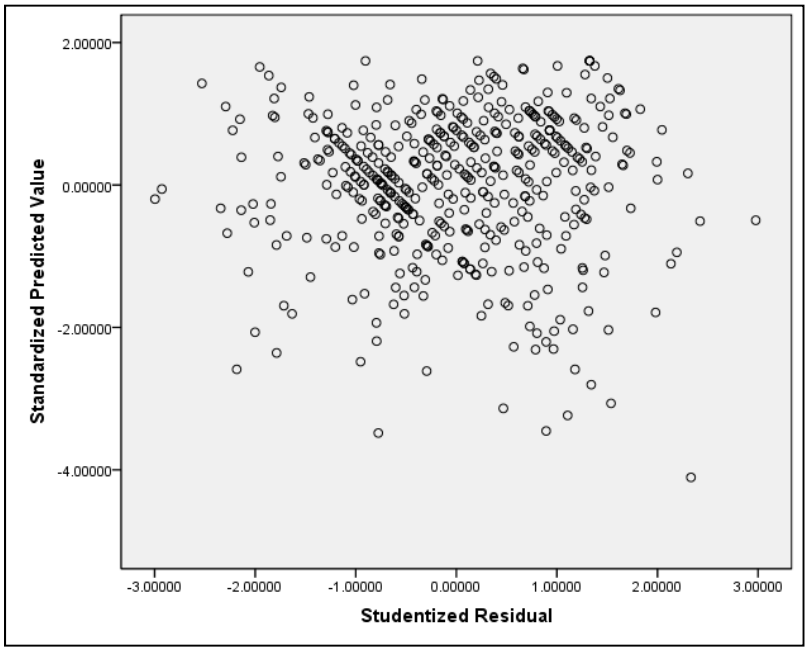


Figure 5: Null Plot

Linearity

The linearity of the relationship between dependent and independent variables represents the degree to which the change in the dependent variable is associated with the independent variable (Hair, et al., 2006). Plots of the residuals against each independent variable can help to determine whether the relationship between the independent variables and the dependent variable is linear, and therefore the suitability of the regression (Hair, et al., 2006). Figure 6 illustrates plots of each independent variable to the dependent variable, controlling for the effects of all other independent variables (Hair, et al., 2006).

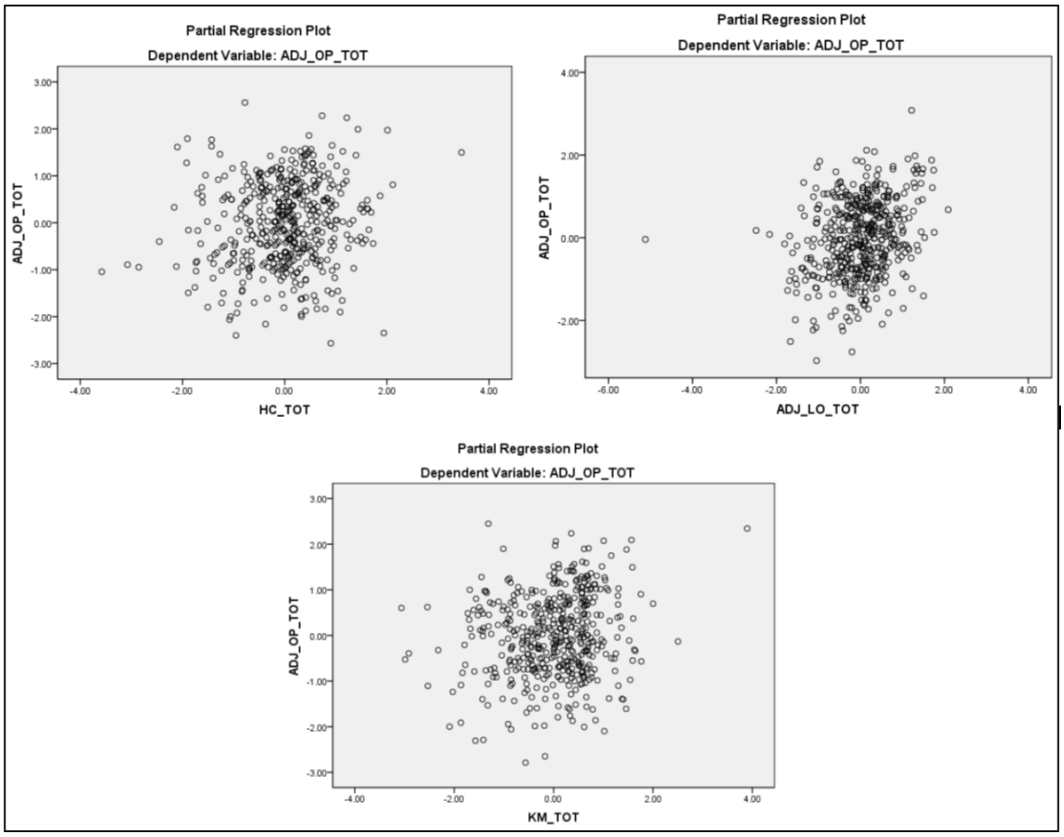


Figure 6: Partial Regression Plots

Constant Variance

The presence of unequal variances (heteroscedasticity) is one of the most common assumption violations (Hair, et al., 2006). The Breusch-Pagan test is a simple test based on the rank correlation between the absolute values of the residuals and the corresponding values of the predictor variable which tests for constancy of the error variance (Neter, et al., 1996). This test, a large-sample test, assumes that the error terms are independent and normally distributed and that the variance of the error term is related to the dependent variable (Neter, et al., 1996). The equation for the Breusch-Pagan test is shown below in Figure 7 while the significance test is shown in Figure 8. The calculated Breusch-Pagan test score for this study was found to be 1.73 which is significant when compared to the Chi inverse of alpha at the 0.05 level with degrees of

freedom 3 found to be 7.82. Thus, it was found this regression model met the assumption of constant variance.

$$BP = \frac{SSR}{2} \div \left(\frac{SSE}{n}\right)^2$$

Figure 7: Breusch-Pagan Test

Notes: SSR = sum of squared residuals, SSE = sum of squared error, n = sample size, df = degrees of freedom

$$BP \leq Chi\ Inverse(\alpha = .05; df)$$

Figure 8: Breusch-Pagan Significance Test

Independence

In regression analysis each predicted value is assumed to be independent, which means that the predicted value is not related to any other predictions; that is they are not sequenced by any variable (Hair, et al., 2006). To test for independence the Durbin-Watson coefficient was calculated using SPSS® 18.0. The coefficient was 2.059 (should be close to 2.0) which at the 0.05 level of significance supports the assertion that the assumption of independence was not violated (Gefen et al., 2010).

Normality

Perhaps the most frequently encountered assumption violation is non-normality of the independent or dependent variables or both (Hair, et al., 2006). Histograms and normal probability plots were used to check for the assumption of normality. Figure 9 displays univariate histograms with a normal overlay. Aside from moderate skewness none of the variables substantially departed from normality. Figure 10 depicts normal probability plots for

each variable. For normal distributions the observations should approximately follow the diagonal line indicating approximate normality (Hair, et al., 2006).

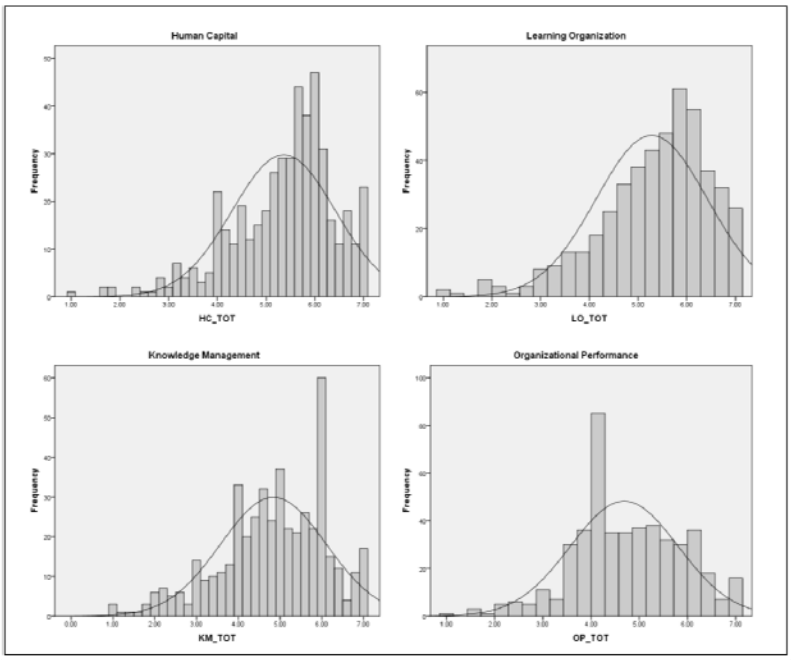


Figure 9: Histograms

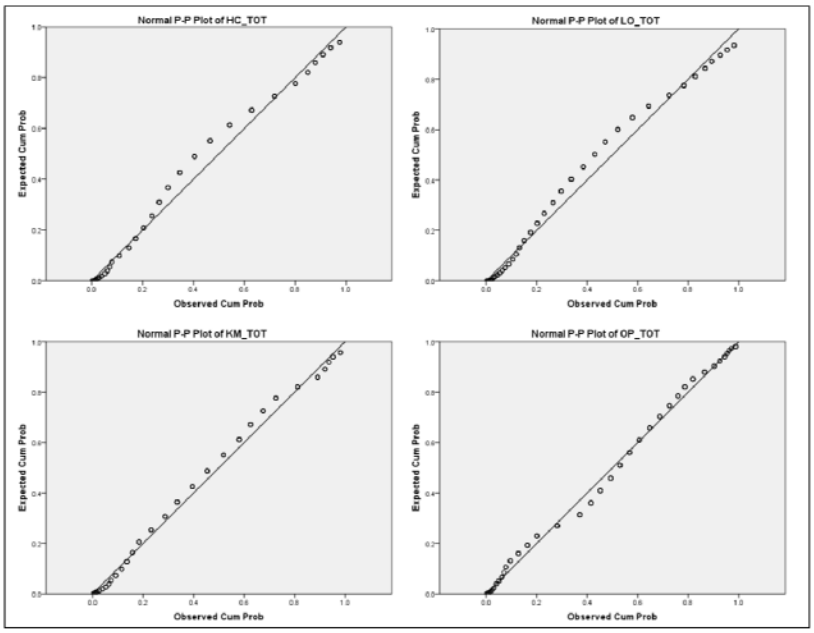


Figure 10: Normal Probability Plots

Multiple Regression Results

This study employed multiple linear regression analysis to answer IQ1. As all of the regression assumptions were met in the previous section it was determined that the multiple linear regression used could satisfactory be applied to the theoretical model. Analysis using multiple linear regression showed the independent variables human capital, learning organization, and knowledge management was statistically related to the dependent variable, organizational performance. The regression results proved significant at the $p<.001$ level ($F = 84.85$, $R^2 = .35$, Adjusted $R^2 = .35$) Results of the regression model are shown in Table 16.

Table 16: Multiple Linear Regression Results

Term	Estimate	Std Error	t Ratio	Significance	VIF
Intercept	1.299	0.230	5.648	<0.001	-
HC_TOT	0.139	0.050	2.798	<0.001	1.621
ADJ_LO_TOT	0.338	0.055	6.137	<0.001	2.334
KM_TOT	0.167	0.048	3.451	<0.001	2.174

Notes: n=474

The results show that the model was significant to the $p < .001$ level indicating the independent variables were significantly related to the dependent variable (Hair, et al., 2006). These results provided the impetus for accepting the proposed theoretical model and hypotheses questions introduced in Chapter 1. To reiterate the hypothesis questions were:

Hypothesis 1: 21A human capital has a positive impact on organizational performance

Hypothesis 2: 21A learning culture has a positive impact on organizational performance

Hypothesis 3: 21A knowledge management has a positive impact on organizational performance

As shown in Figure 11 and Table 17 all three hypotheses were supported.

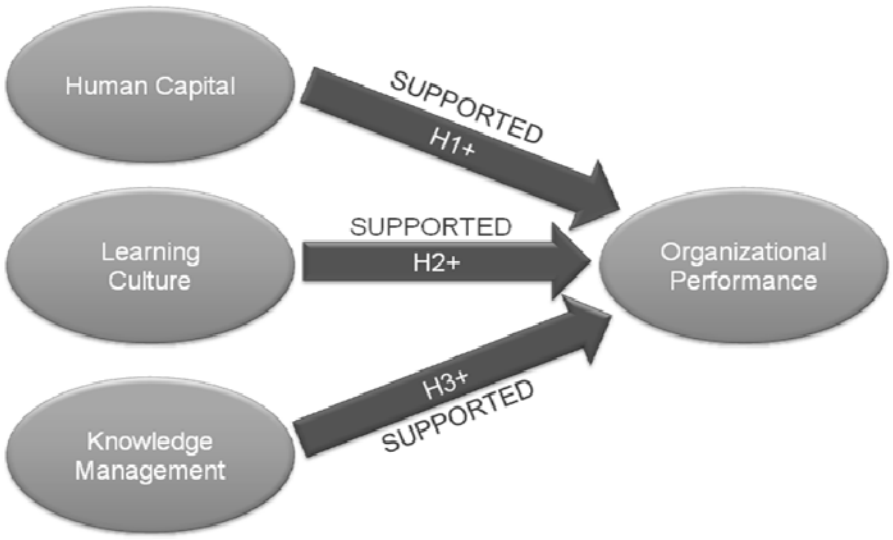


Figure 11: Theoretical Model

Table 17: Results of Hypotheses Testing

Hypothesis Number	Hypothesis	Support?	Significance	Beta
1	21A human capital has a positive impact on organizational performance	Yes	<.0001	0.132
2	21A learning culture has a positive impact on organizational performance	Yes	<.0001	0.348
3	21A knowledge management has a positive impact on organizational performance	Yes	<.0001	0.189

Notes: n=474

IQ 2: What are the Competencies for Which 21As Require Proficiency?

As introduced in Chapter 1, IQ 2 sought to determine the competencies for which aircraft maintenance officers require proficiency. In Chapter 2 various DoD, Joint, and Air Force logistics guidance was introduced and through the 21A CFETP specific aircraft maintenance competences were discussed. These competencies, as confirmed by the research sponsor, were

used in the survey instrument to answer IQ3. Each of the seven competency areas included sub-competencies to provide 21As with specific examples so they could better answer IQ3.

The competencies and sub-competencies for which 21As require proficiency in are presented in Table 18. The *Directs Maintenance Activities* competency included seven sub-competencies, the *Develops, Coordinates, and Executes Flying and Maintenance Schedules* competency consisted of eight sub-competencies, the *Directs Backshop Maintenance* consisted of fifteen sub-competencies, the *Manages Quality Assurance, Maintenance Training, Budget and Resource Management, Analysis, Facilities, Shared Resources to Include End-of-Runway and Weapons Load Training* contained seven sub-competencies, the *Formulates Maintenance Plans and Policies to Meet Unit Tasking* comprised four sub-competencies, the *Coordinates Key Core Logistics Requirements Supporting Aircraft Maintenance Operations* consisted of three sub-competencies, while the *Directs and Manages Wholesale Logistics Life Cycle Sustainment Support* consisted of four sub-competencies.

Specific guidance and explanation was given to survey participants to guide them through answering proficiency questions concerning 21A competency and sub-competency areas. Actual survey guidance for this section can be seen in Appendix C.

Table 18: Competencies and Sub-Competencies

Competency	Sub-Competencies
Directs aircraft maintenance -mission generation and repair network- activities	Maintaining workforce discipline and responding to personnel issues
	Balancing workforce availability and skill levels with operational requirements
	Working with functional managers to develop, formulate, and manage fiscal resources
	Instilling maintenance discipline
	Understanding and enforcing security awareness and force protection concepts
	Ensuring accuracy of documentation, i.e. aircraft forms and automated systems
	Ensuring adherence to technical data policy, procedures and safe maintenance practices
Develops, coordinates, and executes flying and maintenance schedules	Managing aircraft configuration
	Managing daily aircraft servicing requirements
	Managing weapons load training requirements
	Managing launch, recovery, and repair operations
	Managing periodic aircraft maintenance inspections
	Managing flightline safety, foreign object damage (FOD) prevention & dropped object programs (DOP)
	Managing overall aircraft fleet health ensuring aircraft availability to execute mission requirements
	Analyzing aircraft maintenance indicators to identify trends and initiate corrective actions
Directs maintenance activities that may include aircraft propulsion, pneudraulics, egress, fuel systems, electro-environmental, Precision Measurement Equipment Laboratory (PMEL) and avionics systems	Management of aircraft propulsion systems
	Management of pneudraulics systems
	Management of egress systems
	Management of fuel systems
	Management of electro-environmental systems
	Management of Precision Measurement Equipment Laboratory (PMEL)
	Management of avionics systems
	Management of aerospace ground equipment
	Management of structural repair and/or low observable repair
	Management of corrosion control
	Management of machine, welding, & inspection activities
	Management of aero-repair
	Management of crash, damaged, & disabled aircraft recovery
	Management of nondestructive inspection
	Management of off-equipment munitions and armament suspension equipment
Manages quality assurance, maintenance training, budget and resource management, analysis, facilities, shared resources to include end-of-runway & weapons load training	Managing quality assurance
	Managing maintenance training
	Managing budget and resource management
	Analysis
	Managing facilities & shared resources to include end-of-runway & weapons load training activities
	Managing plans and programs
	Managing modifications and modernization requirements
Formulates maintenance plans and policies to meet unit tasking	Formulating maintenance plans and policies to meet unit taskings
	Assessing unit maintenance capabilities in support of combat related operational plans
	Providing inputs for capability assessments for each plan
	Defining aircraft maintenance procedures & requirements in response to emergency or contingency situations
Coordinates key core logistics requirements supporting aircraft maintenance operations	Establishing support requirements for supply requisition, repair cycle, delivery, combat support, ground & aerial port transportation
	Establishing base support plans
	Establishing munitions requirements
Directs and manages wholesale logistics life cycle sustainment support	Coordinates production schedules to include induction and selling systems
	Defines technical problems and economic factors related to research and development, and system operational data to evaluate programs, assess trends, and identify improvements and deficiencies
	Manages weapons system programs, funding of depot maintenance workloads, and transportation distribution systems
	Manages logistics tests and evaluation on new acquisition programs and aircraft modifications

IQ 3: How proficient do 21As need to be in logistics competencies to do their jobs?

IQ3 used the competency and sub-competency areas identified in IQ2 to assess how proficient 21As believe they need to be in each of the identified areas to do their current jobs. The levels of proficiency where obtained directly from AFDD 1-1 and include *Basic*, *Intermediate*, *Proficient*, *Skilled*, and *Advanced*. Participants were also given the option to select "*N/A*" if they felt they did not need any level of proficiency in that particular sub-competency to perform their current job. Each competency area was assessed by its sub-competencies on a scale from Basic to Advanced, with an "N/A" option included. A sample of the results for IQ3 showing two competency and sub-competency areas and the identified proficiency levels can be found in Table 19 below. A complete table of the results is located in Appendix F.

Table 19: Required Proficiency Levels Example

Competency	Sub-Competencies	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Formulates maintenance plans and policies to meet unit tasking	Formulating maintenance plans and policies to meet unit taskings	6	20	74	176	179	19
	Assessing unit maintenance capabilities in support of combat related operational plans	5	13	53	152	222	29
	Providing inputs for capability assessments for each plan	7	16	68	174	187	22
	Defining aircraft maintenance procedures and requirements in response to emergency or contingency situations	9	13	82	154	195	21
Coordinates key core logistics requirements supporting aircraft maintenance operations	Establishing support requirements for supply requisition, repair cycle, delivery, combat support, ground & aerial port transportation	17	44	118	170	103	22
	Establishing base support plans	33	47	125	145	94	30
	Establishing munitions requirements	23	48	105	162	80	56

Notes: n=474 for completed surveys

The results of IQ3 indicate a wide range of proficiency levels required by 21As in their various duty areas. Overall, however, it seems most aircraft maintenance officers require at least a Proficient to Advanced proficiency level in most competency and sub-competency areas regardless of rank or assigned duty. Review of required proficiency levels by rank category (i.e., CGO, FGO, Colonel) did not yield any significant findings with the majority of respondents self reporting Proficient to Advanced proficiency level required in all categories. Proficiency levels were also reviewed by the level of respondent duties (i.e., tactical, operational, strategic, or unsure) and with the exception of Directs and Manages Wholesale Logistics Life Cycle Sustainment Support self reported proficiency levels remained clustered in the Proficient to Advanced range. For the Directs and Manages Wholesale Logistics competency and sub-competency areas those who indicated tactical level duties reported only a Basic to Proficient proficiency level required as well as a significant portion or indicated "N/A". Those who indicated an operational level of duty performance were flat across the proficiency levels with no one area standing apart from another. For respondents who reported strategic level duties proficiency levels returned to indicating a range from Proficient to Advanced was required.

IQ 4: What are the current Air Force logistics centric course offerings?

IQ4 looked to determine the available logistics courses available to aircraft maintenance officers. By reviewing logistics related education and training guidance, analysis of available training websites (i.e., DAU and AFIT), and in coordination with the research sponsor a concise list of logistics related courses was developed. These courses were used to construct survey questions dealing with logistics courses respondents had taken and would like to take. Appendix G contains the entire list of 116 courses available to 21As specific to logistics and aircraft

maintenance. Of the 116 courses, 25 were AFIT School of Systems and Logistics Courses, 72 were DAU courses, and 19 were logistics courses managed by various Air Force organizations.

IQ 5: What courses have allowed 21As to perform their current jobs better?

The logistics courses identified in IQ4 were used to determine which courses have allowed 21As to perform their current jobs better. Specifically, 21As were asked to indicate which of the 116 courses that they have taken have allowed them to perform their primary duties better. Table 20 shows a sample of the Air Force logistics course results while the complete table of results for IQ5 is located in Appendix H.

Table 20: Air Force Logistics Courses

AF Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
AAMOC	3	1	5	5	1	2	17
AFCOMAC		1	9	8	8	7	33
AFCOMAC Sr Crs			1	12	29	21	63
AMC Mx Off. Crs	3	8	38	24	30	4	107
AMIC		4	47	77	80	35	243
AMMOS			41	34	18	1	94
AMOC	33	46	132	100	85	34	430
CSC			22	7	1		30
CWPC		1	5	6	8	3	23
JEMIC	7	14	82	67	45	20	235
MCOC				3	2	2	7
MGRC	2	11	50	20	8	7	98
MINA					1	2	3
MOIC			68	83	40	9	200
NATO				2	1	3	6
NWOC				1	7	9	17
SLMG				3	5	19	27
SFC						2	2
TNOC							0

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col; "Other" courses are listed separately

The results provide a count of the number of 21As in each rank that found a particular course of value for their current job. Appendix H also contains a listing of "Other" courses 21As

provided which they found to have utility in their current job. Overall, the results suggest that aircraft maintenance officers find utility in only a few DAU courses (i.e., ACQ 101/202/203, CLL 001/011, LOG 101/102/103/200/201/235, and SYS 101) while the majority of courses offered were only marked as having utility less than 10 times each, many not being indicated has having utility at all. Analysis of the AFIT course offerings showed LOG 099, 199, 262, 299, and 399 as having high utility for aircraft maintenance officers. Finally, a review of the various Air Force managed programs showed aircraft maintenance officers found high utility in the AMC Maintenance Officers Course, AMIC, AMMOS, AMOC, JEMIC, MGRC, and MOIC. Additionally FGOs and Colonels indicated they found the AFCOMAC Senior Course as having high utility.

IQ 6: Which courses do 21As feel would allow them to perform their current jobs better?

IQ6 sought to determine the logistics courses aircraft maintenance officers have not taken yet feel would benefit them in their current job. Survey respondents were asked which of the 116 logistics courses that they had not taken did they feel would allow them to perform their current duties better. A sample of the potential courses with high utility is presented below in Table 21. The complete list of identified courses can be found in Appendix I. The results suggest that 21As feel many of the courses offered through the AFIT School of Systems and Logistics, DAU, and the various Air Force logistics courses may have potential utility.

Table 21: AFIT Logistics Courses with Potential Utility

AFIT Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
LOG 299	15	20	51	44	28	13	171
LOG 399	7	22	41	47	37	17	171
LOG 262	11	15	40	22	16	10	114
LOG 040	11	17	28	18	19	9	102
LOG 132	13	18	24	25	17	4	101
LOG 199	13	24	23	18	11	8	97
LOG 099	17	17	19	15	15	4	87
LOG 499	1	4	9	13	35	20	82
LOG 209	6	7	19	22	15	3	72
LOG 238	3	7	20	15	11	7	63

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col

To better demonstrate the courses aircraft maintenance officers found actual utility in and those they perceive to have potential utility stacked bar charts of the logistics courses are presented below. Figure 12, Figure 13, and Figure 14 illustrate the combined aggregated results of IQ5 and IQ6. Figure 12 displays aggregate counts of DAU courses, Figure 13 displays aggregate counts of AFIT School of Systems and Logistics courses, and Figure 14 displays aggregate counts of Air Force logistics courses.

The findings were interpreted such that courses below a combined count of 100 have low actual or potential utility. After consulting with the sponsor a threshold of 100 was selected as it represents slightly over 20% of the total 474 survey respondents. This means courses with less than a combined count of 100 were found to have low actual or potential utility by over 80% of the survey respondents. Several logistics courses have combined counts less than 100 and can be considered by the research sponsor as prime candidates for elimination from the portfolio of courses that are instructed or recommended for aircraft maintenance officers to take.

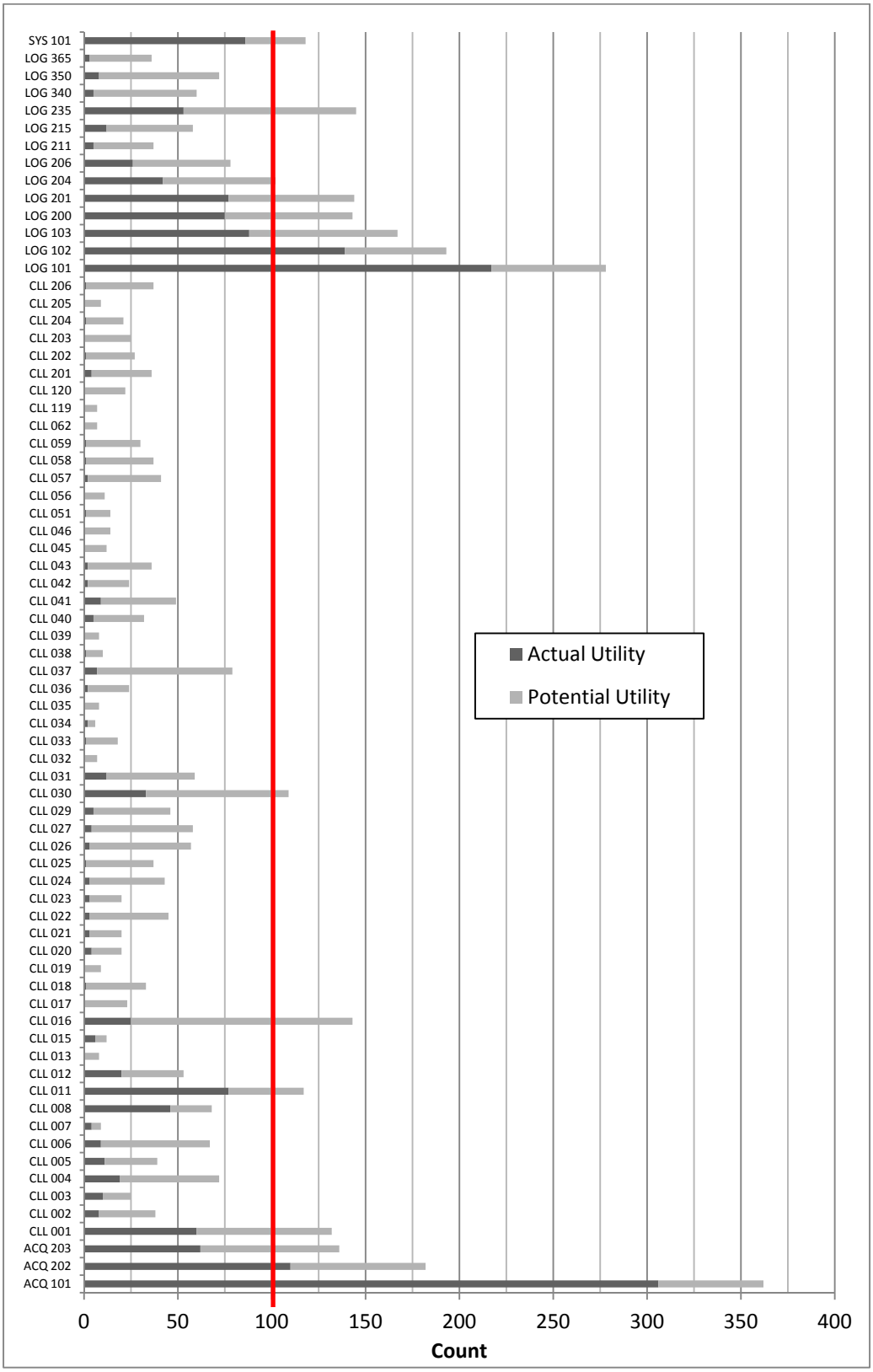


Figure 12: Aggregate Counts of DAU Courses

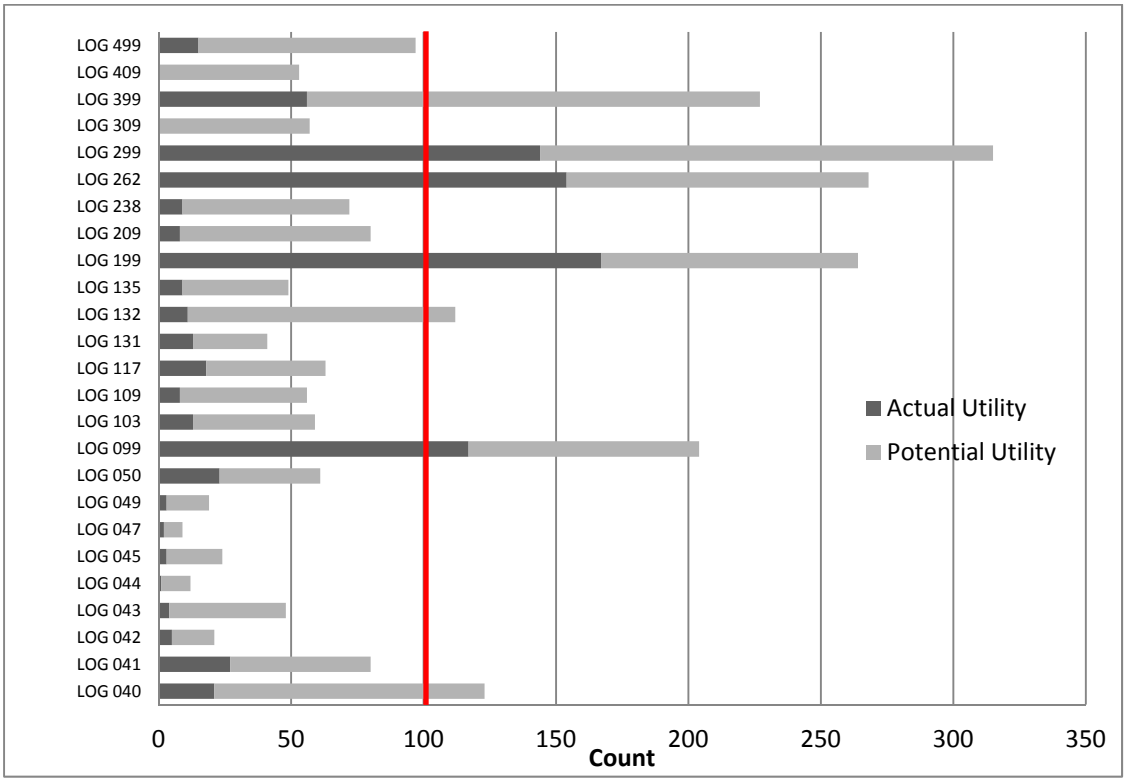


Figure 13: Aggregate Counts of AFIT Courses

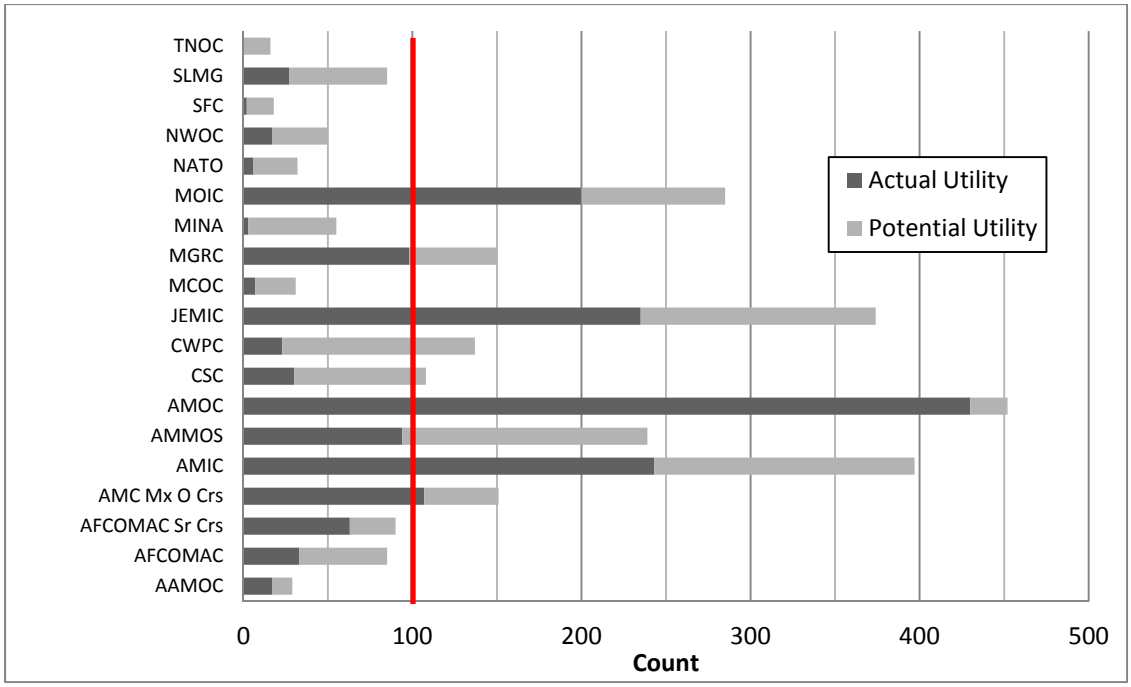


Figure 14: Aggregate Counts of Air Force Courses

IQ 7: How do 21As classify their duties (tactical, operational, strategic)?

Aircraft maintenance officer billets can be classified as tactical, operational, or strategic; as such, IQ7 asked 21As to classify their current jobs accordingly. Additionally, an option to select "Not Sure" was available to survey respondents if they did not know how to classify their current duty assignment. The results of IQ7 are displayed below in Table 22. Overall, the majority of 21As classified their current duty assignment as operational. Interestingly, less than one-third of Majors, Lieutenant Colonels, and Colonels classified their current duty as strategically focused. The percentage of 21As unsure about how to classify their current duty assignment was 5%. Figure 15 presents a visual depiction of the aggregate results for IQ7.

Table 22: 21A Duty Taxonomy

	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
Tactical	40%	37%	36%	32%	14%	12%	**29%**
Operational	33%	43%	48%	42%	54%	50%	**46%**
Strategic	8%	6%	13%	24%	30%	33%	**20%**
Not Sure	20%	14%	3%	2%	2%	5%	**5%**
Total:	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col

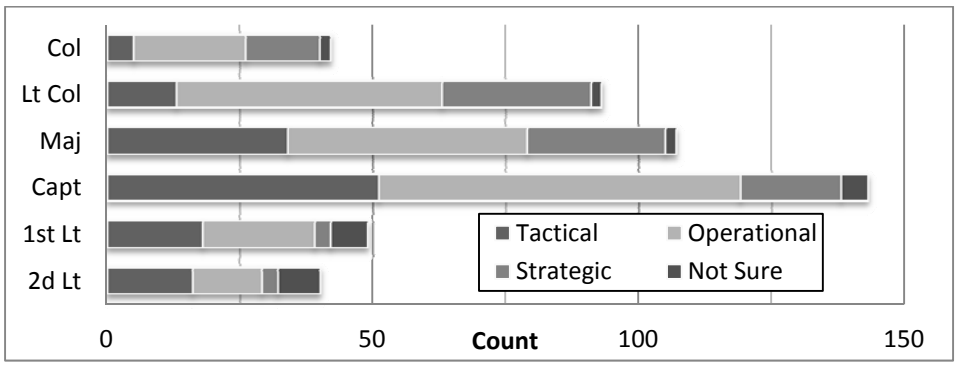


Figure 15: Aggregate 21A Duty Taxonomy

Respondent Comment Analysis

Survey respondents were also asked to provide additional comments pertaining to 21A education, training, and the DCoL. Providing comments were optional for respondents and of the 574 total surveys (including complete and incomplete responses) 158 comments were provided. Comments were reviewed for keywords pertaining to education and training to determine general trends in respondent's answers. Nine words were selected for their relevance to education, training, and leadership as shown in Figure 16 below. For the full list of 158 comments see Appendix J.

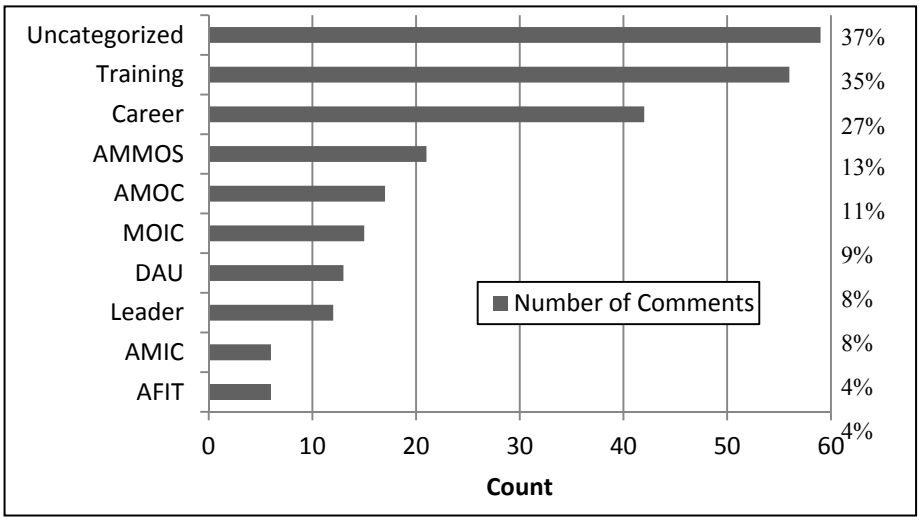


Figure 16: Number of Comments by Keyword

Summary

This chapter presented the analysis and results of the seven investigative questions posed in Chapter 1. Survey demographics were presented with an explanation of pertinent respondent information. IQ1 investigated the relationship between aircraft maintenance officer human capital, learning culture, and knowledge management as antecedents to organizational

performance. An EFA was conducted along with reliability checks of the scales and factor loadings used in the survey to measure each of the latent constructs and ultimately confirmed the survey constructs. The assumptions of multiple linear regression were confirmed for each independent and the dependent variables. The results of the regression indicated the three independent variables all positively related to the dependent variable, supporting the hypotheses developed in Chapter 1. Aircraft maintenance officer human capital, learning organization (culture), and knowledge management all had a statistically significant positive relationship to organizational performance.

The findings for IQ2 through IQ7 offer insight into the competencies aircraft maintenance officers require some degree of proficiency in, how proficient 21As think they need to be in each competency and sub-competency area to perform their current duties, what logistics course are available for 21As, what courses have provided utility to 21As, what courses are perceived to have potential utility, and finally how 21As classify their duties in terms of tactical, operational, or strategic. Aircraft maintenance officers were found to require proficiency in seven competency areas relevant to their career field with specific sub-competencies required for each major area. Overall, aircraft maintenance officers perceive they require at least a Proficient to Advanced proficiency level in most competency and sub-competency areas regardless of rank or assigned duty. A total of 116 logistics courses were found applicable to aircraft maintenance officers and the logistics career field as a whole. Of these courses, aircraft maintenance officers found greater utility in the various Air Force managed training and educational programs finding a combined 47% of these courses having actual or perceived utility. Only seven, or 28%, of the AFIT School of Systems and Logistics courses were found to have actual or perceived utility to 21As. The Defense Acquisition University, with its wide range of course offerings only

provided actual or potential utility in 21% of the total course offerings found to be applicable to the career field. Thus, some logistics courses were considered to provide less utility to aircraft maintenance officers and could be considered as candidates for elimination from the portfolio of courses recommended to the 21A career field. Finally, 46% of the aircraft maintenance officers surveyed classified their current job as operationally focused, 29% as tactically focused, 20% as strategically focused, and 5% were unable or unsure of how to classify their current job.

Additionally, the aircraft maintenance officers who responded to the survey were given the opportunity to provide open-ended comments concerning the state of the 21A career field's education and training. A total of 158 comments were provided and while responses varied common themes regarding specific courses and suggestions for career and training changes made up the majority of responses.

V. Conclusion and Recommendations

Conclusions

The results of this study offer both theoretical and practical insight into the aircraft maintenance officer Deliberate Continuum of Learning for the research sponsor. Four latent constructs were measured through a web-based cross-sectional survey. The findings support a positive relationship between 21A human capital, learning organization (culture), knowledge management and organizational performance. Exploratory factor analysis and multiple linear regression corroborated the proposed theoretical model and supported the three hypotheses presented in this study. Additional data with practical significance to the research sponsor was collected through survey methodology aimed at answering six interrelated investigative questions pertaining to 21A force development.

The results suggest that through a resource-based approach to 21A force development management of human capital, learning culture, and knowledge management practices can potentially yield higher returns to organizational performance. The link between these theoretical constructs and positive returns on organizational performance is not new, as demonstrated in Chapter 2. As first developed by Cherry (2014), this study further validates the positive relationship between human capital, knowledge management, learning culture, and organizational performance in the military setting.

Thus, 21A human capital has been shown as a strategic resource and source of competitive advantage provided that it is valuable, rare, inimitable, and supported by the organization (Barney, 1991; Ployhart and Moliterno, 2011; Cherry, 2014). To achieve these characteristics research and the findings of this study suggest sound knowledge management practices and the fostering of a strong learning culture can be influential forces in increasing

organizational performance. For 21As to become a source of competitive advantage, knowledge must be directed towards organization-enhancing activities. The application of the collective knowledge base of the 21A community will create value for the entire logistics enterprise as well as increase competitive advantage. Such knowledge application will either be enabled by a culture that values learning or stymied by a culture that does not value learning (Gold, et al., 2001). The synergistic interdependency between knowledge management and learning culture means that efforts aimed at improving one without the other will sub-optimize any potential competitive advantage (Cherry, 2014). As such, effective supply chain management has become a valuable way of securing competitive advantage and improving the performance of the Air Force (Li et al., 2006).

Of particular importance to the Air Force and specifically the research sponsor is the potential of optimizing organizational performance specific to the 21A career field. In concert with the research findings developed by Cherry (2014), two-thirds of the Air Force logistics officer community's human capital, learning culture, knowledge management, and organizational performance characteristics have been explored. While the findings of this research and those of Cherry (2014) are similar there are distinct differences between the two logistics career fields indicating different approaches should be used when managing the career fields. Specifically, aircraft maintenance officers view themselves as more specialized in their jobs than LROs, who indicated a more generalized job performance (Cherry, 2014). This is evident when reviewing specific education and training guidance for each career field, with the 21As focusing on generation of aircraft competencies while LROs have a range of dissimilar duty competency areas. Furthermore, aircraft maintenance officers indicated requiring higher proficiency for their

identified competency and sub-competency areas than did LROs for their competency and sub-competency areas (Cherry, 2014).

Force development initiatives such as the DCoL can be seen as an investment in aircraft maintenance officer human capital. As a "purposeful education and training roadmap that supports career path progression" (Department of the Air Force, 2013) The DCoL and the 21A CFETP serve to outline the competencies required and suggest logistic courses for the aircraft maintenance officer career field. This research explored the 7 aircraft maintenance officer competencies consisting of 48 sub-competencies as well as the 116 relevant logistics course offerings currently providing education and training to 21As. The results of this study show aircraft maintenance officers require skilled to advanced proficiency in most of their sub-competency areas, as well as gathered information about the actual utility and potential utility of the 116 logistics courses. Additionally, this research examined how 21As classify their current duties under the prescribed taxonomy of tactical, operational, or strategic. This information allowed for more precise interpretation for the aircraft maintenance officer DCoL structure and possible improvement areas in developing stronger human capital, knowledge management, and a learning culture within the career field. Evidence suggests that actions directed toward achieving these objectives can enhance 21A organizational performance across the Air Force.

The results of the competency proficiency analysis show aircraft maintenance officers require a great deal of specialized training within their career field. This information used in conjunction with the results of the logistics course analysis highlight several courses 21As deem to provide specific utility to their duty responsibility and those which do not. Courses of low actual or potential utility are prime candidates for removal from the 21A CFETP, DCOL, and force development structure as a whole. Providing a more deliberate and concise education and

training will also provide aircraft maintenance officers more time to hone the specialized skills required to perform their duties. As shown in this research the current portfolio of logistics courses recommend to 21As may be excessive. There were, however, some courses that received high ratings and every effort should be made to ensure accessibility of these high utility courses to the entire career field. Courses such as Advanced Maintenance and Munitions Officer Course, Maintenance Officer Intermediate Course, Mission Generation Road Course, and the suite of logistics (LOG) course offerings from Defense Acquisition University (DAU) and AFIT School of Systems and Logistics should be made available to officers at the earliest possible point in their careers. Results collected from this research provide recommendations and suggestions on how to shape the aircraft maintenance officer DCoL.

Recommendations

The recommendations to follow were generated from the results of the seven investigative questions posed in this research. Overall, attention should be paid to the positive relationship found between human capital, learning culture, and knowledge management to organizational performance. Deliberate force development practices should be directed towards strengthening the 21A human capital through the smart application of resourced-based theory.

Given current fiscal constraints, the continued excessive expenditure of underutilized logistics courses is no longer justified. Courses which were indicated as providing low actual or potential utility should be eliminated from the 21A DCoL recommended courses. Specifically, aircraft maintenance officers found little actual or potential utility in many of the DAU logistics course offerings and a number of the AFIT School of Systems and Logistics courses. There are potential cost savings through the evaluation of course content and the combining, rightsizing,

and elimination of none utility logistics courses. Courses which received combined counts of less than 100 are prime candidates for elimination. Conversely, courses identified has having high utility should be advertised to aircraft maintenance officers as critical for organizational success and every effort should be made to ensure maximum attendance of these courses at the right time in an officer's career. Logistics courses for aircraft maintenance officers should be geared towards providing specialized training in the identified competency areas and KSAs as found by Thompson (2013). The results of Investigative Question 3 can be used to tailor specific aircraft maintenance officer courses to meet their proficiency needs. Many 21As indicated greater need of intermediate and advanced specialized training and that they needed the training earlier in their careers. These recommendations align with sound knowledge management practices and smart human capital investment.

Limitations

While every effort was made to insure this research was reliable and valid there are several limitations which must be discussed. While a web-based survey presented several advantages to the researcher, it introduces sources of bias. Possible biases include common method bias, non-response bias, and coverage error. Common method bias arises from having a common rater, common measurement context, common item context, or from the characteristic of the items themselves (Podsakoff et al., 2003). Non-response bias occurs when respondents do not answer every question in a survey or when potential respondents do not provide any data at all (Fowler, Jr., 2009). Coverage error occurs from every unit in a survey population not having a known chance of being included in the sample (Dillman, 2007). Although every attempt was made to mitigate the effects of these biases in this research it is likely some biases existed.

However, to ensure the reliability and validity of this research appropriate statistical tests were conducted and provided sufficient evidence that the results of this survey were not significantly affected by any bias.

Additionally, the cross-sectional nature of this study prevented further exploration into the latent constructs over time and the information gathered herein may be less generalizable as time passes. Furthermore, the conclusions drawn from this study are specific to the aircraft maintenance officer career field and are non-transferable to other Air Force career fields. Even in comparison to another similar logistics career field noticeable difference were found in this research and the research performed by Cherry (2014) on Logistics Readiness Officers. In addition, while the survey was designed to take a minimum amount of time to complete reducing respondent fatigue a more robust survey could have collected additional data. Increasing the number of latent variables may have explained more of the variance in organizational performance and provide stronger insights into the theoretical constructs developed in this research.

Finally, while the concept of competitive advantage is clear in a for-profit environment in the context of the Air Force what constitutes a competitive advantage is ambiguous. Having a clear definition of what constitutes a competitive advantage for the Air Force would allow a clearer understanding of the various activities and initiatives which would foster such a competitive advantage.

Future Research Opportunities

As an extension of the research conducted by Cherry (2014) on the LRO career field this research explored aircraft maintenance officer force development. Future research may include

exploration of the munitions officer career field (21M) and possibly other logistics career fields in the sister services. Additionally, this research would have benefited from logistics course curriculum and cost information to allow for a more concise examination of logistics course utility and allow for more robust recommendations and potential cost savings for logistics course consolidation and elimination.

Summary

This research makes a significant contribution in linking the concepts of human capital, learning culture, and knowledge management as antecedents to organizational performance. Exploratory factor analysis and multiple linear regression showed a positive relationship between these constructs and accounted for roughly 35% of the variance in organizational performance. Similarly, extensions were made to the resource-based theory of the firm by substantiating human capital investments create opportunities for increased organizational performance. Investments in human capital, knowledge management practices, and the development of a learning culture support previous research citing a link to organizational performance (e.g., Hsu, 2008; Ellinger et al., 2002; Cherry, 2014). The implications of this research go beyond satisfying the research sponsor's goals. Similar to the success of Cherry (2014), this research extends the human capital, learning organization, and knowledge management literature further proving its potential in the military context. This research serves as a gateway into the exploration of human capital, knowledge management, and learning culture as antecedents to organizational performance in a wide variety of military specific career fields.

Appendix A: 21A Parent and Child KSAs according to Thompson (2013)

The below enumerated Parent KSAs were derived from research conducted by Captain David Thompson (AFIT 2013)

1. Acquisitions
    a. Acquisition Milestones
    b. Acquisition Process
    c. Acquisition/Procurement
    d. Acquisitions
    e. DOTMILPDF
    f. Experience in one or more areas of the life cycle (test, ops, sustainment, acquisition)
    g. Introduction of a new Item (requirement IA)
    h. Make ACQ 101 mandatory
    i. Procurement
2. Adaptability
    a. Adapt to change
    b. adapt to change/flexibility
    c. Adaptability
    d. Adaptive Planning
    e. Flexible
3. Aerospace Planning
    a. AEF Concept
    b. AEF Next
    c. AEF Process/program
    d. Agile Combat Support
    e. CAF
    f. CRAF
    g. Expertise MAF logistics
    h. MAF deployments (Strat, Tact, Tanker)
4. Air Cargo Procedures
    a. Air Drop
    b. Aircraft Loading
    c. Country Clearance
    d. Engine Running Offload's Planning
    e. Load Planning
    f. Air Trans
    g. Air Infrastructure
    h. Airlift
    i. Airlift Knowledge
5. Aircraft Generation
    a. 2408s/2409s
    b. Aircraft Generation
    c. Generation Effort (Combat)
    d. Generation Flow Plan
    e. Generation Timing
    f. Phase I
    g. Phase II
6. Analysis
    a. Aircraft Availability
    b. Analysis
    c. Analysis Tools
    d. Analytical statistics
    e. Analyze Fleet
    f. CANN Rate
    g. Charts
    h. Condition Analysis
    i. Data Analysis
    j. Data Gathering
    k. Deviations
    l. Fix Rates
    m. Fleet Health
    n. Fleet Health Indicators
    o. Fleet Health Management
    p. Fleet Maintenance Data
    q. Health of Fleet
    r. Leading Indicators; break rate, repeat recurs
    s. Maintenance Analysis
    t. Maintenance Analysis products; How to utilize for fleet health
    u. Maintenance Capabilities
    v. Metrics
    w. Modeling
    x. Models
    y. Operations Research
    z. Quantifying
    aa. Quantitative Measurements
    bb. Quantitative Methods

cc. Reliability/maintainability
dd. Reports
ee. Statistics
ff. Throughput Capacity
gg. TNMC – MX

7. Asset Management
   a. Asset Knowledge
   b. Asset Management
   c. Asset Visibility
   d. Bench Stock
   e. Ensure good visibility of parts
   f. Fill Rates
   g. Inventory
   h. Inventory Management
   i. Inventory of assets (aircraft, ships, tanks, etc)
   j. Kit Fill Rate
   k. Material Management
   l. mission support kits
   m. Not abusing supply system
   n. Parts
   o. Parts Availability
   p. Parts Management
   q. Property Books
   r. Supply Accounts
   s. Supply Priorities
   t. Total Asset Availability
   u. Warehouse/inventory management

8. Base Support and Expeditionary Site Planning
   a. Base Support Plan/ESP
   b. Basing
   c. bed down planning
   d. BSP Training
   e. IGESP
   f. In-Garrison Expeditionary Site Plan

9. Business Acumen
   a. Ability to work with people
   b. analytical reasoning
   c. business and government
   d. Business Ethics
   e. business ethics
   f. Business Government
   g. business law
   h. business mgmt
   i. business strategy
   j. Business/management/ communications skills
   k. Critical Thinking
   l. decision making
   m. decision making ability
   n. economics
   o. form teams
   p. General Administration
   q. General Business admin
   r. innovation
   s. international business
   t. managerial control
   u. Marketing Management
   v. micro economics
   w. most efficient way to manage
   x. negotiating skills
   y. negotiation
   z. negotiations
   aa. Organization
   bb. organization skills
   cc. Outside the box thinker
   dd. Oversight
   ee. Persuasion
   ff. Plan
   gg. Prioritization
   hh. Problem solving
   ii. Program Management
   jj. Project Management
   kk. Resource Allocation
   ll. Review Business models of successful "profitable" business
   mm. Risk Management
   nn. risk taking
   oo. Situational Awareness
   pp. Strategic Focus
   qq. thinking outside the box
   rr. time management
   ss. time management/delegation

10. Cargo Deployment Function
   a. Cargo Deployment Function Processes
   b. Personnel Deployment Function/Cargo Deployment Function

11. Cargo Movement
    a. Cargo
    b. cargo handling procedures
    c. cargo movement
    d. commercial cargo processes
    e. Configuration (ie "Spoke", "Straight Line")
    f. Familiar with available transport network
    g. Ground infrastructure
    h. Ground/Air Transportation
    i. inbound freight
    j. land sea
    k. material handling
    l. material management
    m. Materials Handling
    n. Movement
    o. Movement of Hazardous classes
    p. Multi-modal
    q. Multi-modal means
    r. Multimodal Trans
    s. Other Trans Modes
    t. outbound freight
    u. processing cargo
    v. traffic management
    w. Traffic Management Office
    x. Transportation and Traffic Management
    y. Transportation
    z. Transportation & International Logistics
    aa. transportation and logistics
    bb. transportation engineering
    cc. transportation logistics
    dd. Transportation modes--other than air
    ee. Transportation Network (Civilian and Military)
    ff. Transportation Resources
    gg. Understand transportation
12. Classes of Supply
    a. Army supply categories
    b. Class of Supply
    c. Classes (I, II, III etc)
    d. Classes of Supply
    e. supply classes
13. Communication
    a. be able to explain things across each service (lingo)
    b. Briefing skills
    c. bullet writing
    d. business/mgmt/comm skills
    e. Communicating with Ops planners/Schedulers
    f. communication
    g. communication skills
    h. Documentation
    i. EXORDs, etc
    j. Foreign Language
    k. interagency communication
    l. interfacing
    m. Interpersonal Communication
    n. interpersonal relations
    o. interpersonal skills
    p. Logistics lines of communication
    q. oral communication
    r. PowerPoint skills
    s. Professional Writing
    t. Public Speaking
    u. publish priorities to field
    v. social skills
    w. Speech Communication
    x. Terminology
    y. Written Communication
14. Contracting
    a. Basic contracting
    b. Contract Logistics Support
    c. Contract regulations
    d. Contract Requirements/Limitations
    e. Contract Timing
    f. contracting
    g. contracting knowledge
    h. contracting skills
    i. Contracting/Acquisition
    j. Contracts
    k. Engineering contracts
    l. Establish Contracts
    m. Host Nation Support
    n. Procurement
    o. procuring vehicles
    p. purchasing

15. Customer Service
    a. Customer Service
    b. Customer Relations
16. Deployable Skills
    a. ADCON/OPCON at deployed Location
    b. ADVON
    c. CAF unit Deployment
    d. Combat Skills appropriate for deployment (such as convoys)
    e. deployed joint logistics
    f. jointness
    g. Understanding Joint Operations
    h. Warfighting
17. Deployment Operations - Site Surveys
    a. Bare Base Requirements
    b. BEAR
    c. Site Planning
    d. Site Survey
18. Disposition
    a. Backorders
    b. delinquent document & rejects
    c. Demil
    d. disposal
    e. Disposition
    f. Equipment Retirement
    g. Obsolescence
    h. retrograde
    i. return goods (PQDR)
    j. return goods handling
    k. salvage
    l. salvage disposal
    m. salvage/scrap mgmt
19. Enterprise Logistics
    a. ability to interact w/outside agencies like DLA/AFPA
    b. Demand Management
    c. DLA
    d. DLA disposition
    e. DLA distributer orientation
    f. DLA processes
    g. DOT
    h. enterprise view
    i. GLSC
    j. GLSC/DLA/Organic Integration
    k. item manager
    l. JSTC capabilities
    m. retail logistics
    n. Source of Supply/ALC
    o. Surface Deployment and Distribution Command
    p. TRANSCOM
    q. TRANSCOM process
    r. understanding how other agencies do logistics (like dept of state)
    s. wholesale logistics
    t. Wholesale vs Retail
20. Equipment Management
    a. Allocating resources and eqt appropriately
    b. allowance sources
    c. Equip Prep
    d. Equipment
    e. equipment accountability
    f. Equipment Availability
    g. equipment mgmt
    h. Test equipment
21. Flightline Operations
    a. Aircraft Service
    b. EOR/pits
    c. Fleet Service
    d. Flightline Ops
    e. flightline procedures
    f. Launch
    g. Launch/Recovery
    h. Ops production
    i. Parking planning
    j. Pre/Post Flight
    k. Recovery
    l. Servicing
    m. Thru Flight
    n. Weapons Loading
22. Flying Hour Program
    a. Combat Aircrew Program
    b. Flying Hour Program
    c. Flying Schedule Management
    d. minimizing 2407s, de-conflict with training days, check turn rates
    e. Operations training requirements
    f. Ops Requirements
    g. Ops Scheduling
    h. Pilot Production Requirements

i. Programmed Flying Training
j. Ready Aircrew Program

23. Forecasting
    a. demand forecasting
    b. Forecast
    c. Forecasting
    d. Forecasting Availability

24. Fuels Management
    a. Fuels
    b. fuels knowledge
    c. POL
    d. Spill Response (Fuels)

25. Funding
    a. $ Management
    b. accounting
    c. budget
    d. Budget Codes
    e. Budget Management
    f. CAM
    g. Colors of Money
    h. Cost Effectiveness
    i. fight for money
    j. finance
    k. Money
    l. Org funding
    m. POM
    n. POM/PEM
    o. Pots of Money
    p. POTUS budget
    q. PPBE
    r. Program Objective Memorandum
    s. programming/POM
    t. Resource Management
    u. TWCF
    v. WCF/APN
    w. WCF/Depot Mx Funding

26. Governing Documents
    a. AF doctrine
    b. AFI 20-117 (Draft)
    c. AFI 21-101
    d. AFI 21-165
    e. AFI 23-101
    f. AFI 23-110
    g. AFI 63-101
    h. army doctrine
    i. doctrine
    j. Defense Travel Regulation
    k. Joint Federal Travel Regulation
    l. Joint doctrine
    m. Log regulations
    n. log related regs
    o. log related regs
    p. log related regs
    q. log related regs
    r. log related regulations
    s. logistics regs
    t. Maintenance Standardization & Evaluation Program
    u. National Strategy
    v. official travel regs
    w. regulation knowledge
    x. regulations
    y. regulations/IDO knowledge
    z. regulations/IDO knowledge
    aa. regulations/IDO knowledge
    bb. ROEs
    cc. TCTO/TC
    dd. TCTOs
    ee. title 10 law
    ff. TO 00-20-1
    gg. trans requirements and laws

27. Household Goods
    a. Household Goods

28. Industrial Engineering
    a. facilities
    b. facilities location
    c. Facility Management
    d. Hardened Aircraft Shelter Operations
    e. Industrial Engineering
    f. industrial plans
    g. insurance/real estate
    h. Proper placement of Machines

29. Information Management
    a. AFEMS/SBSS
    b. Air Force Equipment Mgt System
    c. Automated Data Systems
    d. basic deployment sys knowledge
    e. Classified Management
    f. Cargo Movement Operations System
    g. computer jock

h. computer science
i. computer skills
j. D200 computations
k. DCAPES
l. DCAPES Course
m. DEERS/SORTS
n. Deployment Systems
o. ECSS
p. Electronic Commerce
q. GATES
r. GATES, SMS, CMOS, GTN,
s. GDSS
t. Global Force Management
u. GO81 Knowledge
v. IMDS
w. integrated deployment sys
x. information management
y. Information Systems
z. information systems mgmt
aa. IT
bb. IT Systems
cc. ITV
dd. JDPAC
ee. Joint Operations Planning and Execution System
ff. Joint Planning System
gg. joint systems
hh. JOPES (basic knowledge)
ii. JOPES, DCAPES, LOGMOD,
jj. JOPES/DECAPES
kk. Log systems
ll. logdet, logfor etc
mm. Logistics information mgt
nn. LOGMOD
oo. LOGMOD Course
pp. LOGMOD skills
qq. Mng Multiple Sources Info
rr. Mx info Systems
ss. network dynamics
tt. overall IT skills
uu. PPT skills
vv. SBSS
ww. Supply systems
xx. Systems (D200)
yy. systems knowledge
zz. transportation systems
aaa. Virtual Fleet

30. Installation Deployment Planning
    a. building DSOEs
    b. DCC mgmt
    c. Deployment Planning
    d. Deployment Process
    e. IDO Course
    f. IDO Skills
    g. In-Processing
    h. Installation Deployment Plan
    i. Installation Deployment Planning
    j. installation functional knowledge
    k. Mobility Deployment
    l. Out Processing
    m. Phase I
    n. Phase II
    o. Plan
    p. planner (CWPC)
    q. planning
    r. pre-deployment tasks
    s. Reconstitution
    t. redeployment
    u. Redeployment Processes
    v. Regeneration
    w. TDY Planning
31. International Logistics
    a. international affairs
    b. international customs
    c. International Logistics
    d. international regs
    e. International Transport Requirements
32. Leadership
    a. approachable
    b. assertiveness
    c. confidence
    d. decision making
    e. delegation
    f. discipline
    g. easy going
    h. leadership
    i. Leadership by example
    j. Leadership skills
    k. Leading SNCOs
    l. mentor
    m. Motivate Others

n. people skills
o. personal creativity
p. Personal Integrity
q. supervise others
r. time management/delegation
s. train/mentor
t. training abilities

33. MICAPs
    a. MICAPS
    b. MICAP response time
34. Mobility Operations
    a. DDOCs
    b. Maritime Prepositioned Force
    c. theater distribution
35. Munitions Management
    a. Global Ammunition Control Point
    b. Munitions
    c. Munitions Processing
36. Packaging/Crating/Palletizing
    a. packaging
    b. Packaging/Crating
    c. Packaging/DOT
37. Personnel Management
    a. battle rosters
    b. Civilian Relations
    c. Civilian Workforce
    d. Human Relations Management
    e. Human Resources
    f. labor relations
    g. maintenance, learning from their level
    h. manning and equipment
    i. Manpower
    j. Manpower scheduling
    k. Personnel Management
    l. title 10 law
    m. Title 32 limitations
38. Personnel Movement
    a. Passenger Management
    b. PDF Processes
    c. PDF/CDF
    d. Personnel Movement
    e. Personnel Prep
    f. personnel processes
    g. processing passengers
39. Plans Management
    a. All aspects Planning
    b. CAP-Crisis Action Planning
    c. COMDES
    d. contingency planning
    e. CQCP Course
    f. CR Class CR-MOC
    g. crisis management planning
    h. CWPC (Planning)
    i. Deliberate Plans
    j. deliberate/CAP/Planning
    k. deployment planning
    l. desperate/crisis action planning
    m. Employment of Force
    n. Forecasting (sending best aircraft based on depot/phase/ISO
    o. Functional Demands
    p. future threats/ops
    q. global/reg planning
    r. Joint Planning Skills
    s. Material Requirements Planning
    t. MEP
    u. National Strat Plan
    v. Plan creation
    w. Plans
    x. Oplan interpretation
    y. OPLANS/OPORDS
    z. plan/organize
    aa. plan/oversight
    bb. planning
    cc. planning 101
    dd. Plans
    ee. Regional Planning
    ff. Requirements vs. Capability
    gg. sustainment planning
    hh. trans planning
40. Port Management
    a. Aerial Port
    b. APOC
    c. JTF - PO
    d. MAPOC
    e. Port Management
    f. Port Management (Surface/sea/air)
    g. Port Operations

41. Process Improvement
    a. 6 Sigma
    b. Acft Downtime Utilization
    c. afso 21
    d. constraint Management
    e. CPI Lean
    f. deputy processes
    g. Efficiency from head to tail
    h. First Article Test RCM for # of items
    i. lean
    j. Process (Acq 101, etc)
    k. Process Improvement
    l. process mgmt
    m. Product Improvement
    n. product quality
    o. Quality Assurance
    p. Some Systems Engineering
    q. streamlining processes
    r. Theory Of Constraints
42. Production Management
    a. Capability/Capacity
    b. Manufacturing
    c. Production
    d. Production Control
    e. Production mgmt
    f. Production Mx
    g. Resource Management
    h. Sortie Production
    i. Workload Allocation
43. Readiness
    a. ART
    b. ART/SORTS
    c. Deployment Readiness
    d. Doc Statement
    e. DRRs/Sorts/ARTs
    f. readiness
    g. readiness reporting like ART/SORTS/DRRS
    h. SORTs/ARTs/DRRs
    i. Squadron Readiness/Trng
    j. Task (Gen) DOC
    k. UDM Course
44. Repair Cycle
    a. Acft parts availability
    b. assistance requests (107, ETAR, REDI)
    c. Bad Actor Program
    d. CIRF
    e. Component Maintenance
    f. Component Repair
    g. Condition Analysis
    h. depot
    i. depot level repair
    j. Depot PDM
    k. depot processes
    l. depot repair network
    m. Depot Support
    n. DIFM
    o. DIFM Rate
    p. Engineering Technical Asst Request
    q. Experience in one or more areas of the life cycle (test, ops, sustainment, acquisition)
    r. Intermediate Repair Enhancement Program
    s. MSG-3 (Maintenance Steering Group-3)
    t. MXS levels of repair
    u. Not Repairable This Station
    v. Off Aircraft Repair
    w. On Aircraft Mx
    x. on/off aircraft repair process times
    y. Parts
    z. Parts & Service Support
    aa. Parts delivery
    bb. Parts Support
    cc. parts/service
    dd. parts/servicing
    ee. PDM Cycle
    ff. Phase Flow
    gg. Phase/ISO management
    hh. Repair capability assessment
    ii. Repair Chain
    jj. Repair Cycle
    kk. Repair Network
    ll. reparables
    mm. Requirement

nn. Scheduled/Unscheduled Mx
oo. sustainability
pp. Sustainment
qq. sustainment strategy
rr. Tail Number Bins
ss. timely delivery to flightline

45. Requirements
    a. Acft Structural Integrity Program
    b. Commonality
    c. Interoperability
    d. Modernization
    e. Modification
    f. Reliability Engineering
    g. Requirement Determination
    h. Requirements Definition
    i. Service Life Extension Programs
46. Research and Development
    a. Engineering
    b. Experience in one or more areas of the life cycle (test, ops, sustainment, acquisition)
    c. Research and Development
    d. Testing
47. Safety
    a. AFOSH Standards
    b. HazMat
    c. HAZMAT regs
    d. Industrial Safety
    e. ORM
    f. OSHA & AFOSH
    g. Personnel Protective Equipment
    h. safety
48. Scheduling
    a. Aircraft Configuration Management
    b. ATO Development
    c. Long-range planning
    d. Maintenance Scheduling
    e. Production Scheduling
    f. Scheduling
49. Service Culture/Org Capabilities
    a. Capabilities
    b. culture
    c. Executive Agency
    d. inter-service perspective
    e. joint service knowledge
    f. know rank structure and service customs
    g. knowing the seams
    h. log mgmt of other services
    i. Mission Statements
    j. non-AF logistics functions
    k. org structure of other services
    l. other service log ops
    m. personnel mgmt of other services
    n. rank and power
    o. ranks
    p. relationship building
    q. service knowledge
    r. Service specific
    s. services capability
    t. sister service knowledge
    u. Sister Service Processes
    v. Sister Service Systems
    w. Standardization
    x. Structure
    y. Uniforms
    z. unit organization terms
50. Shelf Life Program
    a. shelf life
51. Sister Service Interoperability
    a. ALOCs
    b. create joint efforts
    c. DDOCs
    d. Integration
    e. Integration skills
    f. interagency ops
    g. Interoperability (Assets)
    h. interoperability
    i. Logistics Operations Centers
52. Sourcing
    a. Diminishing Manufacturing Sources
    b. manage supplier relations
    c. Manager/supplier relations
    d. Order Management
    e. ordering
    f. Parts Provisioning
    g. parts sourcing
    h. requisitioning
    i. Tools Sourcing

53. Stock Control Processes
    a. Adjusted stock levels
    b. inventory balancing
    c. leveling
    d. readiness base level
    e. stock allocation/authorization
    f. Stock Control
    g. Stock Levels
    h. Stock management
    i. Stock positioning
54. Supply Chain Management
    a. Supply Chain Management
55. Support Agreements
    a. Host Nation Support
    b. support agreement training
56. Systems Engineering
    a. Systems Concept
    b. Systems Engineering
57. TPFDD Management
    a. Day-to-day tasking mgmt
    b. TPFDD
    c. TPFDD knowledge
    d. TPFDD Mgmt
    e. TPFDD Planning
    f. TPFDD, CWPC
    g. TPFDDL/DSOE flow
58. UTC Management
    a. ULN Requirements
    b. UMD (Task)
    c. UTC
    d. UTC capability
    e. UTC Mgmt
59. Vehicle Management
    a. Fleet mgmt
    b. Vehicle Maintenance
    c. Vehicle mgmt
    d. vehicle ops and management
    e. vehicle utilization
60. Warehouse Management
    a. Warehouse
    b. warehouse management
    c. warehouse/inventory mgmt
    d. warehousing
    e. warehousing inventory
    f. warehousing procedures
61. Weapons System Knowledge
    a. acft transition courses--need to be online
    b. aircraft familiarization
    c. Aircraft Systems
    d. Airworthiness
    e. C-17
    f. C-5
    g. Ops Reg (-1)
    h. Safe Operating Envelope
    i. Tanker
62. WRM Management
    a. Nuclear WRM
    b. WRM
    c. WRM program
    d. WRMO Training

Appendix B1: Sponsor Endorsement Letter

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

30 July 2014

MEMORANDUM FOR Air Force Institute of Technology (AFIT) Survey Control Panel
HQ AFPC/MAPP

FROM: AF/A4L

SUBJECT: AFIT Student Thesis Sponsorship: Aircraft Maintenance Officer Survey

Captain Andrew L. Cooper, an AFIT graduate student, is conducting his thesis research study to determine the most appropriate time in Aircraft Maintenance Officers' (21A) careers to provide them with the applicable education and training (e.g. AFIT and DAU in-residence and distance learning) to best prepare them for their assigned jobs. In addition, Captain Cooper will determine the Aircraft Maintenance Officer competencies that are required by 21As in their current jobs as well as their understanding of learning culture, human capital, knowledge management practices, and organizational performance in order to better align training and education with required job skills. As part of his thesis work, Captain Cooper will need to administer a web-based survey to collect data from active duty Air Force Aircraft Maintenance Officers in the grades of O-1 through O-6.

Determination of the most optimal time to educate and train Aircraft Maintenance Officers will assist current and future force development practices by aiding the effort to achieve a Deliberate Continuum of Learning (DCoL). The DCoL is designed to be a shift in how Aircraft Maintenance Officers are educated and trained in order to better align required skills with job requirements throughout their career.

If you have any questions, please contact Lt Col Joseph Huscroft – Phone 937-255-3636, ext. 4533; E-mail – joseph.huscroft@afit.edu.

KATHRYN J. JOHNSON, Brig Gen, USAF
Director of Logistics
DCS/Logistics, Installations & Mission Support

Appendix B2: AFIT Exemption Request Approval

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

19 Sep 2014

MEMORANDUM FOR JOSEPH HUSCROFT, Lt Col, USAF

FROM: John J. Elshaw, Ph.D.
AFIT IRB Research Reviewer
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Approval for exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for Research Proposal "An Investigation into Joint Base Implementation."

1. Your request was based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

2. Your study qualifies for this exemption because you are not collecting sensitive data, which could reasonably damage the subjects' financial standing, employability, or reputation. Further, the demographic data you are collecting and the way that you plan to report it cannot realistically be expected to map a given response to a specific subject.

3. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. Further, if a subject's future response reasonably places them at risk of criminal or civil liability or is damaging to their financial standing, employability, or reputation, you are required to file an adverse event report with this office immediately.

JOHN J. ELSHAW, PH.D.
AFIT Exempt Determination Official

Appendix B3: Survey Approval Letter

October 6, 2014

MEMORANDUM FOR AFIT/ENS
ATTENTION: LT COL JOSEPH SKIPPER

FROM: AFPC/DSYS
550 C Street West
Randolph AFB TX 78150-4451

SUBJECT: Survey Approval – Aircraft Maintenance Officer Career Development and Education Survey.

1. The survey is approved for use with the following population(s):

Population:	**Number(s):**
Air Force Active-Duty Officers	1,500
Air Force Active-Duty Enlisted	0
Air Force Civilians	0
Air Force Retirees and/or AF Family Members	0
Total Number to be Surveyed	1,500

The Survey Control Number **(SCN)** for this effort is AF14-208AFIT. This SCN is valid from 15 October 2014 through 15 December 2014.

Please ensure compliance with the following guidance, as applicable, while administering your survey.

a. Invitations to participate in the survey must include:

(1) Survey title (as shown in the subject line of this memo).

(2) AF Survey Control Number (SCN).

(3) Statement that completion of the survey is voluntary.

(4) Link to the list of Air Force approved surveys: https://www.my.af.mil/gcss-af/USAF/ep/browse.do?programId=t2D8EB9D6297405FA012980243147010A&channelPageId=s5FDEA9F02134FFA70121351677C80048.

(5) Government contact name or office, with official contact information (e.g., e-mail address, telephone number, etc.), to provide a point of contact for questions about the survey.

(6) Identifying information of the survey's sponsor, to inform survey recipients under whose authority the survey is being conducted.

(7) All AF attitude and opinion surveys must include the following statement on the questionnaire: "We cannot provide confidentiality to a participant regarding comments involving criminal activity/behavior, or statements that pose a threat to yourself or others. Do NOT discuss or comment on classified or operationally sensitive information."

b. This approval is exclusive to the Air Force community and does not constitute authority for administration to individuals from other federal agencies, sister services, etc. Surveys that include individuals from outside the Air Force community must be coordinated through the DOD/WHS/ESCD Information Management Division (commercial phone 703-696-5284).

c. The organization conducting this survey must contact the Civilian Personnel Office; Civilian Personnel Element, Manpower & Personnel Flight; for labor union notification prior to releasing this survey if any participants are civilian employees of a bargaining unit. If this survey involves bargaining unit civilians at more than one base, the organization conducting this survey must notify HQ AFPC/DPIECC, Air Force Program Management and Evaluation.

d. The organization conducting this survey must insure that if this survey requires any changes, request must be submitted to the Survey Office for review and approval prior to implementation in accordance with AFI 38-501.

e. This survey does/does not require review by an Air Force Institutional Review Board. If this survey requires an IRB, the PI must submit all proposed survey changes to the Survey and IRB Office for review and approval (minor changes do not require a change of SCN number) prior to implementation in accordance with AFI 38-501.

f. AFI 33-129, Web Management and Internet Use, paragraph 3.2.5.; 3.7.4, and 3.7.5; Please contact SAF/XCDIG, 1800 Air Force Pentagon, Washington DC 20330-1800, for further guidance details which requires that all websites hosted in the commercial environment (i.e., ".com", ".org", etc.) receive SAF/A6 approval. The organization conducting this survey must coordinate with SAF/A6 (e-mail address A3CS.A6CSStrategy@pentagon.af.mil) for approval of a waiver if the survey will be hosted on any website other than a ".mil" account. If a waiver is required, it must be granted by SAF/A6 prior to administration of the survey.

g. For information regarding digital certification of e-mails, refer to AFI 33-119, *Air Force Messaging*. The reference for PK enabling (PKE) information is https://afpki.lackland.af.mil/html/pkenabling.cfm. For information pertaining to ".mil" accounts, the reference is https://afpki.lackland.af.mil/html/help_desk.cfm. Information for systems that are not ".mil" can be found at http://iase.disa.mil/pki/eca/. For information on External Certificate Authority or to contact a representative, the reference is http://iase.disa.mil/pki/eca/contact_us.html.

h. The organization conducting this survey must ensure its Operations Security (OPSEC) manager reviews this survey prior to administration. References for the OPSEC Program include: DOD Directive 5205.02, *DOD Operations Security Program*; Joint Publication 3-13.3, *Operations Security*; AFPD 10-7, *Air Force Information Operations*; and AFI 10-701, *Operations Security (OPSEC)*.

i. The public may request survey results under provisions of the Freedom of Information Act (FOIA). Results released outside the Air Force require coordination with Air Force Public Affairs prior to dissemination.

j. Data collected under this survey may be subject to the Privacy Act of 1974. Please ensure compliance with this act as set forth in Title 5 United States Code (USC), Sec 552a; Title 10 USC, Sec 55 and 8013; Executive Order 9397; and Air Force Instruction 33-332, *Privacy Act Program.*

2. If you have any questions, please call the Air Force Survey Office at DSN 487-5332 or send an e-mail to af.survey@us.af.mil.

//Signed//
RENEE TEALER
Management Analyst
Air Force Survey Office

Appendix C: Survey Instrument

AFIT Study: 21A Survey (SCN AF14-208AFIT)

Survey Description

PURPOSE: The purpose of this survey is to assess your opinion of how much you use a particular competency in your current job and to assess your perception of 21A human capital, learning culture, knowledge management, and organizational performance in your organization (squadron or equivalent). The results of this survey will aid the Director of Logistics at the Pentagon (AF/A4L) in assessing the current state of the 21A career field and may be used to better develop 21As.

CONFIDENTIALITY: All answers will be kept strictly confidential. In no way will the information you provide be used to determine who you are. The demographic information is valuable to this research and will only be used in analysis of the results. No one other than the research team will see your responses. Group trends and statistical findings may be published and briefed to leadership personnel as part of this research.

PARTICIPATION: Participation is strictly voluntary. You are not required to participate in this survey. This survey should take approximately 15 to 20 minutes to complete. You may exit this survey and return to it at any time if you do not finish on your first attempt.

INSTRUCTIONS:

- Please base your answers on your own thoughts and experiences
- Please make your answers clear and concise when asked to answer in a response or when providing comments
- Be sure to select the correct option button when asked
- Thank you for your participation in this survey

CONTACT: If you have questions about this survey please contact andrew.cooper@afit.edu.

*NOTE: If you are not a Aircraft Maintenance Officer (21A) or you have already completed this survey please exit now.

Page 1

AFIT Study: 21A Survey (SCN AF14-208AFIT)

Organizational Questions

This section will be used to gather information about your perceptions of the 21A human capital, learning culture, and knowledge management practices of your organization (squadron or equivalent), as well as your perception of your organization's (squadron or equivalent) overall performance.

1. Human Capital: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) 21As.

*** Human Capital is defined as the knowledge, skills, attitudes, and abilities possessed by individuals.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
21As in my organization are very intelligent	◯	◯	◯	◯	◯	◯	◯
21As in my organization are very creative	◯	◯	◯	◯	◯	◯	◯
21As in my organization are very talented	◯	◯	◯	◯	◯	◯	◯
21As in my organization are specialized in their jobs	◯	◯	◯	◯	◯	◯	◯
21As in my organization are producing new ideas and knowledge	◯	◯	◯	◯	◯	◯	◯
21As in my organization are the best performers	◯	◯	◯	◯	◯	◯	◯

AFIT Study: 21A Survey (SCN AF14-208AFIT)

2. Learning Culture: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) learning culture.

*** Learning Culture is defined as the value the organization places on learning.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
In my organization, people are rewarded for learning	◯	◯	◯	◯	◯	◯	◯
In my organization, people spend time building trust with each other	◯	◯	◯	◯	◯	◯	◯
In my organization, teams/groups revise their thinking as a result of group discussions or information collected	◯	◯	◯	◯	◯	◯	◯
My organization makes its lessons learned available to all employees	◯	◯	◯	◯	◯	◯	◯
My organization recognizes people for taking initiative	◯	◯	◯	◯	◯	◯	◯
My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs	◯	◯	◯	◯	◯	◯	◯
In my organization, leaders ensure that the organization's actions are consistent with its values	◯	◯	◯	◯	◯	◯	◯

3. Knowledge Management: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) knowledge management practices.

*** Knowledge is defined as the awareness or familiarity gained by a fact or situation.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
My organization has processes for integrating different sources and types of knowledge	◯	◯	◯	◯	◯	◯	◯
My organization has processes for converting competitive intelligence into plans of action	◯	◯	◯	◯	◯	◯	◯
My organization has processes for taking advantage of new knowledge	◯	◯	◯	◯	◯	◯	◯
My organization has processes for acquiring knowledge about organizational partners	◯	◯	◯	◯	◯	◯	◯
My organization has processes for exchanging knowledge with our organizational partners	◯	◯	◯	◯	◯	◯	◯

4. Organizational Performance: On a scale from 1 (Much Worse) to 7 (Much Better) how would you compare your organization's (squadron or equivalent) performance over the past 3 years to that of other organizations that do the same kind of work? What about in relation to...

	Much Worse	Worse	Slightly Worse	Neutral	Slightly Better	Better	Much Better
Quality of products, services, or programs?	◯	◯	◯	◯	◯	◯	◯
Development of new products, services, or programs?	◯	◯	◯	◯	◯	◯	◯
Ability to attract essential employees?	◯	◯	◯	◯	◯	◯	◯
Ability to retain essential employees?	◯	◯	◯	◯	◯	◯	◯
Satisfaction of customers or clients?	◯	◯	◯	◯	◯	◯	◯
Relations between management (leadership) and other employees?	◯	◯	◯	◯	◯	◯	◯
Relations among employees in general?	◯	◯	◯	◯	◯	◯	◯

AFIT Study: 21A Survey (SCN AF14-208AFIT)

Competency and Proficiency Information

This section aims to assess how proficient you need to be in each of the Aircraft Maintenance Officer 7 competency areas to perform your primary duties.

NOTE: Competency areas derived from 21A CFETP.

As outlined in the 21AX CFETP Aircraft Maintenance Officer duties and responsibilities include the following 7 competency areas:

(1) Directs aircraft maintenance -mission generation and repair network- activities
(2) Develops, coordinates, and executes flying and maintenance schedules
(3) Directs maintenance activities that may include aircraft propulsion, pneudraulics, egress, fuel systems, electro-environmental, Precision Measurement Equipment Laboratory (PMEL) and avionics systems
(4) Manages quality assurance, maintenance training, budget and resource management, analysis, facilities, shared resources to include end-of-runway and weapons load training
(5) Formulates maintenance plans and policies to meet unit tasking
(6) Coordinates key core logistics requirements supporting aircraft maintenance operations
(7) Directs and manages wholesale logistics life cycle sustainment support

These competencies are relevant to the 21A community at large and you may or may not use some of them in your job. These competencies have been vetted through senior Air Force logistics leaders with the expectation that Air Force 21As will acquire proficiency in these competencies as they progress through their careers.

* The levels of proficiency are extracted from Annex 1-1 Force Development and include:

(1) Basic: Airmen are focused on learning and developing a foundation skill set. They face similar challenges, have limited responsibilities, and are given narrowly focused tasks.

(2) Intermediate: Airmen continue to learn and develop professional skills, understand how to leverage other professionals and knowledge sources, and begin to apply knowledge of the assigned objectives to their work.

(3) Proficient: Airmen leverage knowledge of issues and objectives to design and develop solutions. They understand how actions taken in one area of competence impact other related areas, and establish and manage the scope and quality of those areas of an assignment for which they are responsible. They may manage complex organizations.

(4) Skilled: Airmen leverage knowledge of strategies and issues to develop, present, and implement solutions. They consult with other subject matter experts and have a deep understanding how actions taken in one area of competence impact other related areas within proposed solutions. They contribute to the development of new levels of capabilities by articulating the added value of proposed solutions to leadership and staff and are considered subject matter experts within their organizational area. In addition, they may manage large, complex multi-tiered organizations.

(5) Advanced: Airmen impact the organization and the Air Force by leveraging their knowledge and expertise across the theater to identify and address the critical success factors for complex areas. They apply knowledge of the strategic alignment of solutions with Air Force mission objectives and serve as recognized subject matter experts inside and outside their own organizations and represent the Air Force to external organizations. In addition, they may manage large, complex multi-tiered organizations.

* N/A means you do not need any level of proficiency in that particular competency to perform your primary duties OR you have no experience in this competency area.

AFIT Study: 21A Survey (SCN AF14-208AFIT)

5. Please indicate how proficient you need to be in aircraft maintenance, mission generation, and repair network activities to perform your primary duties. Mission generation includes the following activities:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Maintaining workforce discipline and responding to personnel issues	◯	◯	◯	◯	◯	◯
Balancing workforce availability and skill levels with operational requirements	◯	◯	◯	◯	◯	◯
Working with functional managers to develop, formulate, and manage fiscal resources	◯	◯	◯	◯	◯	◯
Instilling maintenance discipline	◯	◯	◯	◯	◯	◯
Understanding and enforcing security awareness and force protection concepts	◯	◯	◯	◯	◯	◯
Ensuring accuracy of documentation, i.e. aircraft forms and automated systems	◯	◯	◯	◯	◯	◯
Ensuring adherence to technical data policy, procedures and safe maintenance practices	◯	◯	◯	◯	◯	◯

6. Please indicate how proficient you need to be in developing, coordinating, and executing flying and maintenance schedules to perform your primary duties. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Managing aircraft configuration	◯	◯	◯	◯	◯	◯
Managing daily aircraft servicing requirements	◯	◯	◯	◯	◯	◯
Managing weapons load training requirements	◯	◯	◯	◯	◯	◯
Managing launch, recovery, and repair operations	◯	◯	◯	◯	◯	◯
Managing periodic aircraft maintenance inspections	◯	◯	◯	◯	◯	◯
Managing flight line safety & foreign object damage (FOD) prevention & dropped object programs (DOP)	◯	◯	◯	◯	◯	◯
Managing overall aircraft fleet health and ensuring aircraft availability to execute mission requirements	◯	◯	◯	◯	◯	◯
Analyzing aircraft maintenance indicators to identify trends and initiate corrective actions	◯	◯	◯	◯	◯	◯

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7. Please indicate how proficient you need to be in directing maintenance activities that may include aircraft propulsion, pneudraulics, egress, fuel systems, electro-environmental, Precision Measurement Equipment Laboratory (PMEL) and avionics systems. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Management of aircraft propulsion systems	◯	◯	◯	◯	◯	◯
Management of pneudraulics systems	◯	◯	◯	◯	◯	◯
Management of egress systems	◯	◯	◯	◯	◯	◯
Management of fuel systems systems	◯	◯	◯	◯	◯	◯
Management of electro-environmental systems	◯	◯	◯	◯	◯	◯
Management of Precision Measurement Equipment Laboratory (PMEL)	◯	◯	◯	◯	◯	◯
Management of avionics systems	◯	◯	◯	◯	◯	◯
Management of aerospace ground equipment	◯	◯	◯	◯	◯	◯
Management of structural repair and/or low- observable repair	◯	◯	◯	◯	◯	◯
Management of corrosion control	◯	◯	◯	◯	◯	◯
Management of machine, welding, & inspection activities	◯	◯	◯	◯	◯	◯
Management of aero-repair	◯	◯	◯	◯	◯	◯
Management of crash, damaged, & disabled aircraft recovery	◯	◯	◯	◯	◯	◯
Management of non-destructive inspection	◯	◯	◯	◯	◯	◯
Management of off-equipment munitions and armament suspension equipment	◯	◯	◯	◯	◯	◯

8. Please indicate how proficient you need to be in managing quality assurance, maintenance training, budget and resource management, analysis, facilities, shared resources to include end-of-runway and weapons load training activities to perform your primary duties. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Managing quality assurance	◯	◯	◯	◯	◯	◯
Managing maintenance training	◯	◯	◯	◯	◯	◯
Managing budget and resource management	◯	◯	◯	◯	◯	◯
Analysis	◯	◯	◯	◯	◯	◯
Managing facilities and shared resources to include end-of-runway and weapons load training activities	◯	◯	◯	◯	◯	◯
Managing plans and programs	◯	◯	◯	◯	◯	◯
Managing modifications and modernization requirements	◯	◯	◯	◯	◯	◯

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9. Please indicate how proficient you need to be in formulating maintenance plans and policies to meet unit taskings to perform your primary duties. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Formulating maintenance plans and policies to meet unit taskings	◯	◯	◯	◯	◯	◯
Assessing unit maintenance capabilities in support of combat related operational plans	◯	◯	◯	◯	◯	◯
Providing inputs for capability assessments for each plan	◯	◯	◯	◯	◯	◯
Defining aircraft maintenance procedures and requirements in response to emergency or contingency situations	◯	◯	◯	◯	◯	◯

10. Please indicate how proficient you need to be in coordinating key core logistics requirements supporting aircraft maintenance operations to perform you primary duties. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Establishing support requirements for supply requisition, repair cycle, delivery, combat support, ground & aerial port transportation	◯	◯	◯	◯	◯	◯
Establishing base support plans	◯	◯	◯	◯	◯	◯
Establishing munitions requirements	◯	◯	◯	◯	◯	◯

11. Please indicate how proficient you need to be in directing and managing wholesale logistics life cycle sustainment support in your primary duties. Activities include:

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Coordinates production schedules to include induction and selling systems.	◯	◯	◯	◯	◯	◯
Defines technical problems and economic factors related to research and development, and system operational data to evaluate programs, assess trends, and identify improvements and deficiencies	◯	◯	◯	◯	◯	◯
Manages weapons system programs, funding of depot maintenance workloads, and transportation distribution systems	◯	◯	◯	◯	◯	◯
Manages logistics tests and evaluation on new acquisition programs and aircraft modifications	◯	◯	◯	◯	◯	◯

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Logistics Courses

This section will be used to gather information about the logistics-related courses that you HAVE taken and found useful to you in your current job. Please do not consider professional military education (PME) courses such as SOS, ACSC, etc.

*NOTE: Please choose the "Other" option before typing in the text box.

12. What AFIT School of Systems and Logistics course(s) have you taken that have increased your ability to perform your primary duties?

- ☐ LOG 040 Intro to Supply Chain Management (CANX 2012)
- ☐ LOG 041 Intro to Continuous Process Improvement (CANX 2012)
- ☐ LOG 042 Enterprise Resource Planning Basics (CANX 2012)
- ☐ LOG 043 Forecasting Basics (CANX 2012)
- ☐ LOG 044 Collaborative Inventory Planning (CANX 2012)
- ☐ LOG 045 Strategic Sourcing Basics (CANX 2012)
- ☐ LOG 047 Asset Marking & Tracking (CANX 2012)
- ☐ LOG 049 Logistics Enterprise Architecture & the SCOR Model (CANX 2012)
- ☐ LOG 050 AF Transformation: AFSO21 & eLog21 (CANX 2012)
- ☐ LOG 099 Fundamentals of Logistics
- ☐ LOG 103 Central Asset Management
- ☐ LOG 109 Fundamentals of Industrial Maintenance
- ☐ LOG 117 Process Improvement Team Member Course
- ☐ LOG 131 Industrial Maintenance Management (CANX 2012)
- ☐ LOG 132 Production Maintenance Management
- ☐ LOG 135 Systems Lifecycle Integrity Management
- ☐ LOG 199 Introduction to Logistics (AF)
- ☐ LOG 209 Concepts of Industrial Maintenance Mgmt
- ☐ LOG 238 Critical Chain Project Management Foundational Concepts
- ☐ LOG 262 Applied Maintenance Management Concepts
- ☐ LOG 299 Combat Logistics
- ☐ LOG 309 Concepts of Industrial Operations Mgmt
- ☐ LOG 399 Strategic Logistics Management
- ☐ LOG 409 Applied Concepts of Organizational Design
- ☐ LOG 499 Air Force Logistics Executive Development Seminar
- ☐ None
- ☐ Other

Other (please specify)

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13. Which of the following Air Force logistics-related course(s) have you taken that have increased your ability to perform your primary duties?

- [ ] AAMOC - Accelerated Aircraft Maintenance Officer Course
- [ ] Air Force Combat Ammunition Planning and Production Course
- [ ] Air Force Combat Ammunition Planning and Production Senior Officer Orientation Course
- [ ] AMC Maintenance Officers Course
- [ ] AMIC - Aircraft Mishap Investigation Course
- [ ] AMMOS - Advanced Maintenance and Munitions Operations School
- [ ] AMOC - Aircraft Maintenance Officer Course
- [ ] CSC - Combat Support Course
- [ ] CWPC - Contingency Wartime Planners Course
- [ ] JEMIC - Jet Engine Mishap Investigation Course
- [ ] MCOC - Maintenance Course for Operational Commanders
- [ ] MGRC - Mission Generation Road Course
- [ ] MINA - Mishap Investigation Non-Aviation Course
- [ ] MOIC - Maintenance Officer Intermediate Course
- [ ] NATO Nuclear Surety Management Course
- [ ] NWOC - Nuclear Weapons Orientation Course
- [ ] SLMG - Senior Leaders' Mission Generation Course
- [ ] SFC - Space Fundamentals Course
- [ ] TNOC - Theater Nuclear Operations Course
- [ ] None
- [ ] Other

Other (please specify)

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14. What Defense Acquisition University (DAU) Logistics Course(s) have you taken that have increased your ability to perform your primary duties?

NOTE: Courses listed with an (*) are required for the Life Cycle Logistics Level 1 certification and courses listed with (**) are required for the Life Cycle Logistics Level 2 certification.

- ☐ *ACQ 101 Fundamentals of Systems Acquisition Management
- ☐ **ACQ 202 Intermediate Systems Acquisition, Part A
- ☐ **ACQ 203 Intermediate Systems Acquisition, Part B (R)
- ☐ **CLL 001 - Life Cycle Management & Sustainment Metrics
- ☐ CLL 002 - Defense Logistics Agency Support to the PM
- ☐ CLL 003 - Supportability Test and Evaluation
- ☐ CLL 004 - Life Cycle Logistics for the Rest of Us
- ☐ CLL 005 - Developing a Life Cycle Sustainment Plan (LCSP)
- ☐ CLL 006 - Depot Maintenance Partnering
- ☐ CLL 007 - Lead Free Electronics Impact on DoD Programs
- ☐ *CLL 008 - Designing for Supportability in DoD Systems
- ☐ *CLL 011 - Performance Based Life Cycle Product Support (PBL)
- ☐ **CLL 012 - Supportability Analysis
- ☐ CLL 013 - DoD Packaging
- ☐ CLL 015 - Product Support Business Case Analysis (BCA)
- ☐ CLL 016 - Joint Logistics
- ☐ CLL 017 - Introduction to Defense Distribution
- ☐ CLL 018 - Joint Deployment Distribution Operations Center (JDDOC)
- ☐ CLL 026 - Depot Maintenance Capacity Measurement
- ☐ CLL 027 - Depot Source of Repair (DSOR)
- ☐ CLL 029 - Condition-Based Maintenance Plus (CBM+)
- ☐ CLL 030 - Reliability Centered Maintenance (RCM)
- ☐ CLL 031 - Performance Based Logistics (PBL) Contracting Strategies
- ☐ CLL 032 - Preventing Counterfeit Electronic Parts from Entering the DoD Supply System
- ☐ CLL 033 - Logistician's Responsibilities During Technical Reviews
- ☐ CLL 034 - SLAMIS
- ☐ CLL 035 - Operating and Support Cost Estimating for the Product Support Manager
- ☐ CLL 036 - Product Support Manager (PSM)
- ☐ CLL 037 - DoD Supply Chain Fundamentals
- ☐ CLL 038 - Provisioning and Cataloging
- ☐ CLL 039 - Product Support Requirements Identification
- ☐ CLL 040 - Business Case Analysis Tools
- ☐ CLL 041 - Life Cycle Cost (LCC) Analysis Tools
- ☐ CLL 042 - Supportability Analysis Techniques, Procedures, and Tools
- ☐ CLL 043 - Green Logistics: Planning for Sustainability
- ☐ CLL 045 - Designing for Transportability
- ☐ CLL 119 - Technical Refreshment Implementation Module
- ☐ CLL 120 - The DoD Shelf-Life Program
- ☐ CLL 201 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Fundamentals
- ☐ CLL 202 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Executive Overview
- ☐ CLL 203 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Essentials
- ☐ CLL 204 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Case Studies
- ☐ CLL 205 - DMSMS for Technical Professionals
- ☐ CLL 206 - Introduction to Parts Management
- ☐ *LOG 101 - Acquisition Logistics Fundamentals
- ☐ *LOG 102 - Fundamentals of System Sustainment Management'
- ☐ *LOG 103 - Reliability, Availability, and Maintainability (RAM)
- ☐ **LOG 200 - Intermediate Acquisition Logistics, Part A
- ☐ **LOG 201 - Intermediate Acquisition Logistics, Part B
- ☐ **LOG 204 - Configuration Management
- ☐ **LOG 206 - Intermediate Systems Sustainment Management
- ☐ LOG 211 - Supportability Analysis
- ☐ **LOG 215 - Technical Data

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- [ ] CLL 019 - Technology Refreshment Planning
- [ ] CLL 020 - Independent Logistics Assessments
- [ ] CLL 021 - Product Support Arrangements
- [ ] CLL 022 - Title 10 Depot Maintenance Statute Overview
- [ ] CLL 023 - Title 10 U.S.C. 2464 Core Statute Implementation
- [ ] CLL 024 - Title 10 Limitations on the Performance of Depot-Level Maintenance (50/50)
- [ ] CLL 025 - Depot Maintenance Interservice Support Agreements (DMISA)
- [ ] CLL 046 - The Twelve Integrated Product Support Elements
- [ ] CLL 051 - System Retirement, Reclamation, Demilitarization & Materiel Disposition
- [ ] CLL 056 - Sustainment of Software Intensive Systems
- [ ] CLL 057 - Level of Repair Analysis - Introduction
- [ ] CLL 058 - Level of Repair Analysis – Theory and Principles
- [ ] CLL 059 - Sustaining Engineering
- [ ] CLL 062 - Counterfeit Prevention Awareness
- [ ] **LOG 235 - Performance-Based Logistics
- [ ] LOG 340 - Life Cycle Product Support
- [ ] LOG 350 - Enterprise Life Cycle Logistics Management
- [ ] LOG 365 - Executive Product Support Manager's Course
- [ ] *SYS 101 Fundamentals of Systems Planning, Research, Development, and Engineering
- [ ] None
- [ ] Other

Other (please specify)

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Logistics Courses

This section will be used to gather information about the logistics-related courses that you have NOT taken but would be useful to you in your current job. Please do not consider professional military education (PME) courses such as SOS, ACSC, etc.

*NOTE: Please choose the "Other" option before typing in the text box.

15. What AFIT School of Systems and Logistics course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

- ☐ LOG 040 Intro to Supply Chain Management (CANX 2012)
- ☐ LOG 041 Intro to Continuous Process Improvement (CANX 2012)
- ☐ LOG 042 Enterprise Resource Planning Basics (CANX 2012)
- ☐ LOG 043 Forecasting Basics (CANX 2012)
- ☐ LOG 044 Collaborative Inventory Planning (CANX 2012)
- ☐ LOG 045 Strategic Sourcing Basics (CANX 2012)
- ☐ LOG 047 Asset Marking & Tracking (CANX 2012)
- ☐ LOG 049 Logistics Enterprise Architecture & the SCOR Model (CANX 2012)
- ☐ LOG 050 AF Transformation: AFSO21 & eLog21 (CANX 2012)
- ☐ LOG 099 Fundamentals of Logistics
- ☐ LOG 103 Central Asset Management
- ☐ LOG 109 Fundamentals of Industrial Maintenance
- ☐ LOG 117 Process Improvement Team Member Course
- ☐ LOG 131 Industrial Maintenance Management (CANX 2012)
- ☐ LOG 132 Production Maintenance Management
- ☐ LOG 135 Systems Lifecycle Integrity Management
- ☐ LOG 199 Introduction to Logistics (AF)
- ☐ LOG 209 Concepts of Industrial Maintenance Mgmt
- ☐ LOG 238 Critical Chain Project Management Foundational Concepts
- ☐ LOG 262 Applied Maintenance Management Concepts
- ☐ LOG 299 Combat Logistics
- ☐ LOG 309 Concepts of Industrial Operations Mgmt
- ☐ LOG 399 Strategic Logistics Management
- ☐ LOG 409 Applied Concepts of Organizational Design
- ☐ LOG 499 Air Force Logistics Executive Development Seminar
- ☐ None
- ☐ Other

Other (please specify)

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16. Which of the following Air Force logistics-related course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

- [ ] AAMOC - Accelerated Aircraft Maintenance Officer Course
- [ ] Air Force Combat Ammunition Planning and Production Course
- [ ] Air Force Combat Ammunition Planning and Production Senior Officer Orientation Course
- [ ] AMC Maintenance Officers Course
- [ ] AMIC - Aircraft Mishap Investigation Course
- [ ] AMMOS - Advanced Maintenance and Munitions Operations School
- [ ] AMOC - Aircraft Maintenance Officer Course
- [ ] CSC - Combat Support Course
- [ ] CWPC - Contingency Wartime Planners Course
- [ ] JEMIC - Jet Engine Mishap Investigation Course
- [ ] MCOC - Maintenance Course for Operational Commanders
- [ ] MGRC - Mission Generation Road Course
- [ ] MINA - Mishap Investigation Non-Aviation Course
- [ ] MOIC - Maintenance Officer Intermediate Course
- [ ] NATO Nuclear Surety Management Course
- [ ] NWOC - Nuclear Weapons Orientation Course
- [ ] SLMG - Senior Leaders' Mission Generation Course
- [ ] SFC - Space Fundamentals Course
- [ ] TNOC - Theater Nuclear Operations Course
- [ ] None
- [ ] Other

Other (please specify)

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17. Which Defense Acquisition University (DAU) Logistics Course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

NOTE: Courses listed with an (*) are required for the Life Cycle Logistics Level 1 certification and courses listed with (**) are required for the Life Cycle Logistics Level 2 certification.

- ☐ *ACQ 101 Fundamentals of Systems Acquisition Management
- ☐ **ACQ 202 Intermediate Systems Acquisition, Part A
- ☐ **ACQ 203 Intermediate Systems Acquisition, Part B (R)
- ☐ **CLL 001 - Life Cycle Management & Sustainment Metrics
- ☐ CLL 002 - Defense Logistics Agency Support to the PM
- ☐ CLL 003 - Supportability Test and Evaluation
- ☐ CLL 004 - Life Cycle Logistics for the Rest of Us
- ☐ CLL 005 - Developing a Life Cycle Sustainment Plan (LCSP)
- ☐ CLL 006 - Depot Maintenance Partnering
- ☐ CLL 007 - Lead Free Electronics Impact on DoD Programs
- ☐ *CLL 008 - Designing for Supportability in DoD Systems
- ☐ *CLL 011 - Performance Based Life Cycle Product Support (PBL)
- ☐ **CLL 012 - Supportability Analysis
- ☐ CLL 013 - DoD Packaging
- ☐ CLL 015 - Product Support Business Case Analysis (BCA)
- ☐ CLL 016 - Joint Logistics
- ☐ CLL 017 - Introduction to Defense Distribution
- ☐ CLL 018 - Joint Deployment Distribution Operations Center (JDDOC)
- ☐ CLL 026 - Depot Maintenance Capacity Measurement
- ☐ CLL 027 - Depot Source of Repair (DSOR)
- ☐ CLL 029 - Condition-Based Maintenance Plus (CBM+)
- ☐ CLL 030 - Reliability Centered Maintenance (RCM)
- ☐ CLL 031 - Performance Based Logistics (PBL) Contracting Strategies
- ☐ CLL 032 - Preventing Counterfeit Electronic Parts from Entering the DoD Supply System
- ☐ CLL 033 - Logistician's Responsibilities During Technical Reviews
- ☐ CLL 034 - SLAMIS
- ☐ CLL 035 - Operating and Support Cost Estimating for the Product Support Manager
- ☐ CLL 036 - Product Support Manager (PSM)
- ☐ CLL 037 - DoD Supply Chain Fundamentals
- ☐ CLL 038 - Provisioning and Cataloging
- ☐ CLL 039 - Product Support Requirements Identification
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- ☐ CLL 041 - Life Cycle Cost (LCC) Analysis Tools
- ☐ CLL 042 - Supportability Analysis Techniques, Procedures, and Tools
- ☐ CLL 043 - Green Logistics: Planning for Sustainability
- ☐ CLL 045 - Designing for Transportability
- ☐ CLL 119 - Technical Refreshment Implementation Module
- ☐ CLL 120 - The DoD Shelf-Life Program
- ☐ CLL 201 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Fundamentals
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- ☐ CLL 204 - Diminishing Manufacturing Sources and Material Shortages (DMSMS) Case Studies
- ☐ CLL 205 - DMSMS for Technical Professionals
- ☐ CLL 206 - Introduction to Parts Management
- ☐ *LOG 101 - Acquisition Logistics Fundamentals
- ☐ *LOG 102 - Fundamentals of System Sustainment Management'
- ☐ *LOG 103 - Reliability, Availability, and Maintainability (RAM)
- ☐ **LOG 200 - Intermediate Acquisition Logistics, Part A
- ☐ **LOG 201 - Intermediate Acquisition Logistics, Part B
- ☐ **LOG 204 - Configuration Management
- ☐ **LOG 206 - Intermediate Systems Sustainment Management
- ☐ LOG 211 - Supportability Analysis
- ☐ **LOG 215 - Technical Data

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- [ ] CLL 019 - Technology Refreshment Planning
- [ ] CLL 020 - Independent Logistics Assessments
- [ ] CLL 021 - Product Support Arrangements
- [ ] CLL 022 - Title 10 Depot Maintenance Statute Overview
- [ ] CLL 023 - Title 10 U.S.C. 2464 Core Statute Implementation
- [ ] CLL 024 - Title 10 Limitations on the Performance of Depot-Level Maintenance (50/50)
- [ ] CLL 025 - Depot Maintenance Interservice Support Agreements (DMISA)
- [ ] CLL 046 - The Twelve Integrated Product Support Elements
- [ ] CLL 051 - System Retirement, Reclamation, Demilitarization & Materiel Disposition
- [ ] CLL 056 - Sustainment of Software Intensive Systems
- [ ] CLL 057 - Level of Repair Analysis - Introduction
- [ ] CLL 058 - Level of Repair Analysis – Theory and Principles
- [ ] CLL 059 - Sustaining Engineering
- [ ] CLL 062 - Counterfeit Prevention Awareness
- [ ] **LOG 235 - Performance-Based Logistics
- [ ] LOG 340 - Life Cycle Product Support
- [ ] LOG 350 - Enterprise Life Cycle Logistics Management
- [ ] LOG 365 - Executive Product Support Manager's Course
- [ ] *SYS 101 Fundamentals of Systems Planning, Research, Development, and Engineering
- [ ] None
- [ ] Other

Other (please specify)

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Additional Comments

This section is your chance to provide comments pertaining to 21A education, training, and the Deliberate Continuum of Learning (DCoL).

18. Please provide comments here (optional).

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Demographics Information

This section will be used to gather information about your career and current job.

*NOTE: Please choose the "Other" option before typing in the text box.

19. What is your current rank?

20. What best describes your area of responsibility?

Other (please specify)

21. What best describes your current duty title?

Other (please specify)

22. Which best describes the level at which you perform your primary duties?

Other (please specify)

23. Which most closely describes your current MAJCOM (or equivalent)?

Other (please specify)

24. Please indicate how long you have served in the USAF as an 21A (must input both a year and month).

	Years	Months
Time in Service as an 21A		

25. Please indicate how long you have served in your current position (must input both a year and month).

	Years	Months
Time in current position		

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26. Which best describes your primary duties?

- ◯ Tactical
- ◯ Operational
- ◯ Strategic
- ◯ Not Sure

27. Please indicate your highest level of education completed.

- ◯ Bachelors Degree
- ◯ Masters Degree
- ◯ PhD

28. Which most closely describes your undergraduate degree emphasis?

- ◯ Business-related (e.g. Accounting, Finance, Management)
- ◯ Science-related (e.g. Biology, Chemistry, Psychology, Physics)
- ◯ Other (please use comment box)

Other (please specify)

29. Which most closely describes your graduate degree emphasis?

- ◯ Business-related (e.g. MBA)
- ◯ Logistics- or Supply Chain-related (e.g. Logistics & Supply Chain Management)
- ◯ Science-related (e.g. Biology, Chemistry, Psychology, Physics)
- ◯ N/A
- ◯ Other (please use comment box)

Other (please specify)

30. If you have a PhD, please indicate in what area.

31. Are you prior enlisted?

- ◯ Yes
- ◯ No

Appendix D: Survey Request Letter

From: AMS Mail Robot [mailto:milunique.systems@us.af.mil]
Sent: Tuesday, October 28, 2014 11:31 AM
To:
Subject: Aircraft Maintenance Officer Career Development and Education Survey (SCN AF14-208AFIT)

(view html)

Aircraft Maintenance Officer Career Development and Education Survey
(Survey Control Number AF14-208AFIT)

PURPOSE: The purpose of this survey is to aid the Directorate of Logistics (AF/A4L) at the Pentagon in assessing the current state of the 21A career field and may be used to better develop 21As in the future through strengthening the understanding of the Deliberate Continuum of Learning (DCoL) best suited for the 21A career field.

CONFIDENTIALITY: All answers will be kept strictly confidential. In no way will the information you provide be used to determine who you are. The demographic information is valuable to this research and will only be used in analysis of the results. No one other than the research team will see your responses. Group trends and statistical findings may be published and briefed to leadership personnel as part of this research.

PARTICIPATION: Participation is strictly voluntary. You are not required to participate in this survey. This survey should take approximately 15 to 20 minutes to complete. You may exit this survey and return to it at any time if you do not finish on your first attempt.

ACCESSING THE SURVEY: Please select the following hyperlink to complete this survey.
https://www.surveymonkey.com/s/Survey-21A-DCoL

CONTACT: If you have questions about this survey please contact andrew.cooper@afit.edu.

*NOTE: If you are NOT an Aircraft Maintenance Officer (21A) in the rank of Second Lieutenant through Colonel or you have already completed this survey please disregard this email.

Appendix E: DLOQ Construct Definitions (Marsick and Watkins, 2003)

TABLE 1: Definitions of Constructs for the Dimensions of the Learning Organization Questionnaire

Dimension	Definition
Create continuous learning opportunities	Learning is designed into work so that people can learn on the job; opportunities are provided for ongoing education and growth.
Promote inquiry and dialogue	People gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others; the culture is changed to support questioning, feedback, and experimentation.
Encourage collaboration and team learning	Work is designed to use groups to access different modes of thinking; groups are expected to learn together and work together; collaboration is valued by the culture and rewarded.
Create systems to capture and share learning	Both high- and low-technology systems to share learning are created and integrated with work; access is provided; systems are maintained.
Empower people toward a collective vision	People are involved in setting, owning, and implementing a joint vision; responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do.
Connect the organization to its environment	People are helped to see the effect of their work on the entire enterprise; people scan the environment and use information to adjust work practices; the organization is linked to its communities.
Provide strategic leadership for learning	Leaders model, champion, and support learning; leadership uses learning strategically for business results.
Key results	
Financial performance	State of financial health and resources available for growth
Knowledge performance	Enhancement of products and services because of learning and knowledge capacity (lead indicators of intellectual capital)

Appendix F: Required Proficiency Levels

Competency	Sub-Competencies	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Directs aircraft maintenance - mission generation and repair network-activities	Maintaining workforce discipline and responding to personnel issues	11	27	73	182	171	10
	Balancing workforce availability and skill levels with operational requirements	4	22	79	194	165	10
	Working with functional managers to develop, formulate, and manage fiscal resources	19	46	120	168	110	11
	Instilling maintenance discipline	19	26	81	129	206	13
	Understanding and enforcing security awareness and force protection concepts	55	60	172	128	52	7
	Ensuring accuracy of documentation, i.e. aircraft forms and automated systems	13	44	117	158	129	13
	Ensuring adherence to technical data policy, procedures and safe maintenance practices	26	32	73	131	201	11
Develops, coordinates, and executes flying and maintenance schedules	Managing aircraft configuration	29	37	133	165	88	22
	Managing daily aircraft servicing requirements	45	57	158	135	58	21
	Managing weapons load training requirements	31	56	124	128	64	71
	Managing launch, recovery, and repair operations	24	33	132	161	102	22
	Managing periodic aircraft maintenance inspections	14	37	130	171	100	22
	Managing flight line safety & foreign object damage (FOD) prevention & dropped object programs (DOP)	46	53	150	143	67	15
	Managing overall aircraft fleet health and ensuring aircraft availability to execute mission requirements	6	9	56	144	239	20
	Analyzing aircraft maintenance indicators to identify trends and	6	8	59	152	238	14

	initiate corrective actions						
Directs maintenance activities that may include aircraft propulsion, pneudraulics, egress, fuel systems, electro-environmental, Precision Measurement Equipment Laboratory (PMEL) and avionics systems	Management of aircraft propulsion systems	32	74	164	139	41	24
	Management of pneudraulics systems	45	80	177	116	31	25
	Management of egress systems	47	73	160	113	35	46
	Management of fuel systems	40	70	175	130	35	24
	Management of electro-environmental systems	37	76	173	126	36	26
	Management of Precision Measurement Equipment Laboratory (PMEL)	63	88	177	86	29	31
	Management of avionics systems	35	76	171	125	41	26
	Management of aerospace ground equipment	60	78	182	104	23	27
	Management of structural repair and/or low observable repair	34	74	160	131	43	32
	Management of corrosion control	45	76	186	117	26	24
	Management of machine, welding, & inspection activities	53	94	172	102	28	25
	Management of aero-repair	45	77	169	108	41	34
	Management of crash, damaged, & disabled aircraft recovery	48	78	156	128	39	25
	Management of nondestructive inspection	58	86	172	105	25	28
	Management of off-equipment munitions and armament suspension equipment	50	83	166	103	26	46
Manages quality assurance, maintenance training, budget and resource management, analysis, facilities, shared resources to include end-of-runway and weapons load training	Managing quality assurance	20	54	108	179	96	17
	Managing maintenance training	15	54	114	186	90	15
	Managing budget and resource management	23	60	120	157	101	13
	Analysis	14	42	84	179	141	14
	Managing facilities and shared resources to include end-of-runway and weapons load training activities	24	61	131	161	65	32
	Managing plans and programs	21	60	124	167	86	16
	Managing modifications and modernization requirements	24	52	105	168	106	19
Formulates maintenance	Formulating maintenance plans and policies to meet unit taskings	6	20	74	176	179	19

plans and policies to meet unit tasking	Assessing unit maintenance capabilities in support of combat related operational plans	5	13	53	152	222	29
	Providing inputs for capability assessments for each plan	7	16	68	174	187	22
	Defining aircraft maintenance procedures and requirements in response to emergency or contingency situations	9	13	82	154	195	21
Coordinates key core logistics requirements supporting aircraft maintenance operations	Establishing support requirements for supply requisition, repair cycle, delivery, combat support, ground & aerial port transportation	17	44	118	170	103	22
	Establishing base support plans	33	47	125	145	94	30
	Establishing munitions requirements	23	48	105	162	80	56
Directs and manages wholesale logistics life cycle sustainment support	Coordinates production schedules to include induction and selling systems	61	57	80	116	63	97
	Defines technical problems and economic factors related to research and development, and system operational data to evaluate programs, assess trends, and identify improvements and deficiencies	59	65	91	101	71	87
	Manages weapons system programs, funding of depot maintenance workloads, and transportation distribution systems	50	70	83	92	82	97
	Manages logistics tests and evaluation on new acquisition programs and aircraft modifications	62	64	72	93	87	96

Appendix G: Logistics Courses

Defense Acquisition University (DAU) Courses		
ACQ 101 Fundamentals of Systems Acquisition Management	CLL 026 Depot Maintenance Capacity Measurement	CLL 119 Technical Refreshment Implementation Module
ACQ 202 Intermediate Systems Acquisition, Part A	CLL 027 Depot Source of Repair (DSOR)	CLL 120 The DoD Shelf-Life Program
ACQ 203 Intermediate Systems Acquisition, Part B (R)	CLL 029 Condition-Based Maintenance Plus (CBM+)	CLL 201 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Fundamentals
CLL 001 Life Cycle Management & Sustainment Metrics	CLL 030 Reliability Centered Maintenance (RCM)	CLL 202 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Executive Overview
CLL 002 Defense Logistics Agency Support to the PM	CLL 031 Performance Based Logistics (PBL) Contracting Strategies	CLL 203 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Essentials
CLL 003 Supportability Test and Evaluation	CLL 032 Preventing Counterfeit Electronic Parts from Entering the DoD Supply System	CLL 204 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Case Studies
CLL 004 Life Cycle Logistics for the Rest of Us	CLL 033 Logistician's Responsibilities During Technical Reviews	CLL 205 DMSMS for Technical Professionals
CLL 005 Developing a Life Cycle Sustainment Plan (LCSP)	CLL 034 SLAMIS	CLL 206 Introduction to Parts Management
CLL 006 Depot Maintenance Partnering	CLL 035 Operating and Support Cost Estimating for the Product Support Manager	LOG 101 Acquisition Logistics Fundamentals
CLL 007 Lead Free Electronics Impact on DoD Programs	CLL 036 Product Support Manager (PSM)	LOG 102 Fundamentals of System Sustainment Management
CLL 008 Designing for Supportability in DoD Systems	CLL 037 DoD Supply Chain Fundamentals	LOG 103 Reliability, Availability, and Maintainability (RAM)
CLL 011 Performance Based Life Cycle Product Support (PBL)	CLL 038 Provisioningand Cataloging	LOG 200 Intermediate Acquisition Logistics, Part A
CLL 012 Supportability Analysis	CLL 039 Product Support Requirements Identification	LOG 201 Intermediate Acquisition Logistics, Part B

CLL 013 DoD Packaging	CLL 040 Business Case Analysis Tools	LOG 204 Configuration Management
CLL 015 Product Support Business Case Analysis (BCA)	CLL 041 Life Cycle Cost (LCC) Analysis Tools	LOG 206 Intermediate Systems Sustainment Management
CLL 016 Joint Logistics	CLL 042 Supportability Analysis Techniques, Procedures, and Tools	LOG 211 Supportability Analysis
CLL 017 Introduction to Defense Distribution	CLL 043 Green Logistics: Planning for Sustainability	LOG 215 Technical Data
CLL 018 Joint Deployment Distribution Operations Center (JDDOC)	CLL 045 Designing for Transportability	G 235 Performance Based Logistics
CLL 019 Technology Refreshment Planning	CLL 046 The Twelve Integrated Product Support Elements	LOG 340 Life Cycle Product Support
CLL 020 Independent Logistics Assessments	CLL 051 System Retirement, Reclamation, Demilitarization & Materiel Disposition	LOG 350 Enterprise Life Cycle Logistics Management
CLL 021 Product Support Arrangements	CLL 056 Sustainment of Software Intensive Systems	LOG 365 Executive Product Support Manager's Course
CLL 022 Title 10 Depot Maintenance Statute Overview	CLL 057 Level of Repair Analysis Introduction	SYS 101 Fundamentals of Systems Planning, Research, Development, and Engineering
CLL 023 Title 10 U.S.C. 2464 Core Statute Implementation	CLL 058 Level of Repair Analysis – Theory and Principles	
CLL 024 Title 10 Limitations on the Performance of Depot-Level Maintenance (50/50)	CLL 059 Sustaining Engineering	
CLL 025 Depot Maintenance Interservice Support Agreements (DMISA)	CLL 062 Counterfeit Prevention Awareness	

AFIT School of Systems and Logistics Courses		
LOG 040 Intro to Supply Chain Management (CANX 2012)	LOG 099 Fundamentals of Logistics	LOG 238 Critical Chain Project Management Foundational Concepts
LOG 041 Intro to Continuous Process Improvement (CANX 2012)	LOG 103 Central Asset Management	LOG 262 Applied Maintenance Management Concepts
LOG 042 Enterprise Resource Planning Basics (CANX 2012)	LOG 109 Fundamentals of Industrial Maintenance	LOG 299 Combat Logistics
LOG 043 Forecasting Basics (CANX 2012)	LOG 117 Process Improvement Team Member Course	LOG 309 Concepts of Industrial Operations Mgmt
LOG 044 Collaborative Inventory Planning (CANX 2012)	LOG 131 Industrial Maintenance Management (CANX 2012)	LOG 399 Strategic Logistics Management
LOG 045 Strategic Sourcing Basics (CANX 2012)	LOG 132 Production Maintenance Management	LOG 409 Applied Concepts of Organizational Design
LOG 047 Asset Marking & Tracking (CANX 2012)	LOG 135 Systems Lifecycle Integrity Management	LOG 499 Air Force Logistics Executive Development Seminar
LOG 049 Logistics Enterprise Architecture & the SCOR Model (CANX 2012)	LOG 199 Introduction to Logistics (AF)	
LOG 050 AF Transformation: AFSO21 & eLog21 (CANX 2012)	LOG 209 Concepts of Industrial Maintenance Mgmt	

Miscellaneous Air Force Courses		
AAMOC Accelerated Aircraft Maintenance Officer Course	CSC Combat Support Course	NATO Nuclear Surety Management Course
Air Force Combat Ammunition Planning and Production Course	CWPC Contingency Wartime Planners Course	NWOC Nuclear Weapons Orientation Course
Air Force Combat Ammunition Planning and Production Senior Officer Orientation Course	JEMIC Jet Engine Mishap Investigation Course	SLMG Senior Leaders' Mission Generation Course
AMC Maintenance Officers Course	MCOC Maintenance Course for Operational Commanders	SFC Space Fundamentals Course
AMIC Aircraft Mishap Investigation Course	MGRC Mission Generation Road Course	TNOC Theater Nuclear Operations Course
AMMOS Advanced Maintenance and Munitions Operations School	MINA Mishap Investigation Non-Aviation Course	
AMOC Aircraft Maintenance Officer Course	MOIC Maintenance Officer Intermediate Course	

Appendix H: Logistics Courses with High Utility

DAU Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
CLL 013							0
CLL 017							0
CLL 019							0
CLL 032							0
CLL 035							0
CLL 039							0
CLL 045							0
CLL 046							0
CLL 056							0
CLL 062							0
CLL 119							0
CLL 120							0
CLL 203							0
CLL 205							0
CLL 018				1			1
CLL 025					1		1
CLL 033			1				1
CLL 038					1		1
CLL 051				1			1
CLL 058					1		1
CLL 059				1			1
CLL 202					1		1
CLL 204				1			1
CLL 206					1		1
CLL 034				1		1	2
CLL 036				1		1	2
CLL 042				1	1		2
CLL 043			1		1		2
CLL 057					2		2
CLL 021					1	2	3
CLL 022				2		1	3
CLL 023				2		1	3
CLL 024				2	1		3
CLL 026				2	1		3
LOG 365					1	2	3
CLL 007		1	2	1			4
CLL 020				1	2	1	4

CLL 027			2	1	1		4
CLL 201				1	1	2	4
CLL 029				2	1	2	5
CLL 040			1	2		2	5
LOG 211					3	2	5
LOG 340				2	1	2	5
CLL 015				3	2	1	6
CLL 037			2	1	2	2	7
CLL 002			4	3	1		8
LOG 350				2	2	4	8
CLL 006			2	4	2	1	9
CLL 041			2	3	1	3	9
CLL 003		0	3	5	1	1	10
CLL 005				7	1	3	11
CLL 031			1	4	5	2	12
LOG 215			4	3	3	2	12
CLL 004		1	9	7	2		19
CLL 012			6	7	4	3	20
CLL 016			3	13	7	2	25
LOG 206			5	6	7	8	26
CLL 030			5	8	12	8	33
LOG 204			10	8	15	9	42
CLL 008			16	13	13	4	46
LOG 235			7	17	22	7	53
CLL 001		1	13	22	16	8	60
ACQ 203	1		11	20	15	15	62
LOG 200	1	1	12	23	24	14	75
CLL 011	1	1	22	25	23	5	77
LOG 201	1		12	22	26	16	77
SYS 101	1	4	30	22	21	8	86
LOG 103		2	23	25	26	12	88
ACQ 202	1	3	25	34	30	17	110
LOG 102		7	42	35	39	16	139
LOG 101	3	12	72	51	58	21	217
ACQ 101	9	24	100	74	66	33	306

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col;
"Other" courses are listed separately

AFIT Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
LOG 040	1	1	7	10	1	1	21
LOG 041	1		8	9	7	2	27
LOG 042				3	1	1	5
LOG 043				2	2		4
LOG 044					1		1
LOG 045					2	1	3
LOG 047					1	1	2
LOG 049			1		2		3
LOG 050		1	2	10	6	4	23
LOG 099	1	4	48	35	16	13	117
LOG 103			3	6	2	2	13
LOG 109		1	3	3	1		8
LOG 117			3	8	6	1	18
LOG 131			1	4	5	3	13
LOG 132		1		8	1	1	11
LOG 135				4	3	2	9
LOG 199	3	7	53	51	39	14	167
LOG 209			1	4		3	8
LOG 238			1	4	3	1	9
LOG 262	2	6	33	48	48	17	154
LOG 299	1	13	44	43	27	16	144
LOG 309							0
LOG 399			6	13	21	16	56
LOG 409							0
LOG 499			1	1	5	8	15

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col;
"Other" courses are listed separately

AF Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
AAMOC	3	1	5	5	1	2	17
AFCOMAC		1	9	8	8	7	33
AFCOMAC Senior Course			1	12	29	21	63
AMC Maintenance Officers Course	3	8	38	24	30	4	107
AMIC		4	47	77	80	35	243
AMMOS			41	34	18	1	94
AMOC	33	46	132	100	85	34	430
CSC			22	7	1		30
CWPC		1	5	6	8	3	23
JEMIC	7	14	82	67	45	20	235
MCOC				3	2	2	7
MGRC	2	11	50	20	8	7	98
MINA					1	2	3
MOIC			68	83	40	9	200
NATO				2	1	3	6
NWOC				1	7	9	17
SLMG				3	5	19	27
SFC						2	2
TNOC							0

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col; "Other" courses are listed separately

"Other" Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
ACQ 201A			1		1		2
ACQ 352A						1	1
ACQ 352B						1	1
BCF 102					1		1
CLB 007				1	2		3
CLB 016				1	2		3
CLC 106			2			1	3
CLC 206			1				1
CLC 222			2				2
CLE 004	1	1	5	2	1		10
CLE 006	1						1
CLE 007	1	1	5		1		8
CLE 008			1		1		2
CLE 011				1			1
CLE 015			1				1
CLE 023			1				1
CLG 001				1			1
CLL 010					1		1
CLM 003			3		2		5
CLM 013					1		1
CLM 023				1			1
CLM 025					1		1
CLM 041				1			1
CLR 101					1		1
COM 110					1		1
CRS 1427					1		1
LOG 203				1			1
LOG 203					1		1
LOG 304					1		1
PMT 250					2		2
PMT 401						1	1
PMT 402						2	2
PQM 101	1		3	1			5
RQM 110			1		1		2
SYS 201A					1		1
TST 101				1			1
TST 102			2				2
AFIT 001			1				1
FAM 103			1	2			3

LOG 101		2		3	5
LOG 102		2		3	5
LOG 103		1		1	2
LOG 123			1		1
LOG 201				1	1
LOG 202				1	1
LOG 203		1			1
Mobility AF Maintenance Officer Course	1				1
ACC Combat Wing Maintenance Officer Course	1	7		1	9
Conventional Munitions Officer Course		1			1
Joint Air Operations Planning		1			1
Flight Line Maintenance Officer Course		1			1
Flight Safety Program Management		1			1
AMC Maintenance Officer Procedures			1		1
Joint Air Operations Planning Course			1	1	2
NMOC/NWOC				2	2
SIB/AIB Board President Course			1	4	1	5
LOGTECH				1	1	2
Air Mobility Operations Course				1		1
ALROC					1	1

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col; "Other" courses are listed separately

Appendix I: Logistics Courses with Potential Utility

AFIT Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
LOG 040	11	17	28	18	19	9	102
LOG 041	11	8	13	10	6	5	53
LOG 042	2	4	3	3	3	1	16
LOG 043	5	10	15	4	7	3	44
LOG 044	1	4	3	1	1	1	11
LOG 045	2	5	5	2	5	2	21
LOG 047	3	3	0	0	1	0	7
LOG 049	2	3	3	2	4	2	16
LOG 050	6	4	7	8	10	3	38
LOG 099	17	17	19	15	15	4	87
LOG 103	1	6	9	10	14	6	46
LOG 109	4	9	15	9	8	3	48
LOG 117	6	7	11	8	8	5	45
LOG 131	3	5	5	8	5	2	28
LOG 132	13	18	24	25	17	4	101
LOG 135	3	6	11	12	7	1	40
LOG 199	13	24	23	18	11	8	97
LOG 209	6	7	19	22	15	3	72
LOG 238	3	7	20	15	11	7	63
LOG 262	11	15	40	22	16	10	114
LOG 299	15	20	51	44	28	13	171
LOG 309	5	7	9	18	12	6	57
LOG 399	7	22	41	47	37	17	171
LOG 409	1	3	11	18	11	9	53
LOG 499	1	4	9	13	35	20	82

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col

AF Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
AAMOC	2	4	4	0	2	0	12
AFCOMAC	4	8	14	13	10	3	52
AFCOMAC Senior Course	2	0	5	9	9	2	27
AMC Maintenance Officers Course	8	10	15	8	2	1	44
AMIC	27	33	68	18	7	1	154
AMMOS	16	34	54	16	16	9	145
AMOC	7	3	3	5	4	0	22
CSC	9	11	29	15	12	2	78
CWPC	6	12	38	24	26	8	114
JEMIC	19	24	48	20	22	6	139
MCOC	3	4	5	7	4	1	24
MGRC	7	9	15	10	9	2	52
MINA	6	9	9	18	10	0	52
MOIC	19	24	31	5	4	2	85
NATO	4	3	5	4	7	3	26
NWOC	3	5	7	6	8	4	33
SLMG	4	2	5	12	30	5	58
SFC	4	1	4	0	4	3	16
TNOC	3	2	4	1	3	3	16

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col

DAU Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
ACQ 101	8	10	10	17	9	2	56
ACQ 202	5	9	15	18	22	3	72
ACQ 203	4	9	18	21	20	2	74
CLL 001	8	14	16	15	18	1	72
CLL 002	3	5	3	6	9	4	30
CLL 003	4	3	1	0	6	1	15
CLL 004	5	10	13	9	11	5	53
CLL 005	4	3	6	3	8	4	28
CLL 006	7	10	16	8	13	4	58
CLL 007	2	1	1	0	1	0	5
CLL 008	3	2	7	2	6	2	22
CLL 011	5	4	12	6	10	3	40
CLL 012	6	5	8	6	4	4	33
CLL 013	3	1	1	1	2	0	8
CLL 015	2	2	0	0	2	0	6
CLL 016	8	21	38	25	20	6	118
CLL 017	3	2	5	5	5	3	23
CLL 018	2	5	9	6	7	3	32
CLL 019	3	2	0	1	2	1	9
CLL 020	2	1	4	2	5	2	16
CLL 021	2	3	3	3	3	3	17
CLL 022	6	7	4	9	10	6	42
CLL 023	3	4	3	2	2	3	17
CLL 024	4	7	7	8	9	5	40
CLL 025	3	4	9	6	9	5	36
CLL 026	6	6	12	14	12	4	54
CLL 027	8	4	10	12	13	7	54
CLL 029	5	6	5	10	12	3	41
CLL 030	10	6	18	19	18	5	76
CLL 031	5	5	9	11	11	6	47
CLL 032	2	2	1	1	1	0	7
CLL 033	2	3	2	5	4	1	17
CLL 034	2	1	0	0	1	0	4
CLL 035	3	1	1	0	2	1	8
CLL 036	2	4	4	6	3	3	22
CLL 037	8	11	18	15	14	6	72
CLL 038	3	1	0	3	2	0	9
CLL 039	2	1	1	2	1	1	8
CLL 040	2	2	2	11	8	2	27

CLL 041	7	4	8	5	13	3	40
CLL 042	3	5	4	5	4	1	22
CLL 043	6	9	4	8	6	1	34
CLL 045	3	2	2	1	4	0	12
CLL 046	3	2	0	3	4	2	14
CLL 051	2	2	1	2	4	2	13
CLL 056	3	1	3	2	1	1	11
CLL 057	5	5	11	7	9	2	39
CLL 058	4	4	7	7	10	4	36
CLL 059	5	2	3	3	9	7	29
CLL 062	2	2	0	2	1	0	7
CLL 119	2	1	0	2	1	1	7
CLL 120	4	6	4	5	3	0	22
CLL 201	3	5	3	10	8	3	32
CLL 202	3	1	3	6	7	6	26
CLL 203	3	1	3	7	7	4	25
CLL 204	3	2	2	6	5	2	20
CLL 205	3	1	0	2	2	1	9
CLL 206	6	8	7	6	6	3	36
LOG 101	8	15	13	11	11	3	61
LOG 102	7	8	15	12	10	2	54
LOG 103	8	10	22	20	15	4	79
LOG 200	3	8	18	17	18	4	68
LOG 201	3	8	17	17	19	3	67
LOG 204	4	9	17	15	13	2	60
LOG 206	4	4	13	16	12	3	52
LOG 211	2	5	5	6	12	2	32
LOG 215	5	10	11	11	8	1	46
LOG 235	7	11	24	27	15	8	92
LOG 340	5	6	7	13	16	8	55
LOG 350	4	5	11	11	23	10	64
LOG 365	2	2	1	7	11	10	33
SYS 101	5	3	7	8	8	1	32

Notes: n=40 for 2d Lt, n=49 for 1st Lt, n=143 Capt, n=107 for Maj, n=93 for Lt Col, n=42 for Col

Appendix J: Respondent Open-Ended Comments

Respondent ID	Open-Ended Responses	Keywords
3547658842	When 21As leave the flight line/wing-level, the emphasis on the 21A 623s go out the door	
3547659634	I believe that we do a great job of training our officers. The current problem is that there isn't enough of us so that we can build experience. Currently, all of our junior officers and most majors are serving in a job that is meant for the next higher grade. This creates a large experience gap.	**Training**
3547660642	21A training needs to be geared towards becoming Lifecycle Logisticians. We need to understand how maintenance fits into the bigger picture and be able to create efficiencies by knowing how "systems" work together.	**Training**
3547662249	I haven't been to AMMOS, but feedback that I get from one of our grads is that the course is overly centered on fighter/bomber aircraft and doesn't address other airframes very much. We exercise generation flow plans once, maybe twice a year in my CAF unit, so spending 6 weeks working GFPs and munitions planning doesn't help us much.	**AMMOS**
3547663433	I am currently assigned to a Air Logistics Complex and I feel as though I am complete useless to the organization due to having no understanding of the way the units works and due to unit civilian culture that doesn't know how to properly utilize military members.	
3547665977	Need to consider 21As working at the COCOMs, HQ, or MAJCOMs.	
3547671911	Please note that I am on the Air Staff, so most of the "MX 101 fundamentals" listed (scheduling, managing people, etc) don't apply.	
3547679297	I would like more training for the FGOs including Colonels. I would like the opportunity at a higher rank for the Air Force to pay to get a Doctorate's Degree instead of just at the Captain/Major Level. I would also like pre-training before I enter a new job...for example, I would like to take courses about working at a Depot/SPO before I arrive.	**Training**
3547681505	Devise a more deliberate training/education program for 21A based on AF need or individual-expressed desires for development (i.e. req'd depot sprt education vs. life cycle sustainment vs. combat employment). Identifying these tracks would be a more deliberate approach to creating (from early on) 21A senior leaders with specific SKAs, strengthening the 21A enterprise.	**Training, Leader**
3547690507	The world of maintenance is like a crap shoot. Unfortunately, mx officers lead the largest amounts of people from the start and require minimal training and experience. There are more washouts from other career fields in mx than any other AFSC that I have seen as well as a large number of prior enlisted members, most specifically from mx so the learning curve is astronomical. It is difficult to train everyone when there is no standard level of training. In addition, it seems that extracurricular and presentation of one's self means more for promotions and recognition etc than basic job duties and taking care of mx and one's people. This leads people to not only neglect the more important things, but also to sabotage others. It is so competitive to make yourself look good on a premise that doesn't even benefit the af's mission. It would be beneficial to cut several programs replace emphasis and taking care of people and mx instead of volunteering for the CGOC/LOA president and leading every volunteer event available.	**Training, Career**
3547690922	There needs to be more of a focus on developing FGOs...it simply can't be a "you've arrived/now apply" philosophy. Opportunities need to be afforded to all ranks and skill levels, not just to CGOs/HPOs.	
3547692925	better way to earn a masters while we PCS frequently.	

3547693278	With AMOC and MOIC/AMMOS, we have a good foundation. We lose fidelity beyond that. Unless one is in an Acq billet, the acq/log coursework is not advocated strongly and has been hard to keep up with changing locations/formats.	**AMMOS, MOIC, AMOC**
3547700027	There is currently not enough focus on 21A education or training. The deliberate continuum of learning sounds good in theory but most of these courses CGO's have never heard or nor do they know how to access. Either the information is not getting pushed down from the top or there is a break in the chain and the info is not reaching all the way to the bottom. Further, where is there a model for what classes you should be taking at what point in your career? There are nearly 100 different classes, what do our senior leaders put most value on? Is there a sequential order you want us to follow when signing up for classes. Are these classes things we do on our own time or things we take time away from work for? Finally, 21-101 specifically states that there needs to be a formal training program for accessions to the MXG... I have yet to hear of a group that has a formal training program other than knocking out your CFETP on your own time.	**Training, Leader, Career**
3547705005	CBTs do nothing to increase performance in our actual job. Retention is next to nothing and application is hit or miss. The time required for some DAU online courses is not worth what you receive. We need more courses like AMMOS. It is the best education that I have received in AF career. It is hands-on, relevant, and effective. It has made me a better maintenance officer where no other course I've taken has.	**AMMOS, DAU, Career**
3547708815	DCoL must begin with the end in mind...i.e. what are we looking to develop? I believe 21A/Ms should be developed to be future ALC CCs, ALC Directors of Mx, HAF/A4s, etc--a goal separate from the 21R end state of CCMD/J4s, JS J4, or DLA leadership. DCoL continuum should be built to achieve these ends. Like the idea of combining the log education/training courses to get more bang for buck and consolidate current ad hoc management.	**Training**
3547709210	Recently completed AMMOS and heard that the goal is to make AMMOS 100% through-put. Do NOT do this. About 40% of my class struggled to make it through the course and probably didn't need to go through that course (their careers wouldn't have suffered if they didn't go). For the other 60%, time was lost keeping the 40% up to speed and making sure they passed. AMMOS has traditionally been the Advanced course and needs to stay that way - a lot of the basics of AMMOS are taught at MOIC now, let the people who aren't ready/don't want to/can't handle advanced work go to MOIC and stop. Let those who want to push themselves further have that opportunity by keeping AMMOS as the advanced course and making the class sizes smaller than 24 people.	**AMMOS, MOIC, Career**
3547714767	Best course I have ever taken was AMMOS. Prepared me for several future assignments and helped me mentor junior officers/SNCOs. Most other courses (MOIC, LOG 299/399, etc.) were a waste of time in comparison. AMIC/JEMIC were both educational, but limited in affect to my primary duties.	**AMMOS, MOIC, AMIC**
3547715886	Aircraft maintenance officers are thrown to the wolves and must learn on the fly. We receive very little deliberate education. What we often do, is personally engage in our own developmental education at the cost of our families after a 12 to 16 hour day. We are treated poorly but have to maintain standards far above all other agencies that work on base. my question is, why even ask if at the end of the day nobody will ever do anything for us anyway.	

3547718333	There are a lot of choices for DCoL on the previous questions. Because there are so many I'm not sure which would be best for a Mx Officer to attend. Additionally, this was the first time I've seen a list of what classes are required to receive a Lvl 1and Lvl 2 certification for Life Cycle Logistics. This would be good info to share with the 21A community on a recurring basis, as many times we focus on doing our jobs and hope that someone is out there vectoring us to these opportunities for advancement.	
3547726553	The questions about how much training do I feel is required do not make sense. Question 5+ is unclear on whether I should mark how competent I should be vs. how competent I am. The description says that N/A means I do not need knowledge /or/ that I have no knowledge. Those do not mean the same thing, thus to not skew the results I marked all N/A. Also, 21A should be combined with the LRO career field. Mx officers are basic managers and negotiators, with no real marketable skills in the outside workforce. To retain Mx officers, more desirable training should be offered that would increase overall proficiency and critical thinking ability.	**Training, Career**
3547727909	My current position within an Active Associate severely limits my ability to learn/apply learning at the same rate as my peers. There are less funds available, host MXG does not request/fund active training, no opportunity for growth, no active duty training taking place nearby.	**Training**
3547741990	21A education needs to be focused at the combat wing level because that is the core of our personnel work. The other logistics courses are great to have but in order to be effective #1 there needs to be a requirement for the training. Is it nice to have or is it absolutely necessary. #2 training needs to be in line with the officers development...should we send Lts to AMIC or JEMIC when they are still learning what an aircraft is? Good to have yes...but is this the most effective use at resources.	**AMIC, Training**
3547745017	Good luck finding someone to pay for school.	
3547756551	We need to continue to grow our experience in the joint environment. Additionally, we need to consider cross flows into 21R in order grow our logistics background.	
3547760440	Advanced degrees should be tracked by DISCIPLINE not just level. 21A should be encouraged/required to take MBA and in particular Operations Management specialties.	
3547793223	I did not get the point of many of these questions...in terms of training as a whole, I always feel like I'm thrown into jobs with little to no training. Then, after I've been in the job for several months, they make me sit through this course and teach me stuff that I've already figured out. I understand however, the challenges with funding and whatnot...what can you do?	**Training**
3547798917	The 21A career field is flawed at best.	**Career**
3547815757	Educational opportunities need to be tied to associated job opportunities	
3547842185	Timing for training seems to always lag the need. Other than AMOC, formal training came after I needed it. By the time we go to MOIC or AMMOS, we have so much experience it serves more as a refresher than as an education. The DAU and AFIT LOG courses come based on your location and access to those courses. We have more junior officers filling senior leader positions, but we limit the senior leader courses by rank and years of service. So the officers doing the job, can't attend until they are well passed the timeframe that it would have been useful. My opinion, we need to focus less on "filling blocks" and more on time sensitive training. For example, before you go to an ALC, you get the depot relevant training. Or before you're an operations officer, you attend MOIC. I know it won't always work out that way, but it should be the objective.	**MOIC, AMOC, DAU, AFIT, Training, Leader**

3547860184	As a senior maintenance officer, I spend the balance of my time working logistics issues that have very little to do with the specialty of aircraft maintenance and everything to do with the broad topic of logistics in the joint environment. We need to provide our young maintenance officers with the education and experience to rapidly develop as maintenance experts (and tactical leaders) while providing the off ramps to grow as joint logisticians (with a corporate mindset) as they develop as senior officers. At the senior level, the 21A career field is woefully underrepresented in the joint community.	**Leader, Career**
3547860837	A building block approach should be used to develop our 21As...currently, we are expected to "figure it out" and complete "2-4" courses of our choosing. Define what's needed and establish a solid path of training/development. I'm glad to have options, but it's only through happenchance that I've stumbled across courses that have really helped my career as a 21A.	**Training, Career**
3547888595	AFI 21-101 is a great start for Acft Mx Officers to begin the journey of learning the acft mx business. The issue is we MxO's all get really good at Tech Data, Forms, Metrics ... that's great for base level mission completion, but very few mx officers truly understand the acquisition and requirements side of spare parts or acft they manage. The same goes for the acquisition 63A types who doesn't understand the impact of sustainment in an operational environment. We need to do a better job of teaching the "why's" of our craft once AFI 21-101 runs dry (3-5 yr mark), meaning the ALEET program needs to be at least tripled in scope for cross-pollinating both 21A and 63A. I think the 21A community can all agree that the effort in attaining fleet performance is limited by the quality of the acquisition and sustainment programs. When I would show C-5 RERP Prgm Review slides to my troops, they would be in awe that such things were going on within the Acq/Log world without their knowledge of it, and be thankful someone was giving them a peek behind the curtain of what was coming to either help them or when they needed to prepare for change. Not understanding both sides creates false pretenses in both communities that lead to wasted focus, effort, and man-hours that create ineffective artifacts being worshiped within the associated communities. The command path within the pyramid must learn to value this cross colonization of 63A/21A more than exec time or staff time. It's the only way we create all up logistic rounds within the acft community, GO's like Maj Gen Poly Pyer or Lt Gen Andy Busch is what you get when you do it right ... you can have those kinds of skill sets at the FGO level ... you NEED those kind of skill sets at the FGO levels.	
3547906083	I think 21As are left to just figure things out. We don't have a lot of education in tech school that is really applicable to daily life.	
3547976676	In the past 8 to 10 years I have seen an attempt to minimize the significance of the 21A career field. It has become more difficult to send maintainers to courses and get them the training needed for success. I see a push to make a 21A become a 21R. While 21As call themselves loggies we are not. 21As are specialist in aircraft and leadership of Airman. The importance of the 21A career field on the flight line has been lost by highlighting the challenges faced, the money and weapon system cost of depot maintenance. 21As will never regain the foot hold in AF leadership because they have been watered down and described as loggies. The future of the 21A career field is dim because AF leadership believe a that operators can do the job. While in some cases this may be true a well-trained 21A will always understand the maintenance of the weapon system and the leadership required for the maintainer far better than an operator. The same could be said for the operator career field a maintainer will never lead a flying squadron because they don't employ the weapon system.	**Training, Career**

3547995064	There are not enough opportunities in today diminishing manning environments. I have been signed up to take 3 classes, but due to mission requirement were unable to complete/attend. It's almost like the people who aren't performing get the opportunity to attend the courses, while those who are "star performers" miss out on the opportunities.	
3547995680	I would see the best value for improved education of 21As to center around a concept close to what a distance learning system works with most universities or the blackboard system Air university uses. I would like to see less CBT style distance learning and more discussion/written learning. I found taking most CBT style courses that I was waiting for a page to load with some fancy graphics and a video with little actual content to the section. As for content of what is taught at in residence courses, I found MOIC to be utterly lacking in presentation and up to date information. I was shocked when they presented in class how AFMC depots were structured and then we visited Tinker and they had a new structure. An entire command had moved faster than the school house and they knew their info was out of date but had not updated it because it was time consuming. I was selected as a alternate for AMMOS, but did not attend, however I did have to do a pre-test for them. They used a outdated AFDD-1 for several of their test questions. Again school houses should not be teaching/testing on outdated information. It not only wastes the4 students time and effort, but it wastes AF resources.	**AMMOS, MOIC**
3548079461	A Mx Officer should be provided the Opportunity thru Education and Hands-On Experience to Obtain many of the Special Cert Items such as Engine Run, Bore scope, and ultimately obtain their A&P Certification. DAU and CLL Courses should be made more Available and Advertised for the Value in Learning they Offer a Mx Officer in their Career	**DAU, Career**
3548137885	AMOC is pretty worthless in the long run. So much time and effort is placed on the simulator in the last block. The simulator is not handled like real world and we are told that we are graded based on how we perform according to the simulator rules. The thing is that we are actually graded on real world applications instead of how the sim allows us to do it.	**AMOC**
3548147773	The main problem with the DCoL is that it's not continuous. We have a couple mandatory steps along the way, but no real clear effort to continually educate our folks in the career field. There needs to be an effort to train/educate young 21As in the TTPs, and they need to learn earlier than I did how the various base functions interact, including in deployed environments.	**Training, Career**
3548151244	The 21A training program does not give 21As an opportunity to perform a/c mx. AMOC should include a portion where 21as actually learn on an operating flight line. This could be performed at Sheppard with the T-38s, or a TDY prior to arriving at the first duty location. The current limited manning of 21as does not afford new Lts the opportunity to spend time learning mx - instead they are forced into roles as AMU OICs and then up to MOOs by the time they hit Capt. The 21A community will soon have Sq CCs who have not spent time understanding the rigors of a/c mx - they will just know how to get thru a meeting. Either plus up 21A manpower or add hands-on flight line training during initial skills before starting duty at first base.	**AMOC, Training**
3548192187	AMMOS should be for the best performers and not an automatic course like MOIC	**AMMOS, MOIC**
3548197770	With so few mx officers why do we put so many 61Xs into 21A/21M positions? These folks are bright but they get put into key positions commensurate with their rank TIG but not with their experience level, many times within AFCENT. They just aren't experienced enough to be filling Ops O level jobs with only 2-3 years in the career field. I'm sure they are great engineers and the concept looks good on paper but they are being asked to lead entire squadrons. This creates a vast	**AMMOS, MOIC, DAU, AMIC, Training,**

	disparity in what a squadron may get for an Ops O. You could have a senior O-3 AMMOS/MOIC grad on their 5th MDS and 4th assignment who worked their way up through all the back shops and AMUs or a squadron could get an engineer fresh out of the AAMOC. The training, especially AMMOS (even the its current rendition) is spot on. I attended both MOIC and AMMOS. I thought MOIC was valuable until I went to AMMOS. The advantage; AMMOS makes you practice using the knowledge you just gained. It was painful but useful. Every 21A/M needs to attend AMMOS within 1-3 years of pinning on O-3. DAU has a lot of valuable online courses to offer...IF YOU CAN GET THE COURSE TO LOAD. Why is that site such a pain? Loose the simulated story line and the irrelevant pictures and get down to brass tacks. ACQ101 is 40 hours! Really? More Mx'er AMIC slots. I learned A TON about Mx mgmt in AMIC though the class room was full of flight suits. Need a more even split of Mx'ers/ops. It really hit home the importance of discipline and gave a clue of the types of things that can cause catastrophic damage.	**Career**
3548265897	Trend Analysis of Maintenance Performance lagging Indicators to affect Mission Capability & Aircraft Availability should be taught earlier in career rather than just understood as a mid-Capt to develop more critical thinkers/leaders versus just reporters.	**Leader, Career**
3548327068	We need to change the way we train 21As; give a more structured career plan for education. The plan should include recommendations for AFIT and DAU courses as well as PME and advanced degrees. The goal should be to develop the broad, advanced skills described earlier in this survey.	**DAU, AFIT, Training, Career**
3548357876	More clearly defined TBA requirements--do something, not just "observe and understand."	
3548358907	Disconnect with expectations for junior officers capabilities and realities of what they can provide. Adequate training and giving them the opportunity to fail by doing is important. Critical thinking is lacking and stifled by senior leaders who are unwilling or afraid to challenge the norms. Maintenance officers are losing the ability to make maintenance and logistics decisions and rely too heavily upon technical representatives and contractors who are generally in advisory roles. Many senior maintainers are unwilling to challenge the status quo and won't even take minimal risk as we've created a "one-mistake" mentality. Being undermanned and under resourced drives decision makers to over analyze and consistently avoid any appearance of risk without a way to shift blame when issues arise. Young maintainers don't know how to read technical data and make informed decisions or recommendations. Not addressing enlisted training issues or accountability by overly using temporary mechanism such as IPI to Band-Aid repair deep organizational issues without going back and redressing the training or tech data procedures to ensure a solid fix is in place draws valuable 7-levels away from working the real issues.	**Training, Leader**
3548362834	I am currently attending the Advanced Maintenance and Munitions Officer School CSC 15A. This course is phenomenal but I believe we lose something by focusing on throughput vice quality of instruction/content. Be sure that this is the most demanding and rewarding course I have ever taken in my Academic and Professional career however I believe the community benefits from returning to a model that is based on the weapons school model of being more selective and taking more time with every student. I believe this is the greatest force multiplier as we would then have the smartest core of tactical experts possible who can take the knowledge to every wing and be counted on as a SME.	**Career**
3548408389	DCoL should be tailored to assignment driven actions (i.e. once selected for assignment, certain courses should be accomplished prior to reporting). Once you are in position, it is very difficult to disconnect from daily events to get DCoL training unless it is mandated requirement.	**Training**

3548434189	The HBS Course offered by DAU are also of great value to 21As who desire to further develop their maintenance skills.	**DAU**
3548555486	I work in acquisition in an APDP Life Cycle Logistics (LCL) Level III position (CAP), so my data is probably at the end of the normal distribution.	
3548572261	Should have included a way to identify courses that an individual had taken that did not increase personal knowledge, e.g. SLMG	
3548635006	21A CFETP education is inconsistently tracked and enforced among wings. Not enough emphasis is placed on learning how to do things...more "be familiar with"	
3548866171	This survey is further evidence that there is a huge gap between the concerns at the Air Force-level and the unit-level logisticians. Both are important--but the knowing how to manage depot inductions has zero relevance to running a maintenance (aircraft generation) organization on a day-to-day basis. This survey was obviously aimed at how to create air staff or depot logisticians--as the huge majority of courses referenced (seem to) have zero tactical relevance in a sortie generating organization.	
3549036830	I think the CFETP for new 2nd Lts can be greatly improved. I believe we are starting off our new officers on the wrong foot in regards to training.	**Training**
3549135084	I firmly believe mx officers should be taught stats/analysis/root cause analysis and change management at AMMOC. From Day-1 mx officers should be able to read/interpret guidance, be able to implement performance measurement tools/track progress, and affect change (the people side) as required. TTPs for negotiations should also be taught at AMOC as part of the change management process since we require many resources and services that are outside of our control. The biggest shortfall I see in mx officers from accession to SQ/CC is the ability to conduct detailed analysis, negotiate for ever-decreasing resources, and successfully implement change through collaboration vice pure direction.	**AMOC**
3549297359	Need to train all 21As for AMMOS, we're too thin to be selective. We need everyone operating at the same level. There are no other schools that teach wartime taskings and not only AMMOS students have to fill those slots.	**AMMOS, Training**
3549358509	AQ courses are based on benefit if moved into an AQ program, otherwise thus far not having AQ background has not been a factor.	
3549408996	In class room learning provides the best way to learn, and personally I have felt a lack of opportunities to go to these classes. While fellow co-workers have gotten opportunities to go to many if not all of the in class room training courses. Over all 21A training as always felt to me as learn by doing experience (and getting chastised) rather than be trained on how to do your job. I am not sure if this is because what we do can't be taught and learning by doing it is the best way learn it (and develop a tough skin), but sometimes I feel like there could be more training and less getting thrown to the wolfs.	**Training**
3549735438	The 21A career field (like most AF AFSCs) is very stove piped. While 21Rs seem to be more versed in "logistics" than 21As...we are exposed to logistics, but are not experts. Should we be? Should we have a career field called Aircraft Generators(ion) vice Aircraft Maintenance or Logistics Readiness? Maybe every Aircraft maintenance officer should have an ALC tour to expose them to AFMC (vice relying solely on LCPB). I've enjoyed being a 21A and have had great experiences/opportunities because of it. Others will have a different opinion. I remember the days of there being opportunities for cross flow amongst Maintainers, Supply Officers and Transportation officers. Maybe this concept should be brought back for 21A/Rs...to widen the capability of our "logistics" community.	**Career**
3549740674	Time needs to be built in early in a young officers career to facility learning. To many times a young officer is thrust into a situation that they have neither been trained in or have experience in. We need to take the time to develop our officers, instead of always relying on the school of hard knocks or learning as you go!	**Training, Career**

3549742601	The education and professional development of 21As is much more focused in programs like LCBP and organizations like LOA, but this focus has not yet filtered down to the operational/field level. Commanders in the field are focused on meeting mission requirements, handling disciplinary issues, and enlisted force development. CGO professional development is not deliberate.	
3549751698	I feel that because we are not vectored until the 10 year mark, education and training is a free for all, you get what your base can give/get you but there is not direction, so you get basics all over the place.	**Training**
3549763800	Majority of learning takes place during OJT. Most of the classes and courses I have taken have not been applicable to Wing level work, though they did apply to my MAJCOM Staff job. Unfortunately 21As are stove piped in maintenance, allow us to branch out into joint jobs or 21R work and these courses might be relevant.	
3550451723	hands on application w/ usage and discussion of real/current unit challenges would enhance group learning forums. We need training that is not so strategic or advanced that we cannot immediately relate it to the work that we deal with on a daily/recurring basis.	**Training**
3550922800	I am the only 21A in my organization, which is a TFI. There are 21As in our partner unit which is why I cannot accurately gauge how other 21As compare. As for the logistics courses, a large number of the DAU and AFIT courses are at too high of a level to be really useful for a maintenance officer at an operational wing.	**DAU, AFIT**
3551604509	- Develop an AMMOS - Distance Learning course - Allow other Exec positions to qualify for duty position in upgrade	**AMMOS**
3551873946	I only have 2 yrs in the service, I believe my answers to be skewed	
3552004075	I recommend MOIC be taught earlier in officers career; prior to Captain/3-4 years. There are many Lts serving as AMU OICs that could benefit from this training. Then AMMOS at the 6-8 year point.	**AMMOS, MOIC, Training, Career**
3552477724	With resources diminishing, there needs to be crossing of 21A/M/R core competencies to better round out officers in order to face future LOG issues. With a "Jack of all trades, master of none" approach, will require a need to educate the AF operational community the LOG community is evolving and thus not as specialized as it today via strictly 21A vs. 21M vs. 21R.	
3552620776	We provide a good base for our 21A officers and based on the direction the individual wants to pursue--the avenue is available but not always taken due to leadership advice. The portfolio is pretty complete...	
3552679312	I feel there should be more emphasis placed on joint logistics education. In the joint world we are not only looked at as solely a 21A, but rather a 21X (general logistics professional).	
3552690846	More emphasis is required for officer training. It is great to have these courses listed in the CFETP but without supervisors, commanders, Senior Leaders stressing the importance of follow-on training, no one is going to do them.	**Training, Leader**
3552724652	When possible, I believe it's better to send new 21A officers to an operational assignment for 3-6 months before AMOC. This gives them actual experience with organizational structures and processes before they get the academic/school house version and improves their ability to understand.	**AMOC**

3552746470	I have been in USAF Aircraft Maintenance for 24 years--as a prior enlisted Maintenance Officer I've had the opportunity to perceive AF Mx Officers from a number of perspectives. I am very convinced that the AF Mx community would gain so much if we made the AMMOC Instructor positions a highly coveted, sought after, and promotable position. In the medical community only the best of the best get to teach the upcoming Doctors--we should do the same in Mx. Presently, the "non-volunteer" instructors are uninspiring and our young Mx Officers are emerging from Technical School uninspired and less motivated than expected. Inspiration at Tech School would do a lot to launch them on an exciting career path!	**Career**
3553487396	21A career field is all about management of people, processes and things. Adding some project management professional courses would enhance the 21A maintenance officer to accomplish more on a daily basis. It should be taught throughout the career. Or maybe become part of the certification to be a maintenance/logistic manager.	**Career**
3553519161	some questions hard to answer. I currently have 5 authorized officers in my squadron and I am the only one assigned. Also level of proficiency would determine skill level needed. Also the one officer I did have was an ALEET cross flow.	
3553547000	The online courses and training are not helpful. They are simply "boxes" that must be checked to advance in the career field	**Training, Career**
3554016863	The current target audience for AFIT courses seems to be higher than it should. Most feedback I receive from attendees is that they wish they knew that info as a SSgt vs. a MSgt, young Capt vs. a Major, etc. Therefore, I think most courses could open the target audience one to two grades lower than they currently are.	**AFIT**
3555421991	It seems that the 21A career field is all over the place in grooming future 21A leaders. 21A's are bred (mostly) to be group commanders. Education/training needs to be focused to that target. Anything else is fluff and a waste.	**Training, Leader, Career**
3557722972	21As are being placed in demanding positions much earlier than they were a decade ago. Many of the core maintenance management courses should be tacked onto AMMOC to orient them to more maintenance management philosophies so they have a broader knowledge before they reach the grade of First Lieutenant.	
3559294781	Career Broadening is not encouraged enough. Any experience outside your normal career field gives you the bigger picture when you come back, where you can help others understand why some things are done the way they are.	**Career**
3559410651	DAU courses provide absolutely no value to any duty performance. I'm currently sitting in an acquisitions billet, and even then, the Lvl 1 requirements have been worthless to me. By far, the most valuable course I have attended so far is AMMOS (or CSC now).	**AMMOS, DAU**
3559569611	Not enough on-line courses are available for Log Officers to round out there education. Getting AFIT courses is too limited, and too costly to organizations.	**AFIT**
3559609145	I feel there is a need for additional training for 21As filling staff or depot positions. Having completed 2 MAJCOM staff tours, I noted a significant gap between what my duties required and what I had been trained to do. A short course (online or live) covering acquisitions basics, title 10, CORE, etc. would have been helpful and enabled me to hit the ground running when I arrived at the staff (as opposed to spending my first few months trying to get spun up). There are likely other positions that 21As fill that would benefit from some form of "pre-assignment" course that outlined the basics. These could simply be voluntary, online courses available on an "as-needed" basis.	**Training**

3560827769	To succeed on today's flight line, maintenance officers must be skilled in their specific discipline first. Although the acquisition/logistics disciplines are of some value, the transformation of "maintainers" into "logisticians" has diluted the critical skill set needed to accomplish every flying unit's first mission - to generate sorties by maintaining a healthy fleet and workforce. Rather, this focus has turned maintainers into part time LROs, and in many cases has relegated Mx'ers to taking up the slack on the logistics side while still shouldering their full Mx responsibilities. Maintenance leaders must understand and be able to communicate their sortie generation capabilities AND limitations in terms of fleet and MOST importantly, workforce health. Mx resources are greatly constrained in stark contrast to their ops counterparts resulting in an unquenchable thirst for sorties from a waning capability. The ability to set the standards which equate qualified, available manning to front lines is crucial in preserving a healthy fleet and workforce. Going with no spares, flat turns, inverted turns, adding tails to the schedule, leapfrogging crew chiefs VS going in with sufficient numbers, two-go Fridays and weekend duty as a norm all work towards eroding an already weary workforce, and degrading an aged fleet of aircraft by robbing Mx crews of the crucial time they need to "fix it right the first time". Maintenance leaders must know maintenance first - scheduling, metrics interpretation, manpower planning, leadership, forecasting the next "gotcha". One general officer about 6 years ago briefed LOA "maintenance is just another source of supply". This statement along with eliminating the word "maintenance" from AF organizations at the MAJCOM level has negatively impacted career field focus at the AF's detriment. Maintainers are maintainers first, not logisticians. They must be PhDs in Mx first. As a maintenance squadron commander a level 2 Acq certified captain is worthless to me on the flight line if they can't perform as a maintenance professional first. Mx standards, leadership, scheduling, forecasting, investigation, risk management, negotiation and enforcing standards should be the initial focus in the development of maintenance professionals.	**Leader, Career**
3561529461	Please just be clear on what the DCoL consists of and what is important to senior leaders and those that would like to be a senior leader one day. Is breadth or depth more important?	**Leader**
3562132278	While I have taken many DAU courses because they were required I do not feel they increased my ability to perform my job.	**DAU**
3565848002	I honestly have to say that as a young Maintenance Officer, I had tremendous mentorship from my MOOs and Sq/CCs, all the way up to my MXG/CC. I believe this is where my foundation was developed. They instilled in me a mentality of "self-betterment"...more specifically, if I want to learn, there's only so much they can do. I had to take it upon myself to do the extra work to apply all of the knowledge I gained. However, I understand this is not standardized across the 21A career field. Being a 7-year Captain (Log Career Broadening Officer), I have attended multiple formal trainings and have seen great officers, and some not-so-great. And the trend always seems to be the same with the latter: Poor Mentorship. I feel DAU and ACQ training can only go so far. It's necessary to have that Champion in the organization who pushes/supports/encourages a culture of learning and mentorship. By the time you are a Captain, I feel it's too late. As we are socialized as children to learn right from wrong, LTs are socialized in the same manner early in their career with regards to safe, sound, and effective maintenance practices.	**DAU, Training, Career**

3565894163	There are several challenges to improving maintenance education. First and foremost is our career progression. There is no incentive to take the continuing education courses, they are hard enough or inconvenient enough to make it extremely discouraging when we are already doing more with less. I would love to learn more about these topics, but I don't want pass/fail tests, a strict timeline to complete it, or time-intensive CBTs to labor through. And if I fail a test, I definitely don't want my Gp/CC or Sq/CC notified in order to reset it. I learned more about my job and my role in the AF by attending AMMOS than any other event or course I've taken. Now that AMMOS is for everyone, it went from being a prestigious badge of honor to another way of selecting people (those who fail) for the next RIF. Year one of the new program and it is already being dismissed as a significant accomplishment on our OPRs. The career field is already so competitive that any energy spent on a continuing education course beyond the core requirement is a waste of time because it requires diverting energy and limited time from doing things that "get noticed." Unfortunately, I would rather put energy towards my Master's Degree which I chose to support my career, but have found it to be completely useless and a waste of time, money, and energy. It is supposed to be masked now, but it still influences our ability to get a "DP" and means far more to our Leadership Chain than any of the Logistics Courses. Depending on your base, even organizations like LOA are discouraged because it is considered wasted effort. We have a culture of learning under fire and those who fail get fired.	**Career**
3565898941	As 21As there is not a ton of officer to officer mentoring. Pretty much everything I know is because I have SNCOs that cared enough to walk me through the basics and teach me scheduling, Maintenance 101, how to act and react in certain situations, what types of discipline are applicable to specific instances and when is verbal counseling enough, etc. I have friends who do not have SNCOs who care and they are way behind when it comes to leading an AMU. Most of my learning has been "on-the-job" and the mentoring from my superintendent.	
3565903452	AMOC was a waste of time. It is very fighter-centric and does not do a lot to help out 21As at mobility and heavy bases. MAF MOC, on the other hand, was a fantastic course that was taught at McGuire, and I was glad to see that it was added to the required classes for new 21As in AMC.	**AMOC**
3565915123	I am a 21A assigned to Arnold AFB, TN which performs a ground T&E mission. I do not perform many normal duties like a 21A assigned to an operational or depot. My answers to the previous questions will reflect this difference.	
3565925302	Stop changing tasks on the CFETP, or at least grandfather us in! I keep having to redo sections I have previously completed. Also, the online courses are too dull to learn anything.	
3565988898	I am currently in a joint billet and am considered a loggie (though I'm a 21A) If we are going to be labeled as loggies in the AF, outside of the AF, or both, then we need more training. I understand the importance of knowing how to get from point a to b when the boss asks but if we have 21Rs who do that, then why am I considered a loggie? Shouldn't we be leaning on the 21Rs and not the 21As? I find myself way behind the power curve at this joint job compared to my brother and sister loggies from other services. Either give us the training or start leaning on the LROs. I understand having the knowledge of deploying my unit but I shouldn't be the go to every time.	**Training**
3566041033	I am currently assigned to an RPA unit which is still within the acquisitions process and going to be going into IOT&E. Learning in depth about the acquisitions process, how we fit in, and how we can make the system work with us would be extremely helpful. Also more items which revolve around not just logistics, but also a comm. infrastructure would benefit RPA 21As.	

3566089621	After PBD720 manpower cuts, the need for more in depth training for young 21A/M accessions became essential. After the recent force management initiatives, that training became critical. 21A allocations have dwindled to the point where positions once held by senior, seasoned "Iron Majors" are populated with mid-level Captains with a fraction of the experience. Because overall numbers of 21As have declined while the demand for trained/CMR aircrew has not, the workload has stayed the same or in some cases actually increased with FTUs funded to 110% when the three year average funding was between 80-90%. With fewer Mx Officers trying to lead fewer mx technicians to fly the same or a greater number of sorties on an ageing airframe limits the amount of deliberate OJT senior Mx Officers can provide due to the overall workload and sets the stage for negative second and third order effects not too far down the road.	**Training**
3566193963	A general lack of manning precludes many from seeking or completing many training opportunities.	**Training**
3566199307	I feel it is imperative that we cycle young 21A through the depots (create more depot slots working on the production lines) to learn that process at an "early age" and not wait until they are O-6s before they get their first "taste" of depot maintenance...by then it is just a "ticket punch" and they are missing out on utilizing those skills throughout their career	**Career**
3566221111	I'm not a big believer in using "Very" in survey questions. It can skew your results....Interesting survey, I would be interested in the findings.	
3566231676	This is my 2nd base where I have no 21As in my squadron, but instead have all Op Ex officers. Where are the 21As?	
3566332716	Focus more on agile combat support for junior officer. AMMOS a must for every career 21A. Focus in developing COAs for senior leadership. More focus on 21As being able to articulate Mx capabilities and understand operational rqts. Developing COAs to achieve shared successes between the Ops and Mx community.	**AMMOS, Career**
3566378372	AMMOS should go back to the longer course version. This version provided 21A/M's with a superior education. I understand not everyone could attend this version; however, I also believe that's what makes going to the course worth it, especially when you are trying to groom/bring-up the next generation of Mx officers. There's also a problem with crossing MAJCOMs...some officers stay almost their whole career in one MAJCOM and learn nothing else, like MAF, then get a multiple MDS Sq/Gp/etc and have no experience other than what they can remember from AMOC. Either we specialize completely into SEI-types (MAF/CAF/NUC/SOF) or there needs to be more education throughout your career so when you move to other bases you aren't starting from scratch. I believe you shouldn't stay on one platform or in one MAJCOM your entire career as this limits your perspective and can be debilitating once you become a senior officer, which I have seen many times. Lastly, we are just not making Mx officers like we used to...not sure how soft we've gotten but MXGs don't run meetings like they used to when I was younger, for example, and you don't see the same expectations/pressures put onto officers. This only hurts us in the long run as we need officers who are competent, confident and ready to take on challenges. This along with all of the manpower drawbacks where our good officers are volunteering to get out and the loafers are staying in, continues to drag down the 21A/M community and our reputation in the Wg/AF. If only there was a way to look at an individual's work ethic and personality prior to commissioning as a Mx officer to ensure they were fit for the job...	**AMMOS, AMOC, Career**

3566484476	Would like to see more Logistics and Maintenance courses offered at base level or regionally. An traveling team with several experts could teach a course or two at base level and then proceed to hands on exercises working actual deficiencies or problem areas at that base to reinforce the teaching points.	
3566862573	Aircraft Maintenance Officer IDE/SDE should be an internship with Boeing, Airbus, UPS, FedEx, etc	
3566877007	I have taken quite a few courses but can't remember which ones. I now work in an Embassy so I am not in a MX capacity.	
3566884796	A plan for on-line and formal courses for the 21A/21M should be outlines at each wing org and funded to allow for development. Funding and availability is predicated on how important this is to the commanders or the MAJCOM. Getting classes and the appropriate funding becomes difficult and it is feast or famine. JEMIC should be something combined after AMOC...AIMIC should be fully funded for MX officers.	**AMOC**
3566910139	Our MX TTPs should be made the standard curriculum at AMMOC along with teaching the fundamentals of maintenance organization. This is because teaching LTs about aerodynamics, LRUs, etc. AMOC needs to prepare LTs who can generate mission ready airmen and aircraft for immediate combat operations.	**AMOC**
3567210479	I feel that too much emphasis is put on the logistics portion of this career. I feel are job is to know aircraft and how they fit into the Air Force's plan as far as needs and capabilities, and to have those aircraft ready when they are needed. All of the education you can give a person will not necessarily make them a better officer. All of the skills needed cannot be learned.	**Career**
3567434957	Do not know if it was just me but the 21A career field in my opinion has done generally a rather poor job in advertising and advising members about what courses are available or are recommended outside of the CFETP.	**Career**
3567532199	I would say that we don't do a very good job of training mx officers beyond the basics. AMOC and CFETPs are a start but after that, everything is OJT. Life cycle logistics/sustainment is important but only a few officers get to experience depot operations. It's been a long time since I've taken the DAU classes. I took them while I was at the depot so the learning was reinforced because people spoke that language. Taking the DAU class while in a field-level job ends up being a "square filler." Mx officers have a very limited knowledge of supply operations. Most know MICAP and that's about it. The TTPs are great. Wish I had them as a young Lt! I don't have the answer to fix officer training/make good recommendations because I haven't given it a whole lot of deliberate thought (failure on my part!). The biggest frustration I've seen over the years was the level of expectation that an MXG/CC had for AMU OICs regarding troubleshooting/fixing aircraft. They were expected to be the technical experts on all things which they aren't trained for and shouldn't be. There definitely needs to be a deliberate approach to training after the basic level but I don't have many thoughts at this time.	**AMOC, DAU, Training**
3567588954	If we are going to keep the CFETP I believe we need to keep the leadership/mentoring aspect as well. We have used the CFETP as a crutch that allows leaders to say they are training, but the true aspect of interaction has been lost. From my personal experience of not being assigned to both MAF and CAF aircraft (not the same aircraft twice) the human interaction and getting involved with the organization and my supervisors is what made me successful....not my CFETPs. I still don't have all the items "signed off" yet I am a graduated CC 3x. We need to emphasize a more "intern" approach and putting the young officers in situations to let them make decisions and learn from them.	**Training, Leader**

3567661796	The 21A career field utterly fails to provide adequate training prior to assignment placement. Our best trainers are SNCOs and Chiefs, and we occasionally have leadership that can afford the time or funding to provide mentorship or actual training. If assigned to a flight line position, send the officer to job-specific training en route or provide it immediately upon arrival. If assigned to a depot or more logistics-core function, this is very different than flight line and requires specific training prior to arrival. All Mx Officers should receive industry-standard project management training (Project Management Body of Knowledge - PMBOK) as part of AMOC. Most of what we do is project management of some sort, yet there is no training on industry-proven concepts and techniques. I cannot overstate the value of SNCO/Chief mentorship to officers, and the inadequacy of the 21A training plan which is nothing more than eyewash...more specifically, the execution of any structured plan.	**AMOC, Training, Career**
3568093026	I believe we need to do a better job at explaining how a young Lieutenant's everyday duties tie into the bigger Air Force decisions. It wasn't till I became an Exec for a Group Commander that I realized why my everyday duties as a Flt/CC or AMU OIC were so important. I did not know anything about reading an ATO, reporting readiness to MAJCOMS and COCOMs... I reported on broken airplanes and personnel disciplinary issues, but did not see how it related to the bigger Air Force.	
3568719417	I have been placed in positions where I was junior to the position's requirements in rank; where I felt under-qualified and under-experienced. While I have been thus far successful, I believe I would have been (and would be) more successful if I had enough experience and rank to fill the jobs that are being asked of me. With each job I have had to learn totally new things as fast as I can while carrying responsibility for mission execution... I am afraid that I will one day fail to do so quick enough at the detriment of the mission and my people.	
3568963997	I have heard rumors there is talk of combining 21A and 21R career fields; I do not feel like this is setting up brand new officers for success. The broad content of what would be required to truly understand both of those career fields is too much, especially when the AF is becoming smaller than it's ever been before. Based on numbers alone and the AF downsizing, 21A CGOs have a lot more on their plate than ever before in the AF.	**Career**
3571070119	There is a great need for training within the maintenance community...not just for officers. We place men and women in important roles with little to no training on those specific duties (pro-supers, AMU OICs, MOOs). If there is training, it is not sufficient...because it is a local product...i.e. it is up to whoever is at AMOC or on staff at the time to develop the program (I hear the ACC Pro-Super training is going to CBT...that is hands down probably one of our most important training requirements and it will be conducted via CBT?!?) I have heard MANY individuals laud the training accomplished at AMMOS and that should be the best practice to build from. We are WASTING money when we send individuals to training that they learn nothing from. There is value added it taking some (not all) of the AMMOS curriculum and making that mandatory for all MXOs and selected SNCOs (since SNCO numbers are higher). However, there needs to be a "Weapons School" equivalent program and it must be in the Weapons School. Maintainers fix and fly aircraft...and that's what they must be taught alongside their OPS partners. There is SO much synergy to be gained from maintainers learning alongside operators...but then we MUST ensure those Weapons School trained personnel go back out and teach! If they fall under the Weapons School, they will be tracked and this will happen. Yes, part of being a maintenance officer is the depot and that is an important piece and it must be taught as well...but if as a maintenance community, we believe that is our priority, then we've completely lost focus on our mission. I do understand that is the best way to make general…or so I've been told.	**AMOC, Training**

3571651140	The tools to learn are there, but the time doesn't always exist to complete these courses while performing a wing level mx job (especially in-residence courses). I also don't think the classes are advertised well, and commanders don't always push them to the younger officers.	
3572478941	AMMOS needs to return to a more robust course. The newest generation of graduates are not producers, instructors, or advisers. After the stand down and course rewrite graduates have not impressed me. Also we as a community need to vector depot mx officers to help build adaptive sustainment packages based on deferred mx.	**AMMOS**
3572636457	More courses need to offered online through a variety of methods, as I am unable to access secure AF web in my current assignment location.	
3574244378	The basic logistics courses offered to 21As are very high level and really don't provide much insight to the topics discussed.	
3575985254	I attended MOIC and shortly thereafter AMMOS. I feel there is value in looking into what the value really is of having two separate courses. I found MOIC to be very simple for where I was at in my career (2 year Capt with all Mx time), and AMMOS to be slightly behind when it would have been more valuable. I went to AMMOS after having been AMU OIC x2 and felt it would have been better prior to being an AMU OIC. Timing is always difficult but if there could be a way to focus the curriculum on what AMMOS teaches, and really try to target the time based on development, I view that as a good thing.	**AMMOS, MOIC, Career**
3578825879	Being overseas, some of the courses are not offered. My base only gets a few seats for AMIC for the entire FY. Those seats must be spread out between everyone authorized to take the class. Sequestration has cut into maintenance officer training and will hurt us as we progress through the ranks.	**AMIC, Training**
3579441835	Most of our training and skills we acquire as maintenance officers come from the on-the-job training we receive. One thing that has been extremely lacking in the five years I've been in this field is a lack of officer progression at the base level when it comes to a plan of where they will progress through job titles. Leadership gives minimal to no guidance for when young officers will move into other jobs or what direction they are heading in. Instead, they hide behind the saying of "do a good job where you are and the rest will fall into place". This saying has a lot of truth to it, however, it's also important to know how much time you have in one duty title to help pace yourself for future plans. It's important for both the member and the mentor. For example, as a young LT, if you keep getting pulled from back shop to back shop with less than 6 months in a flight, you lose the ability to establish ownership and true responsibility for the information being passed in or out of the flight. Without this buy in of ownership, young CGOs miss the chance to truly grow their leadership skills because all they do is bounce from place to place. In addition, if a senior CGO (Capt) or mentor is given a young CGO (Lt) or mentee, it's difficult to provide a good deal of future guidance without the knowledge of how long they will be in that unit for. Overall, the lack of base level progression is more than disappointing and quite frankly, it's a disservice to young officers. We wonder why we have retention problems or lack of leadership skills by the time officers reach the MOO or even squadron commander level. I think if each MXG was forced to come up with a fluid, but structured progression plan for all its officers (instead of making decisions as they are needed) and we look ahead at least two years, we would see a dramatic improvement in all these areas and then some.	**Training**

3579474449	The knowledge required for success in a maintenance organization for a 21A should be based on understanding of the mission, analysis of the shortcomings of the organization and general understanding of how to fix it. Trying to make the maintenance officer an expert in multiple areas is a recipe for disaster and does not allow the enlisted experts lead their particular areas. Additionally, while AFIT and DAU offer great courses that can provide the level of information needed to work in AFMC (product development or product sustainment), they are not as useful for personnel in the field and should not be required as such. Be careful of any additional educational workload that is levied onto personnel for training in preparation future assignments.	**DAU, AFIT, Training**
3579845806	I am a maintainer, not a loggie. While they are directly related, my focus is aircraft and not classes of supply. We are required to be more specialized as a result of the delicate nature of the aircraft maintenance profession and how quickly things can go wrong. We go hand in hand and need to understand each other, but are still very different for a reason. I also think we need to broaden our horizons when it comes to understanding logistics and become more like our joint brethren in the sister services; have logistics encompass more of what we deal with all the time so we are able to operate more fully in the joint world (something that is becoming more and more important in the current environment). Even if organizationally stay the way we are, we need to understand how other services work better to get a big picture perspective. Maintenance and logistics training needs to be better represented as well; currently we have a smattering of intermittent training that is mostly online, which does not appeal to most. Joint training would probably be the most preferable, to get the most bang for our buck and understand different perspectives and avenues that we can take so we don't reinvent the wheel. We can also use this to ensure that we understand the differences between maintenance and logistics and why they are different in our career field. Ultimately, we are vastly underrepresented in education and training and rely a lot on experience (which will vary based on leadership). There needs to be additional information available in the event that that learning is not taking place from the leadership and operational level. And seriously, I am not a loggie. Stop it.	**Training, Career**
3580555773	I am a maintainer, not a loggie. They are different given the delicate nature of aircraft maintenance and require more specialty to properly maintain for a long period of time than other services. We are hand in hand, but not the same...for a reason. I also think we need more joint training, we need to better understand how everything works outside of our organizations. Logistics itself in the Air Force would do well to align itself with other sister services, but 21As are a breakout given the specialty. We need to get better at seeing past our noses when it comes to logistics. Additionally, maintenance and logistics are vastly underrepresented when it comes to education and training. I believe we rely too much on experience, which will vary based on leadership. If there is nothing to offset, then we are putting things too much into one set of hands at the operational level and it is shortchanging the up-and-comings who could be doing so much better. We need to be better represented from an educational perspective; we have a smattering of classes that are mostly online and don't do much for us. With the amount of resources 21As are in charge of, shouldn't we invest more into folks to ensure that we aren't being unknowingly wasteful of flippant with resources? There has to be a balance between in-class education and OJT to really ensure we are doing ourselves justice. And seriously, stop calling me a Loggie.	**Training**
3582018147	Majority of DAU courses are not specific to MX, no need to invest in the course unless you are going to go into a position that you will use it. Need courses for the flight line maintainer where cross-tell can happen. Simply visiting other bases and seeing how other units operate as part of education/training can make 21As think a bit more.	**DAU, Training**

3590487617	I'm confused by the endless emphasis for logistics training that is not core to what 90% of what 21As do. Only a small percentage will ever lead in an acquisitions or logistics repair network yet look at what courses are offered. Once the majority of Mx officers complete AMOC, they will only receive additional MAINTENANCE training through MOIC and AMMOS.	**AMMOS, MOIC, AMOC, Training**
3590504402	My experience is primarily in fighters and RPAs. I think MOIC comes too late for most 21As to use what they learn to be better at their jobs. I think anyone can be a Flight Commander, but you need to know what you are doing to produce combat airpower. The more we can teach scheduling, configuration management, weapons loading, and generation the better. Learning lifecycle is great, but OICs and Ops Officers that work on the flight line need to understand scheduling and fleet management. They also need to know what their pilots need to fly to stay current in their qualifications to meet their OPLAN requirements. They should be able to know how to prep for night flying, and managing split configurations all the while being able to generate and then reconfigure for daily flying. Training should be tailored and focused to make them better at doing their jobs versus learning about logistics and life cycle management.	**MOIC, Training**
3590505813	We should partner with 21R/M to develop a joint intermediate course to benefit us with deeper understanding of our own career field and broader understanding of others. The current intermediate course does not apply to all who take it - big missile guys get little from it, although the principles are the same. Creating a joint course could open deployment opportunities to 21X instead of specific to each career field. At the O-5 level, we are no longer "workers" and are managers. While being technically proficient is helpful, it is not required to be a good manager and leader. What is required is an understanding and ability to apply to given situations.	**Leader, Career**
3590511355	It looks like the way that maintenance officers are trained on flight line ops is to make mistakes, get beat up for those mistakes, and then hopefully avoid the same mistake twice. I would rather become an expert first, then do the job I was trained for. Instead, I am asked to do a job that is better suited for a senior captain. As it is, two Majors, a Lt Col, and a Col all breath down my neck and criticize every mistake I make while I am left to conclude that the AF gets what they pay for.	**Training**
3590539069	Shrinking TDY budgets mean more of these courses need to be offered either in Road Shows or online even DCO if possible. For example the JEMIC, AMIC and Board President courses- we need more 21As trained but can't get slots..EVER.	**AMIC, Training**
3590543438	Our career field should provide for a two track career path. One for operational maintenance officers with the occasional break for the staff job and the other for tech training/other maintenance duty positions. There are many of us who were put into career paths outside the operational/flight line maintenance assignments causing us to lose the necessary maintenance experience to keep pace with our peers who have gained the proper education/experience. Yet at the O6/Group CC level, we are expected to lead a maintenance group with only an intermediate working knowledge.	**Training, Career**
3590673697	Need to add a standardized list of core tasks for an Ops immersion and LRO immersion.	

3590705085	Prior to attending AMOC, I believe all new 21A's with no maintenance experience should spend time at their first assignment prior to going to AMOC at Sheppard. The training can be a fire hose to the face for many and it seemed in each class there were a number of 21A's that had been to their base prior to attending training. They had all said this helped them understand everything much better than those that went straight from ROTC, OTS, USAFA, or another commissioning source straight to Sheppard for AMOC. (TDY Enroute). They were able to see things and piece the training at AMOC together from their time in their unit. I also believe that every base should have a Maintenance Officer Training Plan to accompany the CFETP tasks. A set amount of time each officer can spend in squadrons learning and completing tasks prior to being thrown into the fire of their first job or title. They will only be assigned to learning and completing the CFETP tasks during the time and will have no additional duties. That way the unit can allow the 21A with no maintenance experience to spend time after training just focusing on, developing on, and applying what they have learned at AMOC. Every squadron is different and they are all very unique in their own ways. The Maintenance Officer Training Plan will allow the officers to learn their organization and complete CFETP at the same time without any other distractions.	**AMOC, Training**
3590727434	Some things you can't learn from a book or CBT. Leading (and following) in Maintenance is far more challenging than the academic element.	
3590763929	Questions answered from an AMXS/CC perspective.	
3590774266	NO CBTs, we don't have time so we blow through them and get very little. Adopt the road-show dynamic for those that are applicable to multiple AGE groups our provide training/teaching materials to MTFs on base to have their AMMOS grads, SNCOs, or FGOs teach the courses. Also consider revisiting what is covered in MOIC and AMOC and incorporating more than flight line basics.	**AMMOS, MOIC, AMOC, Training**
3590812640	I feel we do a pretty good job of training and mentoring ourselves. Being married to another officer in a different career field that isn't Ops I really see the lack of mentoring and education in her career field. We are way ahead of the curb when it comes to writing, supervising and general Air Force knowledge.	**Training, Career**
3590851466	What advanced logistics courses are offered at ACSC as electives? If still none, why not? AFLMA is across town??? How about a series of accredited road courses that culminate with an MS degree by the time you're a senior captain?	
3590902136	The Aircraft Fam course are a must. You don't see them on the bases anymore but it's a must for Mx Officers. We move from one airframe to another and are expected to pick up the differences over night. I know the basics are still there but it helps a lot getting an intro to the aircraft.	
3590949538	Our community needs to have Career Development Course to bridge the gap between AMOC graduation and MOIC attendance. I'd recommend splitting the Acft Mx TTP into 3 sections and build a course from that.	**MOIC, AMOC, Career**
3590972976	I think we need to have more in-depth system knowledge like our Ops counter parts have. AS a Mx officer we should have at least the same working knowledge as our counterparts.	
3591000490	my answers a skewed as I'm serving on a remote and all our officers are on a 1 yr tour. The skill set we need is CAF sortie generation. Our career field doesn't seem to value this much and it shows across our fleets.	**Career**

3591137228	AMMOS is supposed to be a highly sought out school for all 21A/M's but since the curriculum has changed, the course and students we receive aren't to the caliber it used to be. Our school is very underutilized from across the logistics platform in the AF as well as from the A3 community. The A4 community needs to be better at utilizing grads and sending problems, issues, concerns to our cadre to fix things. The school also needs to stay exactly where it's at because we have the ability to reach out to several organizations on Nellis that help TTP's for maintenance and we have the ability to easily adapt to changes and make course corrections if required. I do feel that instructors lose out on several great opportunities in the 2-3 years they are here and need to be pushed more for things like AMIC, JEMIC, CWPC, JAOPC, SIB/AIB, etc.	**AMMOS, AMIC**
3591287465	Make 21A earn a PHD in aircraft mx	
3591527824	I am currently serving in an unorthodox 21A role as an advisor to coalition forces. I just arrived here however and completed this survey from the perspective of the unit I just departed. 116th/461st ACWs--A TFI unit	
3591611438	Munitions and munitions systems should be included. Shadowing Production Supervision and being thrown into the fire on the line is the best form of learning.	
3591625996	I would have liked to attended the MOIC course before I pinned on Captain. Once you have served as an AMU OIC the course is a little late. After serving as an Asst AMU OIC would be the right time to attend.	**MOIC**
3591634622	OJT is critical to officer development. Focusing courses like the AMC Mx officers course, and the ACC Flt line Mx Ofcrs Crse, to develop the actual skills, vice concept introduction, is critical to establishing an advanced baseline for Mx officers. With the removal of ASBC, there is more time in junior mx officers first years to allow for advanced, post AMMOC, concept development that will assist with bridging basic skills training and AMMOS. Likewise, the incorporation of depot experience into a 21As career is a stepping stone to the "other" side of the Air Force. I think it would be prudent to plan tours through the ALCs as a second or third assignment, to build to core logistics mindset we need to harness the eLog21 concepts we practice today.	**Training, Career**
3592274212	There's not a lot of structure and most places doesn't even push the TBA on most LTs, and even the ones they do, they still suck.	
3592284693	Not enough maintainers have knowledge and expertise outside of core activities...need more emphasis on learning the rest of the logistics enterprise as well as the acquisition, test and evaluation phases in efforts to effectively impact the sustainment of all weapons systems.	
3594063477	Based on experience with having gone through LCBP and having spoken with AMMOS graduates I feel LCBP is more relevant to our business as it concerns logistics. No doubt there is great information learned in AMMOS but have not seen it used in the active duty force so far. We either need to do a better job of institutionalizing the course and what it's graduates are expected to do or get rid of it and use the resources elsewhere.	**AMMOS**
3594283353	The entire 21A community needs good education directly relating to our career field. AMMOS CSC is an excellent course for 21As and should be available to reach 100% of our community vs. an elite few. 21As should have opportunity to take CSC 4-8 years time in commissioned service. In-classroom education vs. on-line courses is invaluable to good career progression. On-line courses should be used to enhance, but not substitute for well-timed in house education in a formal classroom setting.	**AMMOS, Career**
3594876301	21As get a lot of specialized training and they need to be able to apply that training on the base level for several years...particularly we need to get every 21A at least 2 years of direct sortie generation experience.	**Training**

3598459064	21A/M's should be sent to MOIC before they become AMU OICs, regardless of rank. The information taught there would have greatly benefited both my Airmen and myself. Several of our older FGOs (currently in command positions) seem to be very uneducated on the Mx and Logistics enterprise--which is rather disappointing. However, I feel like I've received a good amount of education in my almost 6 years in Mx--we need to keep it up! The current FGOs are demonstrating why we need to be educated experts in our fields.	**MOIC**
3606490799	21A Training is well established, but coming out of training leadership should have officer establish what has been learned	**Training**

Appendix K: Thesis Quad Chart

Antecedents to Organizational Performance: Theoretical and Practical Implications for Aircraft Maintenance Officer Force Development

Captain Andrew L. Cooper
Advisor: Lt Col Joseph R. Huscroft
Reader: Lt Col Robert E. Overstreet
Department of Operational Sciences (ENS)
Air Force Institute of Technology

Problem Statement:

The 21A career field lacks a clear understanding of how force development practices influence organizational performance

Investigative Questions:

1. What is the relationship between the learning organization (culture), human capital, and knowledge management of 21As and organizational performance?
2. What are the competencies for which 21As require proficiency?
3. How proficient do 21As need to be in logistics competencies for them to do their jobs?
4. What are the current Air Force logistics course offerings?
5. What courses have allowed 21As to perform their current jobs better?
6. Among the courses 21As have not taken, which courses do 21As feel would have allowed them to perform their current jobs better?
7. How do 21As classify their duties (tactical, operational, strategic)?

Hypotheses:

1. 21A human capital has a positive impact on organizational performance
2. 21A learning culture has a positive impact on organizational performance
3. 21A knowledge management has a positive impact on organizational performance

Implications & Recommendations:

- DCoL is an investment in human capital
- Tailor education & training based on 21A proficiency requirements
- Review portfolio of logistics courses for curriculum relevancy – potential savings ~ $90-$900K per year

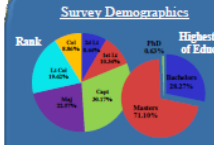
Sponsor: HQ/A4LF
Force Development and Organizations Division
Headquarters USAF, Washington, DC

Methodology:

Cross-sectional self-administered survey (42.9% response rate), Exploratory Factor Analysis & Multiple Linear Regression

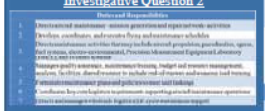
Results and Analysis:

Survey Demographics



Investigative Question 1

Investigative Question 2



Investigative Question 3

Investigative Question 4

AFIT School of Systems & Logistics	Misc. AF Logistics Courses	Defense Acquisition University Courses
25 Course Options	19 Course Options	72 Course Options

Investigative Question 5 & 6

Investigative Question 7

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14. ABSTRACT

This research explored the impact of Aircraft Maintenance Officer human capital, learning organization, and knowledge management on organizational performance. Survey methodology was utilized to gather data with both theoretical and practical implications on 21A force development practices. Solicitation of information regarding 21A competencies, utility of current AF logistics courses, and latent constructs were conducted through a web-based self-administered cross-sectional survey. Examination of the latent variables human capital, learning organization, and knowledge management was conducted using exploratory factor analysis and multiple linear regression supporting a positive effect on organizational performance. Practical application of the theoretical findings could yield potential cost savings through the consolidation, restructuring, or removal of logistics courses currently considered under the 21A Deliberate Continuum of Learning. Implications for researchers, practitioners, and senior 21A leadership are discussed along with limitations, recommendations, and areas for future research.

15. SUBJECT TERMS
Aircraft Maintenance Officer, Logistics Officer, Logistician, Human Capital, Learning Organization, Knowledge Management, Organizational Performance, Force Development, Deliberate Continuum of Learning

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