



**Education, Experience, and Organizational Enhancements Necessary to Develop the  
Army Acquisition Workforce**

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09 April 2020

This research paper presented to the Defense Acquisition University for partial fulfillment of the academic requirements for the Army's Senior Service College Fellowship (SSCF) under the direction of SSCF Director, Michael Chandler, and Research Advisor Major General Retired (MG (R)) Vinny Boles.

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**Approval Page**

Title: Education, Required Experience, Leadership, and Organizational Enhancements to  
Develop the Army Acquisition Workforce

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Date of Paper: 09 April 2020

Informed Consent Forms: Not required

Research Advisor [MG (R) Vinny Boles] Approval Date: 16 MAR 2020

Second Reviewer [Dr. Dana Stewart] Approval Date: 18 MAR 2020

SSCF Director [Michael Chandler] Approval Date: 09 APR 2020

OPSEC [Michael Knapp] Approval Date: 09 APR 2020

**Disclaimer**

The views and opinions expressed or implied in this research paper are those of the author; no agency or department of the United States Government has officially sanctioned any of these view and opinions.

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### **Acknowledgments**

I would like to thank my wife and kids for her unwavering support during the numerous travel sessions, late nights, and weekends that I worked on SSCF activities.

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### **Abstract**

This research seeks to answer the question of “what education, experience requirements, leadership, and organizational enhancements should the Army make to develop the Acquisition workforce?” The 2018 United States (U.S.) Army Strategy highlights the urgency of getting the right mix of Acquisition human capital talent to produce the warfighting capabilities. The Army Talent Management Strategy for 2025 describes the need for competent personnel as the “overall strategic personnel objectives of enhancing readiness, sustaining a workforce of trusted professionals, and ensuring we have diverse and integrated teams across the enterprise” (U.S. Army Talent, 2016, p.4). This study aims to establish whether current and future Army Acquisition community members should shift to a mixed type academic focus, such as Management of Technology (MOT), where there is a combination of hard science with business. The research should assist senior Army leaders in executing the talent management strategy in a manner that effectively facilitates the Army’s long-term Strategy and the Army Vision. The paper highlights the challenges senior leaders are facing in assessing the education, experience requirements, leadership, and organizational enhancements necessary for the Acquisition workforce leaders of the future. The retrieval of information focuses primarily on private sector organizations, which are used in a comparative nature against the government—specifically the United States Army. Additionally, the research addresses academic preparation through analysis of information in the areas of technology careers, education attainment, dual/individual career development, promotions, and management trends. After the completion of the analysis in these five areas, there is a presentation of recommendations in Chapter 5 that focus on resolving the Army Acquisition talent management aspect of the broader Army problem.

## **Chapter 1: Introduction**

### **Problem Statement and Context**

Senior U.S. Army leaders are concerned the service is not efficiently utilizing its human resource talent. Specifically, a key issue listed in the 2018-2020 U.S. Army War College list of study topics is “To what extent does the Army optimize its effectiveness at the individual, organizational, and societal levels of the human dimension?” This theme, Theme #8, is broad and relevant to many different Army organizations. However, aspects of sub-themes 8.2 and 8.11 are directly relevant to the U.S. Army Acquisition community. The two sub-themes are:

- Theme 8.2 Assess the Army’s effectiveness in identifying the traits, education, training, and experience necessary for leaders of military organizations to be effective in the future environment (U.S. Army Key Strategic Issues List, 2018, p. 34).
- Theme 8.11 Analyze leadership, cultural, and organizational changes the Army should make to enhance its technical workforce (cyber, space, and science, medical, and technology experts) (U.S. Army Key Strategic Issues List, 2018, p. 34).

A better understanding is needed regarding employee performance expectations, the skill sets that require further enhancements, skill sets that will be of increasing value in the future and the type of work opportunities employees or leaders need to participate in that will depict a holistic representation of promotion and career growth potential.

### **Study Purpose and Research Gap**

The overarching focus of this study revolves around how senior Army Acquisition leaders can implement an updated talent management strategy to support the Army Strategy, vision, and preparedness. The study will aim to establish whether the focus of individuals with clear aspirations for leadership or managerial careers within the Army Acquisition community

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should shift their academic focus to a mixed type education, such as MOT, where there is a combination of hard science with business. Additionally, there is an obvious mismatch between the skills required in the private sector in comparison to those in a defense organization. There exists a significant amount of literature on technical skill development in the private sector, but there is a lack of literature how technical proficiency will influence the selection of leaders and managers in the U.S. Army Acquisition organizations. Additionally, there is limited study material on whether future leaders and managers within the Acquisition Corps should possess a commensurate level of business-management knowledge in-lieu of technical proficiency to facilitate career advancement.

Army civilian employees do not all define career success or growth as receiving a promotion to a next higher position. Career development is not always upward mobility, but more of producing an atmosphere that cultivates personal and professional growth, challenges, and job enrichment. The need for skilled manufacturing executives within the U.S. results in excessive costs in enlisting and training because of complexity in getting the best individuals within the organization (Owens, 2010). Inequitable leadership promotions of business management personnel, contrasted with science-educated employees, functions as the basis for this qualitative study. The requirement for leader proficiency in various skill sets increases the level and regularity of training and amplifies the difficulty employers have when seeking employees with the needed skill sets.

### **Research Question**

What education, experience requirements, leadership, and organizational enhancements should the Army make to develop the Acquisition workforce?

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### **Background**

The 2018 Army Vision and Army Strategy documents the expectation “the Army will prioritize development and promotion of smart, thoughtful, and innovative leaders of character who are comfortable with complexity and capable of operating from the tactical to strategic level” (U.S. Army Strategy, 2018, p. 2). As the Army moves forward, there is a need for smart leaders, who are both technical and management savvy within the Acquisition community. As part of the development of smart leaders, the study points to Line of Effort #3, Reform, in the Army Strategy, focusing on the need to “push authorities that is competent and capable of using them to allow for expeditious actions and decisions” (U.S. Army Strategy, 2018, p. 9). From a Talent Management perspective, the 2016 Talent Management Strategy states the labor market needs employees who can add knowledge to the Army Enterprise. The Army Workforce Management Framework subsection of the Talent Management Strategy discusses the need for hiring authorities to include personnel who have developed knowledge, skills, and abilities (KSA) to fill what were previously developmental gaps. As concluded in the 2016 Talent Management Strategy, there must be a retention of personnel with in-demand talents, broad KSA possession, and a desire to want to add value to the Army Enterprise (U.S. Army Strategy, 2018).

### **Study Scope**

In focusing on the issue of manufacturing sector managerial promotions, this study discusses how the type and level of post-secondary education influences the availability of qualified manufacturing employees available for promotions within the Army Acquisition Corps. When placed in the context of a framework for human resources management, the issues of academic preparation, employment within the manufacturing sector, career development, and performance are relevant to workers seeking promotions. The needs of the Army are becoming

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very similar to the requirements of the Manufacturing Sector, specifically, the need to better optimize the personnel currently conducting work crucial to the defense of the nation. Within the Defense Sector, technically educated workers possess a wealth of industry technology specific knowledge. Specialists within technical organizations have become more common, which typically require employees possess the expertise for swift and constant innovation. These issues relate to the basic elements of both the Human Capital and Career Development theories.

### **Study Limitations**

The most important limitation in constraining the study to an assessment of U.S. manufacturing sector organizations is the accuracy of determining which form of education, along with level of employee skill development, is most important to selecting employees for leadership and managerial promotions. Although the study focuses on the manufacturing sector, there is the deliberate exclusion of specific industries aside from the defense sector. The study also excludes the use of first-hand collected data, is strictly written from a U.S. only perspective, and should not be construed as being indicative of the academic, employment, career development, management, and promotion realities that may exist in other industrialized nations.

### **Discussion of Key Terms**

There will be several terms appearing on a regular basis throughout the paper and are significant enough to be considered a key term when assessing promotions within manufacturing sector. The following key terms are important:

- *Technical and Individual Contributor Ladder*: The technical and individual contributor ladder is a structure designed to meet employee diverse career interests by formalizing promotions. The technical and individual contributor ladder provides a managerial career path along with technical advancement of equivalent prominence. The technical and

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individual contributor ladder serves as a system for promoting technical professionals without removing them from their specialized employment.

- *Management of Technology (MOT)*: A way to reduce the disparity between technical and business-educated counterparts is through MOT education. This idea lets technical and business experts raise competence through the integration of science, engineering, and management into an organized academic program. MOT links engineering, science, and management to influence objectives.
- *Skilled-biased Technological Change (SBTC)*: New technology requirements based on competition and modernization have resulted in an increase in the request for skilled technical employees. Consequently, SBTC is a modification to the production of technology that prefers skilled labor to unskilled labor.
- *Human Capital*: A resource at the organization level that focuses on individual knowledge, skills, abilities.

## Research Chapters

- Chapter 1 provides the basis and structure for the research study. The information includes the problem and context, purpose and research gap, research question, background, study scope, study limitations, and key terminology.
- Chapter 2 provides a review of the applicable literature focusing on the effects of academic achievement on performance and promotion success.
- Chapter 3 presents the research methodology and provides comprehension of how the different aspects of the study influences the research topic.
- Chapter 4 presents an assessment of the overall findings of this study.
- Chapter 5 discusses the management implications from this study.

## **Chapter 2: Literature Review**

This chapter addresses the U.S. Army Strategy, U.S. Army Talent Management Strategy concerns, and then provides a substantive discussion on the different aspects of senior leader selection within the Army Acquisition workforce. The discussion focuses heavily on employee education, KSA development, and the implications to managerial competence, selection, and promotion. An assessment of career development patterns provides evidence about employee motivational factors, the dual-ladder career path, and decision-making.

Understanding individual career motivations is an important aspect of delineating the success or failure of technical versus non-technical employees. Career development influences, the influence of tacit and explicit knowledge development on professional growth, and the aspects of managerial promotion potential are critical to the foundation of this study. Thus, workplace performance and supervisory support will complete the discussion about an employee's motivation to compete for senior level promotions and the influence of performance on senior leader's selection of lower level managers.

To frame this research about senior level promotions and the role of individual competency and performance in Army acquisition sector. The literature review begins with a description of themes and linkages, followed by a synopsis of theories that support explanations of factors influencing promotions in Army organizations. An interpretation of theories occurs throughout the review and precedes the discussion about how academic institutions are updating curricula to satisfy changing industry requirements of new college graduates.

### **Theoretical Lenses for this Study**

There are many ways to examine the influence of technical competence and knowledge as grounds for increasing promotion potential and opportunities. Extant studies, such as the one

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conducted by Drucker (1990), shared viewpoints about the impacts of technical knowledge and education on public sector individual performance and promotions. Drucker viewed the future success of managers as dependent on the worker honing and combining management skills. As working age adults progress forward as active members of the Army labor force, numerous theories support career selection and progress. The theories presented below are relevant to gaining an understanding of the promotion patterns of technical and business management personnel via utilization of quantitative and exploratory studies, along with assessments of current research. These theories support the explanation of factors affecting academic preparation, employment, career development, and performance, all of which influence managerial and leader promotions.

**Human capital and skill development.** The premise for use of the Human Capital Theory (HCT) in this study is that employee acquisition of skills and knowledge enhances the worth of the employee to the employer. Gary Becker, an economist, developed the HCT as a way of defining how the link between education and skill training and the worth of an individual to a community or an organization. From an organizational perspective, the finding is that growth is associated with the level and amount of investment made in human capital promotion.

Research conducted by Clinton and Laurence (2008) indicate that employee possession of the right mix of skills and knowledge is crucial and are a direct result of the education employees receive and the on-the-job and professional training supplied by the employing organization. The technical knowledge and skill requirements of Army organizations, when possessed by employees, support the organization's primary focus of developing and fielding capabilities in defense of the nation. Additionally, enhancements in productivity gains occur

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through training and experience, both of which make the employee an asset to the organization (Ng & Feldman, 2010).

**Career development and perspectives about success.** Although the Career Development Theory (CDT) has cultural implications to the decision-making process, the discussion in this study will limit any mention of cultural implications. In making a career choice and facilitating the development process, employees require an environment that allows the maximum growth and utilization of skills and abilities. In the application of this theory to the engineering community, a sizeable segment of new engineering graduates does not immediately commence a career in the field for which they were educated (Tillman & Tillman, 2008). Although a strong job market for engineers exists, a sizeable percentage of engineers leaving post-secondary institutions find work more suitable in fields that balanced technical and managerial tasks.

Execution of technical tasks is crucial in defense organizations dependent on technology to overmatch our global adversaries. However, managerial tasks play a significant role in the success. Competent leaders and managers must know how to groom and grow personnel through career development opportunities that supports defense organization goals and productive work processes. Competence becomes even more important at the supervisory and managerial levels within an organization.

### **The Army Strategy**

When examining the 2018 U.S. Army Strategy, there is strong language focusing on the urgency of attaining the right mix of Acquisition human capital talent to produce the warfighting capabilities needed to overmatch our adversaries. A casual observer might assume the Army focuses on engineering in-lieu of other skills sets based on statements such as "... we will

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prioritize research and development on our six modernization priorities defined by the Army Modernization Strategy and listed below” (U.S. Army Strategy, 2018, p.6).

Throughout the strategy, the Secretary and Chief of Staff of the Army comment on the need to overhaul the Acquisition system. The focus is clear in the following statement:

At the same time, the Army will overhaul the current Acquisition system to accelerate innovation and technology development. The Army will work with defense industry, university, and private sector partners to pursue opportunities for combined research and development on emerging technologies. (U.S. Army Strategy, 2018, p.6).

From a business management perspective, leadership will seek to increase efficiency through automation and streamlining of acquisition contract management and budget execution processes, the consolidation and divestiture of legacy Acquisition systems auditability of our resources (U.S. Army Strategy, 2018). Program management changes include scrutinizing and prioritizing every Army program, developing low-cost solutions, and maximizing our return on investment (U.S. Army Strategy, 2018).

### **U.S. Army Acquisition Civilian Talent Management**

The U.S. Army Acquisition workforce plays a crucial role in the defense of the nation. Acquisition professionals of all educational backgrounds have daily responsibility for the development of weapon systems utilized in the defense of the nation. Engineering, Contracting, and Logistic skills make up around 60 percent of the Acquisition workforce across DoD (GAO-19-509). Across the U.S. Army, 38,400 (96 percent) of the 40,000 personnel facilitate innovation within the capability development community. Acquisition professionals must design what is deemed to be impossible in order to provide needed national security systems (USAASC, 2020).

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From a KSA perspective, the workforce changes as a response to the life cycle phase of the program. According to Government Accountability Office studies, the difference between technical and business personnel during the concept development to sustainment phases vary (GAO-19-209, 2019). Up front, the Army has a significant engineer workforce with the expected transition to a smaller cadre of engineer and technical staff, more management, and more business management personnel in the post-production phase. Yet, Program Management personnel (~9.5 percent), mostly business educated, form the core of the senior leadership across the Acquisition force.

The U.S. Army Talent Management Strategy for 2025 describes the need for competent personnel as the “overall strategic personnel objectives of enhancing readiness, sustaining a workforce of trusted professionals, and ensuring we have diverse and integrated teams across the enterprise” (U.S. Army Talent Management Strategy 2025, 2016, pp. 4-6). The Talent Management Task Force tasking is to develop a new talent management system that supports near and mid-term reformation to the personnel system starting back in September 2019 (U.S. Army Strategy, 2018, p. 10). The challenge facing the Army Acquisition community, and the Enterprise, is identifying and synchronizing the hiring of individuals with in-demand talents and integrating incentives and opportunities that do not meet those of the private sector (U.S. Army Talent Management Strategy 2025, 2016).

Planning for a talented Acquisition workforce is essential to delivering capability requirements needed by the Army (GAO-18-217, 2018). As highly complex technological capabilities become the norm in product development, the Army will compete more with the private sector for skilled personnel whose competence can decline over time without the required training . As leaders plan future activities, there is a realization that although the Army civilian

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roadmap identifies and addresses potential gaps in experience, it has not resulted in personnel attaining the wide range of program management competencies achievable by civilians seeking positions of higher responsibility.

**Career path determinants.** Based on the dynamic changes occurring in capability development and the types of skills needed, the employment model of the 20th Century appears to be antiquated. There is growing concerns the talent management model that has been in use since the 1990s will not provide Army Acquisition organizations with the employees that are multi-task-oriented. For the younger workforce, expectations of simply becoming an expert at one skill set is insufficient, if there is a plan to seek promotions to higher level. The transition from a job-based approach to a competency-based approach influences the makeup of the workforce (U.S. Army Talent Management Strategy 2025, 2016).

The need to be more skill-oriented is focusing Army Acquisition organizations to more closely focus on the recruitment and development of employees based on specific work-related task descriptions rather than broad scope job descriptions. This type of transition is time consuming because it requires extensive organization human capital restructuring. The strategy for such change occurs over a long duration in order to allow the proper transition and training of employees, while limiting risks to the organization (Hutchins, 2004).

According to Inkson and Arthur (2001), the future success of organizations is dependent on investment in the careers of employees, with a strict focus on maintaining or improving the status of the organization—*employee personal growth is second in nature*. Yet, employees become a liability to the organization if their KSAs do not translate into greater efficiency and value-added productivity. Results of research in this area show that organizations with a competitive-based human resource approach are more prepared for the demands of a changing

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environment than are organizations with a long-term job-based focus. According to Nepal, Yadav, and Solanki (2011), changes to organization structures require employees to partake in rapid learning and skill-changing programs with the aim of making their work more valuable and helping the organization perform more effectively. These pressures spur organizational changes, which require employee hiring and promotions to be dependent on skill possession in lieu of maintaining employees strictly from a longevity perspective.

Germaine to the discussion of a competency-based approach to recruitment and career development is the issue of job-specific tasks descriptions. Competency-based management requires employees be cognizant of past business management requirements and trends, which clearly shows that most technically competent employees in the manufacturing sector are borderline competent at the managerial tasks because they do not possess the necessary business management knowledge (Clinton & Laurence, 2008). As a result, organizations are implementing a wide array of competence-based training programs to make selected employees more knowledgeable and competent (Bishara, 2006; Thelen, 2012).

Studies conducted by Inkson and Arthur (2001) determined that most workers will change specific jobs an average of every four years. There is no denying that, when employers no longer have a need for specific skill sets, it is prudent to transfer, or release employees possessing them and hire new employees with the skill sets needed to meet mission requirements. The challenge for the Army Acquisition workforce organizations is the adherence to government employment practices, which conflict with the rapid change out of employees. This raises concerns about career changes in the Army, the frequency of occurrence, and the implications to competing with near-peer adversaries and the private sector.

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It is important in this context to realize that individual career control is a result of knowledge and understanding of the occupational sector and the expectation of encountering roadblocks to promotions. Therefore, employees are expected to invest in their own professional growth to achieve the career benefits sought. Employee failure to manage his or her career leads to dissatisfaction with the employer and eventually results in a change of employment and possibly career field. Performance feedback and a constant preparation for employment change are critical actions for effectively managing careers. The essential point is that theories focusing on career development and professing expectations of career determinants will continue to develop and change and a new workforce model will require continuous learning and enhancement of KSAs for present and future job opportunities.

### **Academics, Professional Competence, and Career Development**

The themes of manufacturing, education, decision-making, performance and promotions, science, technology, and management competency are the primary areas of consideration for assessment of degree type importance for managerial promotion opportunities. These areas are relevant to the cognitive and psychological abilities of individuals seeking promotions.

Managerial competence highlights the ability of future Army program managers to plan and use critical or limited resources in a manner that is effective and beneficial to their organization.

Freedman (2005) argues that possession of this ability allows a potential manager to execute the mission of the organization, while simultaneously focusing on actions that meets the strategic vision set forth by leadership. Managerial competency also promotes subordinate followership and motivation when faced with situations where there may not be a perfect answer to resolving an organizational problem. When there is a link of competency needs and academic preparation, there is an expectation of successful career path movement. Career development as a

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theme requires a greater understanding of the numerous actions an employee takes to ensure they have met the minimum KSA threshold to support competing for promotions.

Individual skill development actions, whether technical or business, are more prevalent as changes in the Army require organizations to seek employees with a high self-efficacy for learning and performance. The rapid changes in human skill needs of the Army has been constant since the turn of the century and is of greater urgency in the current environment. The need for highly skilled personnel supports the rationale for academic preparation as a decisive factor for promotions.

### **Influence of Management Competence**

The growth of technical requirements over the past decade has fostered a renewed sense of urgency among public and private sector leaders and human resources professionals to hire personnel educated in technical fields. Specific to the Army, this trend is occurring because there is an expectation that the workforce will experience significant knowledge and skill erosion within five to ten years because of rapidly changing technology. According to Barrella & Buffinton (2009), a lack of technical and managerial competence on the part of employees, mainly managerial staff, leads to a risk avoidance mentality that hinders development of competencies, stifles career growth, and slows the pace of mission success within the organization. Therefore, employee motivation to satisfy education requirements is an influential factor on performance and the level of effort deemed necessary to accomplish organizational desired outcomes (Kovac, & Bertoneclj, 2008).

All employees, specifically those with leadership desires, must demonstrate the ability to plan, organize, command, coordinate, control activities, and act autonomously within the organization (Weymes, 2004). Regardless of type of education and skills previously identified in

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relation to the sector of work, the ability to solve problems, think critically, and work as a cohesive team are a few of the characteristics that support technical competence and decision-making. Still, research suggests that most technically trained personnel lack the business management and communicative skills needed to succeed as a manager. Therefore, KSA development that promotes management competence is essential to decision-making ability and the subsequent promotion to managerial positions (Wilson, Bell, Jones, & Hansen, 2010).

Additionally, there is the possibility of organizational human resource issues arising when the factors of percentage of task accomplished, job performance, and the organizational environment influences whether an employee is assessed as competent. These three analysis factors, when assessed alone or as a group, can derail an employee's development efforts and the assessment of the employee's capabilities by leadership. Employees must therefore be cognizant of the effort they must exert to ensure they are meeting the competency requirements expected at the next level.

### **Effect of Academic Preparation**

Aspects of this literature review focus on trends in collegiate education. According to the United States Department of Labor report (2009), education in the 21st Century has become increasingly challenging because of a greater focus on academics to meet industry short-lived requirements. Changes in workplace requirements necessitate strong academic skills and the ability to apply those skills to solve emerging, but complex organizational problems. According to Piva and Vivarelli (2009), employees gain the experience needed to manage complex processes simultaneously with their development and refinement of industry-specific skill sets – the same is true for the defense industry. Possessing the right mix of skills and education makes an employee better prepared to conduct different levels and variety of work-related tasks. In

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reference back to the competence model presented by Bertonecelj (2010), employee education supports the cognitive component via the development of KSAs that lead to the strengthening of individual autonomy and successful performance behavior needed within a competency-based system such as the defense industry.

The technical education section focuses on the re-tooling of education systems to meet evolving challenges presented by a changing global community, where the implications and severity more applicable to technical education than to business management education (Hickman & Olney, 2011). Possession of the right education—*more of a technical focus in the defense sector*—by employees is crucial to the issue of organization mission success. Authors such as Anderson, Courter, McGlamery, Nathans-Kelly & Nicometo (2010), Wilson, Bell, Jones & Hansen (2010), and Piva & Vivarelli (2009) all articulate the need for technology education programs to focus on education and training. Changes such as SBTC and MOT affect processes and practices at the organization level and require both academia and Acquisition industry leaders to understand the significance of preparing and nurturing a skilled workforce with a set of KSAs appropriate to industry needs.

**The influence of management of technology (MOT) education.** Competitiveness and flattening of leadership hierarchies have had noticeable effects on the level and type of technical knowledge and skill potential managerial candidates are required to possess. Abraham (2008) asserted that technology education serves the task of fostering the development of a competent workforce. Yet there continues to exist a narrow view of the significance of management of technology education in industry (Siegel, 2009).

The changing manufacturing environment—inclusive of defense sector organizations—requires the development of a labor force proficient in the business and technology skills needed

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to meet the diverse needs of business (Drage, 2009; Brown & Campbell, 2001). For industry and academia to ensure employees are adequately prepared to meet the demands of industry, there must be the development of curriculum that is flexible to meet the changes in skill requirements (Silva, 2009). Workers must therefore receive routine technical and business training to strengthen KSAs needed for the future are present (Low, 2004).

Technology management programs focus on training managers on the complexity of managing technical programs while mastering the business management requirements of large organizations. The integration of business school curricula with that of a scientific and engineering school is challenging, but deserves the attention needed to support technology management and skill development among future and current workforce participants (Clarysse, Mosey & Lambrecht, 2009). Vyakaram (2012) argues that enactment of additional steps should ensure practical experience aligns with real projects so there is relevancy to what is occurring in real-world manufacturing practices. The Manufacturing Institute (2012) report argues the need for an increase in the engineering workforce. The report articulates the need for the U.S to “educate and train workers with the necessary skills for a technologically and globally oriented factory sector” (Manufacturing Institute, 2012, p. 63).

The list of “needs” and “criterion” translate into competitive challenges at the organization level and place the burden on academia and industry to work cohesively to ensure labor force participants acquire the technical and business management knowledge needed to support greater promotion opportunities (Freeman, 2006). The cohesive effort by industry and academia to implement change that should be beneficial to organizations is a risky strategy. There is an expectation that current requirements, when considering the rapid pace of industrial change, will adjust in the future. Jordan and Yeomans (2003) concluded that as science and

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technology education become more prominent, this type of education will become central to a knowledge-led economy and requires higher levels of technical education to support.

According to Gimenez, Prior, and Thieme (2007), academic institutions play a significant role in the level of technical efficiency attained by a nation. The authors provide an explanation of the importance of the different aspects and implications of MOT education to career progress. The research qualitatively assesses management development programs to support the claim that technical managers within organizations require special skills to perform basic management tasks. Their analysis shows a trend of technically trained employees concentrating their skills on technology-related tasks, rather than the art of business management. Accordingly, the conclusion is that for an organization to be successful there must be both a technical and management competent workforce. Although a significant demand for technically educated employees exists in the manufacturing sector, there will continue to be an increasing number of employees choosing to pursue non-science related degrees.

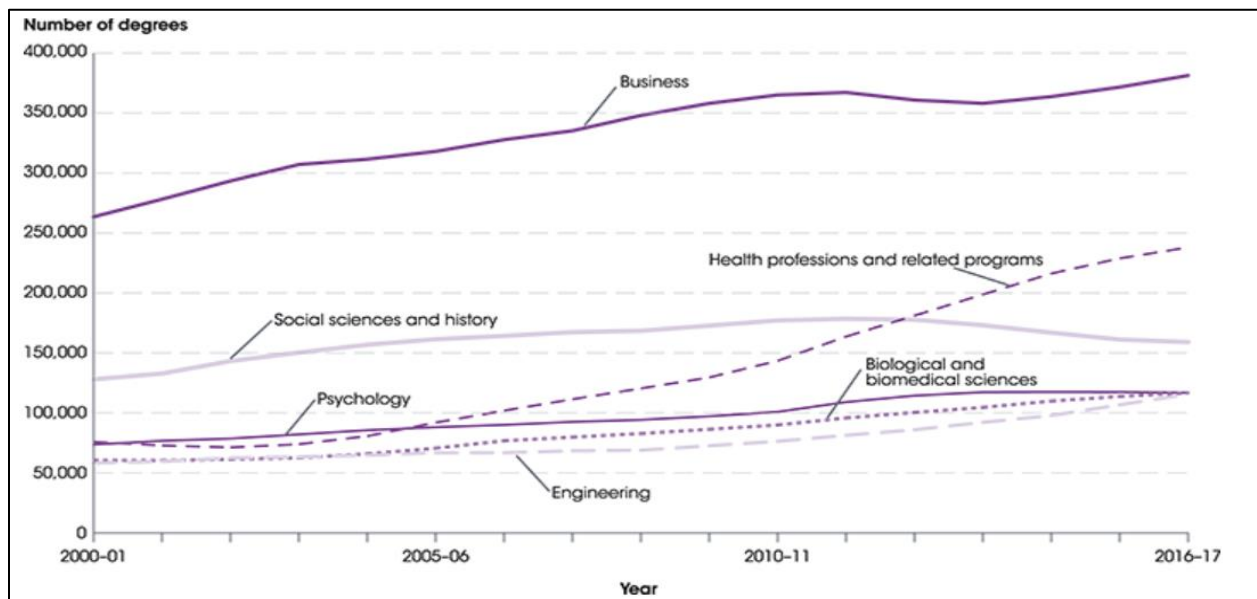
In line with the arguments presented above, Nambisan, and Wilemon (2002) discussed the importance of technical competence in the fields of engineering, computer software, communications, as important skills employees in the new global environment should possess. The authors highlight the need for both leaders and workers to possess strong technical abilities. Yet, the authors do not provide evidence that strongly supports claims for a greater mix of business and science education as seen in articles written about MOT education.

The importance of technology as a segment of education cannot be overstated when examining the effects of globalization on national manufacturing. Improvements to technology education will have direct impacts on competitiveness, and the demand growth for technical knowledge in the economy require flexibility and innovation in technical academic curricula

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(Nambisan & Wilemon, 2002). The provision of the right academic knowledge by post-secondary institutions is critical to ensuring that workers seeking leadership opportunities remain competitive in this new era.

**The growing significance of management education.** In the academic arena, science related degrees are falling behind at a greater range of disparity when compared to the number of management degrees annually conferred. Interpretation of the 2019 National Center for Educated Statistics clearly show this alarming trend (Figure 1). Changes to technology curriculums with a greater management and science emphasis is the most effective means of solving this issue.



**Figure 1:** Number of Bachelor's Degrees Conferred by Postsecondary Institutions - Academic years 2000-01 through 2016-17  
Retrieved from [https://nces.ed.gov/programs/coe/indicator\\_cta.asp](https://nces.ed.gov/programs/coe/indicator_cta.asp)

Universities have been engaged in enhancing their management and technical type training emphasizing MOT because organizations are increasingly requiring employees to have dual competencies. Reforms to engineering and technical curriculum in post-secondary and vocational schools must occur in order to improve opportunities for promotion to senior managerial ranks regardless of the pressures of the economic market sector (Beaudry & Green, 2005). Even when faced with the need for obvious change, post-secondary education institutions

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are struggling to respond to the growing trend of business and industry seeking changes to the curricula of academic institutions. These higher learning institutions are adopting the position of slowly providing management development courses focusing on the skills an employer thinks are critical to the success of individuals in managerial roles. Although they are still vital, degrees such as the Master of Business no longer carries the prestige of business leadership it once did because they lack attainment of the technical education aspect that is part of MOT type training.

There is a growing, if not significant, belief that management education should be a technical practice. Leaders in the technical fields have noted the need for managerial expertise among employees seeking advancement within the organization. University graduates demonstrating dual competency upon entrance to the labor market tend to have opportunities for promotion that surpass those available to graduates with less extensive technical or managerial knowledge (Nambisan, 2002).

Within organizations, middle managers and executives state a lack of managerial skills tends to be the most crucial shortfall of engineers seeking to enter the managerial field (Barrella & Buffinton, 2009). From an Army strategy perspective, a challenge that faces the private sector has bled over to Acquisition talent requirements. When asked to evaluate and rate skills thought most needed to succeed as a manager, *creativity, collaboration, critical thinking, communication*, management courses, and non-engineering coursework were leading areas of concern for leaders. Taken together, these findings suggest that long-term organizational success is dependent on personnel who demonstrate technical and business abilities and organizations should only recruit new employees competent in management of tasks in both aspects.

### **Defense Sector Employment Considerations**

In the U.S. Army, the effects of changing technology requirements, partly due to growing competition and technological innovation—*Skilled-Bias Technological Change*—have led to a rise in the demand for highly skilled and technically educated employees. Jung and Choi (2009) highlight the growing demand for workers with science and/or engineering backgrounds because industrial highly complex technical innovation is increasingly resulting in a demand for such skills and education.

In the context of the field of technology manufacturing, late 20th Century and early 21<sup>st</sup> Century studies, present a mix of viewpoints about the level of importance of science and engineering jobs in comparison to jobs in business and management fields (Jung & Choi, 2009). The complexity of modern weapon systems in the Army has been the catalyst for growth and variation of skills within the workforce. As technology-driven change continues, the pass-over of long-term employment is becoming increasingly noticeable; hence, public sector employment with the associated promotion structure may not be attractive. If one considers employee needs, from an employment perspective, clearly the advancement of workforce members can influence the long-term success or failure of our national defense.

Possessing a strong background in engineering, or a science-related field, in conjunction with the possession of “some” managerial skills, is important for personnel to be successful as senior acquisition leaders. This view blurs the perception of whether engineers are equally up to the task of handling key managerial positions. What has become a troubling sign for industry leaders, project managers, and human resource departments, is the issue of technical workers failing to correlate the significance of managerial decision-making to the possession of technical and business expertise.

### **Career Field Selection and Development Influences**

Individual career success is highly dependent on having the correct understanding of career goals and the level of knowledge and skills required to satisfy those goals. Human Capital Theory helps to form the basis for organization leaders attempting to analyze the potential value of individuals as they enter and participate as members of the labor force. The theory assesses the individual acquisition of KSAs through education, training, and productivity and the career opportunities that follow (Gati & Amir, 2010).

As public or private organizations struggle to remain competitive, technology changes, in conjunction with a changing workforce, require employees and potential employers to ensure the skills sets possessed by individuals are of value (Ito & Brotheridge, 2005). Individuals must consider the field of work they intend to participate in prior to embarking on years of education in order to ensure their value to the prospective employers as well as their long-term job satisfaction. Dependent on skill level and education, employees may have the flexibility to change employers, change jobs within the same organization, or change career fields regularly. However, conducting any of these changes will affect the pathway for promotion within an organization. Similarly, the organization employing the individual must also be capable of adjusting if the desired employee skill sets are not possessed in enough quantity.

In today's Army Acquisition workforce, the requirement for greater business management and technical competency, in conjunction with the possession of superior KSAs, requires routine clarification to all employees on a recurring basis to support managing the increasing technical complexity of Acquisition capabilities. The benefits of possession of technical and business KSAs to the workforce are: 1) extended periods of employment, 2) enhancement of KSAs needed to support future success as defined by the employer, and 3) better

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career development opportunities. The constant is that diverse human capital investment is essential for professional growth of employees and organization success (Ito & Brotheridge, 2005).

**Dual-ladder career pathways to promotion.** The dual-ladder career system rewards professionals for outstanding performance without removing them from a strict focus on the technical and theoretical aspects of daily work (Tushman, Fenollosa, McGrath, O'Reilley, & Kleinbaum, 2007). Within most organizations, there are a limited number of opportunities to promote personnel to managerial roles. As a result, private and public sector organizations have sought to free up promotion opportunities by implementing the dual career track solutions. Within the Army Acquisition community, the closest, yet not quite dual-ladder track is the Armament Research, Development and Engineering Center. Ng & Feldman (2010) argued that performance in a dual-ladder structure reduces the pressure for specialized workforce members to demonstrate greater performance in order to obtain promotions.

According to the Hay Group Study (2004), the growing complexity of manufacturing heightens the stress placed on one individual to manage all the functions associated with a managerial role. The constant evolution of technological products drives the need for managerial assistance to focus on the more complex work. The dual-ladder system of advancement facilitates promotion of technical and managerial personnel along two tracks without hindering individual career aspirations. In the study by Levine, Albright & Fiester (2010), they point out that dual-ladder programs should incentivize personnel wishing to avoid supervisory positions, to remain with an organization. Tushman et al. (2007) made an important point when they articulated that technical employees, working for management supervisors, experience

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promotions in a different manner than technical employees working for supervisors on the technical side of an organization.

Examining these two characteristics more closely, Ferreira and Sah (2012) emphasizes the growing need for non-production workers—*managers*—because technological change, along with unpredictability and complexity, has increased the need for a delineation between management and specialist. The study by Ferreira and Sah (2012) recognize that specialized skills are needed in many organizations, but those skills do not translate into the requirement that leaders at higher levels need to possess. Therefore, it is unlikely that a specialist will have the wide-ranging expertise needed to oversee the numerous operations that occur in parallel within an organization. These findings support the conceptual rationale behind the need for greater MOT education that provides current and future workforce participants with a breadth of knowledge that supports technical and business management abilities.

In an aged, but yet important study, Gupta and Singhal (1993) found that technology workers, with a strict focus on technical development or production could use the dual-ladder to avoid the daily management of employees within the organization without hampering their careers. Technical professionals have a difficult time adjusting to the subjective decisions of management because decision-makers usually lack the in-depth technical skills and knowledge needed to support their decisions. Contrary to the efforts of technical workers, managerial workers require superiors within the organization to validate the contribution of their work, which is not often measurable or quantifiable. Most technical professionals view upward mobility as offering little value when placed in direct competition with the autonomy gained in their technical specialty (Tushman et al., 2007).

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Murphy and Zabochnik (2004) and Custódio, Ferreira, and Matos (2013), all argue that possession of general managerial skills is becoming increasingly more important than specialized skill sets. Generalist, specifically a Chief Executive Officer (CEO) and senior managers, received an average of 19 percent higher compensation than that of employees who are specialists. Prasad (2009) argues that although specialists can uniquely understand information relevant to a specific area of expertise, their position in the management structure limits their ability to influence any significant decision-making. The study goes on to support the argument of Ferreira and Sah (2012) that “people who are excellent at what they do should not be pushed into managerial roles that they are not equipped to perform” (Prasad, 2009, p. 398).

The dual-ladder has not been without controversy during its implementation, specifically, controversy associated with the dual-ladder promotion system and the issue of distribution of power (Simard, Henderson, Gilmartin, Schiebinger, & Whitney, 2008). One criticism that comes up in research is the possible misuse of the dual-ladder system by managers seeking to rid departments of personnel they view as unsatisfactory technical performers or those who have demonstrated a lack of managerial skills. Similarly, there is recognition that dual-ladder supervisors are more likely to deny promotions for technical professionals seeking managerial positions outside of the technical arena. Further, personnel on the management side have the power associated with running day-to-day operations and making decisions about promotions. Technical professionals lack such decision-making authority—by choice—and are therefore outside of the promotion decision-making sphere of influence.

**Decision-making competency and career goal orientation.** The Army Acquisition workforce needs competent employees with technical and managerial knowledge to influence decision-making and capability development success. Depth and breadth of knowledge is an

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important criterion to managers and organizational leaders when making decisions that will have positive or negative consequences on capability development activities. Regardless of whether there are substantial differences in autonomy within an organization, leaders must have a way of formalizing the chain of control and making decisions.

The rational approach to management decision-making stresses the need for systematic problem analysis prior to deciding and taking the necessary steps for implementation. The bounded rational approach asserts that decision-makers are intentionally rational because they make decisions because of goal orientation and self-imposed limitations, such as time and capacity of detail analytic actions. Within the manufacturing community, employees must be cognizant of the balance between the two forms of decision-making as relates to day-to-day operations.

Modern organizational management practices highlight the struggle between these two aspects of decision-making. The public sector—government—is very centralized and decisions are elevated up the chain-of-command as the severity of consequences and financial burdens increases (Newcomer, 2007; Newcomer & Caudle, 2011). Such centralization also tends to result in rewards and benefits, such as decision-making authority and recognition resting more in the hands of senior employees and less with junior employees executing the daily work. As a result, there continues to be avoidance of government work by a significant number of younger potential employees because of the failure to push decision-making down to the lowest level and the limited promotion opportunities available while waiting for senior managers to retire.

Unlike the public sector, decentralization in the area of decision-making is more abundant in the private sector. Private sector organizations choose and contract managers to run segments of the organization efficiently and provide hefty financial rewards for the results of

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their efforts. Lane and Wallis (2009) pointed out that, unlike public organizations, private sector leaders operate mostly under a single managerial or leadership title and employees are clearly aware of the chain of command and more involved in the decision-making. Ironically, the collegial atmosphere that can be found in most Army acquisition organizations is absent from the daily operations of the private sector organizations. This, in turn, facilitates efficiency and productivity through decision-making processes that make profit maximization the end goal.

Decision-making, performance, and promotion information form a theme that depicts the need for workers to possess competency-based skills. These skills are synonymous with the technical and managerial skills required to be a productive manager. With respect to management competency, most of the information points to the need of employees to have a satisfactory level of technical proficiency, while also demonstrating competence at conducting managerial tasks.

### **The Influence of Tacit and Explicit Knowledge Development on Professional Growth**

There is growing demand for identification of methods best suited for managing and enhancing employee intellectual capital to meet current and the development of future capability requirements. Intellectual capital from an employee perspective is the compilation of competencies, experience, expertise, and innovative capability that allows him or her to gain and maintain a competitive edge over rivals. Scholars and practitioners, such as Burr and Girardi (2002) and Shaikh (2004), believe there is a requirement for organizations to provide better management of human and intellectual capital in both private and public sector organizations.

Within the Army Acquisition community, managers increasingly face unique challenges inclusive of eliminating stovepipe type mentalities and sharing knowledge across the different aspects of an organization. In the process of answering the research questions guiding this study,

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the evidence attained from extant research indicates that knowledge is and will remain a fundamental component of organizational competitive advantage. While the importance of organizational knowledge has been examined from the perspectives of the employer and employees, it is of considerable interest to the present study to explore how an Acquisition employee's explicit (knowing what) and tacit (knowing how) knowledge is manifested in workplace performance (Armstrong & Mahmud, 2008).

Explicit knowledge consists of intelligence, employees express and transfer as they conduct daily organization business, while tacit knowledge is the product of learning from a real-world experience. The compilation of tacit and explicit knowledge by employees facilitates sharing and integration of new knowledge throughout the organization. According to Schulz and Jobe (2001), 90% of an organization's tacit knowledge rests within the personal experience and insight of employees, thus there is understanding across the labor sector why retaining employees possessing high levels of knowledge is crucial to organizations. The real value of the technical and managerial dimensions of knowledge reside at the individual level, which when utilized properly, benefits the organization. Both forms of knowledge are of great value to the Acquisition professional and organization because the fast-paced nature of the capability development environment requires employees to utilize both in an efficient manner.

### **Managerial Promotion Potential**

From a holistic management perspective, managers or decision-makers with experience need to be smart at selectively avoiding, mitigating, or transferring risks and making costly mistakes. Employees with considerable experience and possessing both the business and technical education should have the tacit and explicit knowledge needed at the leadership level. Organizations must ensure that management competency spurs promotion of employees

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demonstrating the requisite KSAs and the transfer of knowledge to subordinates and peers within the organization.

The interaction needed to pass on internally possessed knowledge to junior employees is more suited for the close communication between engineers and supervisors in dual-ladder environments (Starbuck et al., 2008). The years of knowledge accumulated by senior engineers can provide a competitive edge to the organization. Yet, these employees prefer supervising engineers versus the management responsibilities sought by a minority of engineers and most business personnel.

Ballout (2009) identified a point where employee success and progress came into conflict with the concept of a competency-based organization. As described earlier, private sector organizational flattening of the managerial hierarchy reduces the room for long-term advancements. Unlike the private sector, Army Acquisition organizations are not in the position to enact such flattening. Therefore, individual career mobility and experience challenges that are prominent within Army Acquisition Corps formations are not identical to those found in the private sector. As a result, the personal and professional strategy of the employee to increase individual self-worth is limited (Harvey, Fisher, McPhail, & Moeller, 2009).

Past and present performance of employees also serves as a predictor of potential for future promotion into positions of greater responsibility. As with the positive aspects of promotion, there is also the underlying negative diminishing possibility of promotion that is associated with long tenure in a position or organization. Stagnation in a position or low performance and lack of ability by an employee can be indicative of negative potential for promotion as perceived by senior management. Promotion advantages possessed by senior engineers range from their experience working on projects from start to finish, working as part of

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teams tasked to solve difficult engineering problems, to performing well in situations where the problem or information is ambiguous in nature (Starbuck, Barnett, & Baumard, 2008). Although experience results in better decision-making when dealing with unfamiliar challenges, and usually results in a higher probability of success when facing familiar problems, most technical workers lack the business management skills necessary for the challenges facing a manager.

### **Summary**

This literature review about managerial promotions focuses on manufacturing sector—inclusive of U.S. Army capability development—education and management, the implication of employee motivation about KSA development, the impacts on organization knowledge growth and employee career advancement, needs of manufacturing sector industries, and promotions. Research material to support this study came from numerous databases and focused on the areas of manufacturing, education, decision-making, performance and promotions, science, technology, and management competency.

The literature review about the area of technical education as a path to higher promotions has led to the discovery of a wealth of information, some of which was inconsistent and sometimes contradictory. However, there is a consensus that leaders, managers, and workers must be capable of successfully taking the organization forward in an environment saturated with competitors with an equally competent labor force. Previous research results have made it clear that understanding technical, organizational, and the human dimensions of management and career growth is a routine challenge for leaders (Brewer & Brewer, 2011).

In the past, seminal and often cited researchers such as Drucker (1990) pointed to the impacts of technical knowledge and education on public and private sector individual performance, promotions, knowledge, and skill requirements of employees. A variety of

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previous research makes it evident that the technical and business management competence—possession of the right mix of skills and knowledge—of employees forms the basis of decisions by upper management to promote members of the workforce in to the managerial or leadership ranks. Successive improvements to skill are a direct result of the education employees receive, as well as on-the-job and professional training supplied by the employer and are indicators of potential for future promotions.

From an academic standpoint, the concept of technical mobility supports the right organization strategy through inclusion and cohesion of the education, decision-making, and the right employee base. Development of a talent management strategy to meet emerging human resource demands requires entry-level employees to possess technical skills earlier and at higher levels than previously required by organizations. The characterization of MOT is the possession of the basic components of research and development (R&D) management, product technology management, process technology management, information technology management, and business management. The consequences of a lack of skills by an employee are more severe for technical than for business management professionals.

Regarding the topic of employee motivation, the level possessed by employees allows them to utilize and enhance KSAs to perform their jobs, while acquiring new KSAs that support senior management or leadership promotions. Additionally, possession of value-added KSAs is beneficial to employees in a competence-based organization. Therefore, organizations should ensure that employees demonstrating strong potential can enhance their KSAs in order to be competitive for promotions.

### **Chapter 3: Research Methodology**

This chapter describes the research approach by explaining the collection, analysis, and molding of information into findings that address the research questions. The research approach uses the following methodology that serves as the basis for the presentation of information:

- Research strategy
- Systematic review approach
- Journal selection standards
- Literature Examination Procedures
- Reliability and validity

Throughout the conduct of research on promotions, with an emphasis on Army Acquisition Corps promotions, followed by private sector promotion strategies as a secondary discussion, there was utilization of literature mapping to organize the articles into a common-sense framework. The framework is to review, find, and articulate any noticeable relationships or influences of key points. The identification of relational factors between academic curricula, career development, and promotions is important to supporting the argument about which employees should receive promotions and the rationale supporting those decisions.

Scholarly research focuses on a review of articles that covered a period that spanned from 2000 - 2020 on the topics of technology careers, education attainment, generalist or technical and individual contributor career-track development, promotions, and management trends. This period is most relevant to the globalization change of the 21<sup>st</sup> century. Additionally, a review of some seminal articles assisted in forming a foundation for the utilization of some material and as support for some of the key discussion points related to career progression and academic attainment. The study argues that paths from the themes of technical and management education

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are directly related and that KSAs, at the individual and organization level, are dependent on those forms of education attainment. The argumentation continues with the connection of KSAs to the motivation of employees. Employees, who are competent at technical and business management skills, are likely to have a greater career development and promotions.

### **Research Strategy**

The research design is a sequence of steps taken with the aim of understanding the problem in a specified context and includes the selection of literature. Throughout the design process for this study, there was an emphasis to ensure information included in the paper answered the overarching question of “What education, required experience, leadership, and organizational enhancements should the Army make to further develop the Acquisition workforce?” The study also focused on developing and presenting a coherent account of past, present and suggested future actions that would result in a new frame of thought on education, employee skill premium, career development, and promotions. As a part of this study, a comprehensive review of literature focuses on the factors associated with the research question.

This literature review merges information from existing studies on the factors of education, career development, technology careers, promotions, and management in the manufacturing sector – which includes the U.S. Army government and contractor industrial base and employees. There was an analysis of information and identification and grouping of themes. The themes were then examined to determine relations and implications to personnel development and managerial and leadership promotions.

The occurrence of relationships aids the fundamental argument on managerial promotions. During the review, there was an obvious lack of proof necessary to provide support for augmented technical instruction to support career progression. Further, there was

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identification that business management skills became more of a requirement at the upper levels.

As a result of the recognition of this gap, there is a comparison of the factors relevant to employee actions as they relate to personal and professional development, career decision-making, and promotions

### **Systematic Review Approach**

Based on information provided by the authors Petticrew and Roberts (2006), differences in the results of similar analyses provide enough reasoning for a scholar to conduct a systematic review as a means of understanding why outcomes vary. Understanding the differences in results permits the researcher to satisfy the research question and substantiate or discard premises. The process of using a systematic review not only fulfills the task of making sense of large quantities of data; it is also a way to provide additional support for the answers to the research question (Petticrew & Roberts, 2006).

There is the need to be cautious of bias in the review when identifying the inclusion or exclusion criteria. These criteria specify the exact qualities that supports inclusion or exclusion in the study. Therefore, any potential or assumed biases are brought forward early and there is a clear discussion how those biases might influence the study. Subjectively, fourteen years of experience executing numerous Acquisition business management and engineering tasks will more than likely result in some predetermined notions. There must be mitigation of all predetermined notions with primary research and concrete argumentative reasoning.

Systematic reviews are a stand-alone method of assessment because qualitative information utilized in research is traditionally investigative in nature, and these types of studies do not include first-hand research. In order for this study to be objective, the first task was to perform an evaluation of qualitative material before considering any possibility of using

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information from quantitative studies because this study is more an assessment of the examinations and analyses of promotion consideration characteristics than of understanding numerical assessments.

### **Journal Selection Standards**

The journal selection process started with a computerized search of numerous databases identified by the University of Maryland Global Campus (UMGC) librarian. Databases include Academic Search Complete, Business Source Complete, Emerald Fulltext and Management Reviews, Google Scholar, and Web of Science. At the completion of the search process, all articles that were determined to support the current research were organized and coded in accordance with one of the five categories previously listed in the first section of this chapter. This study assesses written material published in peer-reviewed journals and sought to include the following content:

- Subject material relevant to engineering, technology, and business management
- Focused on the areas of technology, education, career development, management, and promotions
- Limited non-seminal articles to U.S. publications and no older than calendar year 2000

In the academic arena, peer-reviewed writing is the only form of dependable information because the peer review serves as a gatekeeper on the quality of publication, which is a direct reflection of the content of printed articles (Raelin, 2008). As part of the selection process, there was utilization of the 2018 Association of Business Schools (ABS) Journal Guide to find peer-reviewed journals with the highest quality ratings. The guide consists of journals with the following categorical ratings:

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- Journals that are recognized within their field based on a select set of standards
- The publication of original research of an acceptable standard
- The journals only publish original and research papers that are highly regarded
- The journals have worldwide recognition as exemplars of excellence within the business management field

In qualitative research, coding is a systematic method that supports shortening information into smaller manageable elements the organization, retrieval, and interpretation of qualitative information. Lockyer (2004) states that coding in qualitative research occurs in one of three methods – open, axial, or selective – selective for this study. The area of concentration for this study focuses on education, career development, technology careers, promotions, and management. Articles that did not meet the criteria for a more detailed comparison and contrast were not viable for further use.

### **Literature Examination Procedure**

While conducting the literature search, the focus was to avoid retrieving identical articles, which means there was an effort to exclude information not strictly focused on the U.S. manufacturing workforce. This search constraint is typical throughout the study because there is a necessity to guarantee comprehension of the effect of education, career development, technology careers, promotions, and management practices. Finally, this study implemented a previous exploratory research procedure. Using combinations of keywords that facilitate the retrieval of scholarly data on the research topic (see Table 1).

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Search String Development Methodology		
Search String	Journal Type Limiters	Article Limiters
business AND education AND promotions business AND education AND technology business AND engineering AND degrees business AND engineering AND promotions business AND skill-bias AND manufacturing business AND manufacturing AND promotions business AND technology AND promotions industry AND engineering AND management industry AND management AND promotions industry AND engineering AND promotions industry AND promotions AND manufacturing management AND education AND promotions management AND education AND technology management AND engineering AND manufacturing management AND engineering AND promotions management AND engineering AND technology management AND career-development AND education management AND knowledge AND technology management AND science AND promotions manufacturing AND engineering AND education manufacturing AND technology AND education manufacturing AND technology AND promotions technical AND education AND promotions technical AND engineering AND manufacturing technology AND promotions AND manufacturing technology AND management AND promotions	Management Business Engineering Industrial/Mechanical/Civil Operations Research Management Science Engineering Multidisciplinary Engineering Manufacturing Industrial Relations Labor Engineering 2000-2019	Full-text Scholarly Academic Journals Articles PDF 2000-2019*  <i>* As a means of limiting a large quantity of results in one search, retrievals with more than 1,000 results were further limited by reducing the range of time working forward toward 2019</i>
* Note: this list is not inclusive of all string searches		

**Table 1:** Army Acquisition Workforce Development Search Criteria

### Reliability and Validity

In this study, an assessment of both internal and external validity took place following a review of material focusing on technology careers, education attainment, generalist or technical and individual contributor career-track development, promotions, and management trends.

Threats to external validity are in the form of other industry sectors in the U.S. requiring management degrees as a qualification for personnel to achieve a managerial or leadership promotion. This perception on academic need raises concerns regarding whether the contention that technical education is a requirement for promotions in the manufacturing sector, which includes the U.S. Army Acquisition workforce. To mitigate this perception, the study only focuses on the manufacturing sector within the U.S., where a significant proportion of the work is technical in nature.

The level of internal and external research validity forms the initial basis for assessing bias in the research findings. In order to validate the research approach, a researcher must be

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capable of replicating the study and produce the same results by following an annotated process.

The ability to highlight a contributing relationship between major points in a study is central to fulfilling its validity. Therefore, the analyses present information in a manner that facilitates comprehension of the techniques that lead to specific results.

Finally, reliability happens through the layout and enactment of a repeatable process in which persons who read without a doubt understand the importance of technical education to managerial promotions. The foundation for reliability rests with the following:

- Impartiality to the subject under review
- Consistency during the research
- A repeatable and steady gathering and explanation of information

## Chapter 4: Findings

### Introduction

The purpose of this qualitative study was to seek and provide information that could assist senior Army leaders in executing a talent management strategy that effectively facilitates the U.S. Army's long-term Strategy post 2028 and the Army Vision. This is accomplished through a greater understanding of whether a mixed type education, consisting of technical or business management knowledge enables managerial and leadership promotions within the Army Acquisition community. The predominance of information in this chapter comes from the perspective of private industry, yet the analysis assesses the implications to public sector workers.

The information is presented in a comparative fashion to the research question and the 2018 - 2020 Key Strategic Issue that focuses on methods the Army can best employ to optimize effectiveness at the individual, organizational, and societal levels of the human dimension. The subcomponents of the study relate to how the Army can effectively identify education, training, and experience necessary to develop future leaders. The research question pertaining to this study is *“Research Topic: What education, required experience, leadership, and organizational enhancements should the Army make to further develop the Acquisition workforce?”*

The findings support the research question through a discussion on the selection of relevant content from numerous articles supporting the assessment of academic attainment influence on career development and progression within the Army Acquisition community. There will also be a discussion on promotion dynamics and the significance of academic achievement and KSA development on professional advancement. Concerning the topic of career advancements, promotion dynamics focuses on associations of labor force changes relating to a

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given period. The chapter will also discuss concerns about the effects of variables such as education, tenure, self-efficacy for learning, and the variability in promotions relating to the different levels of management (Belzil & Bognanno, 2004). Finally, there will be a discussion of findings relating to the technical and individual contributor ladder system and career development of technical and business employees.

### **Results**

A combination of 76 articles focusing on 1) education achievement, 2) business and technical career development, 3) the influences of technology on the technical and individual contributor ladder, 4) business and technical promotion trends, and 5) management for inclusion in the initial literature review, provide more material on the main study focus. There was a separation of articles into categories focusing on academic attainment, career development, and promotions. After completing the assessment of articles focusing on the five subject areas, the initial population of 76 articles was scaled down to 22 articles for development of the findings for this study. The reduction to 21 articles was a result of reviewing articles and determining which provided a comprehensive discussion relating to the five primary subject areas. Most of the selected articles covered multiple focus areas. Finally, there was an assessment of information from the context of technical and individual contributor ladder organizations and promotions.

The conclusions from the research all revolve around the five main areas of focus and how each of them influences the discussion on what the United States Army can do to strengthen talent management through changes in strategy that relate to education attainment, experience requirements, leadership, and organizational enhancements to develop the Acquisition workforce. The three primary takeaways from the research are:

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- The holistic Acquisition corps lacks a comprehensive organizational structure that strictly focuses on facilitating technical professional career development.
- The education system at the undergraduate level is not structured—nor should it be—to provide incoming Acquisition workforce members the necessary level of knowledge and skills through a MOT—*technology and business management*—construct.
- When there is a predominant emphasis on technology and promoting technical workers, organizations inadvertently build a workforce that predominantly lacks business management KSAs, which are important to senior leadership success.

## **Technology and Individual Contributor Career-Development**

One focus of this study focuses on how career-development patterns of employees with technical degrees differ from those with business management degrees. Answering this question required an assessment of numerous articles and studies, which argues the technical side of a technical and individual contributor ladder organization results in a negative career actions on technologist choosing to focus on development of business skills. The technical and individual contributor ladder system facilitates the growth of employees who desire the challenges of business management tasks.

Ferreira and Sah (2012), linked organizational and professional growth to the KSAs that are specific to the generalist employee in the technical and individual contributor ladder. As an employee advances, those who demonstrate the ability to master a variety of tasks are more likely to achieve the next higher level. Central to managerial positions, the issue of promoting business management personnel is a consequence of past perceptions regarding the long-term value of this knowledge/skill area at the senior leader level within organizations.

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The findings of this research show, through a compilation of conclusions from the articles offering the most substantive content in the areas of education, career development, technology careers, promotions, and management trends. Specifically, technical employees seeking career progression do well in organizations with an established technical and individual contributor career structure, which has the flexibility to advance personnel to a variety of technical positions. This study agrees with the conclusion of Murphy and Zabochnik (2004), which states that basic managerial skills is a decider in promotions. This trend is resultant the growing importance of areas such as economics, financial accounting, and other general management science fields. The conclusion of this research is that a majority of managerial promotions are a result of general skills in a technical and individual contributor ladder environment.

### **Management and Promotions**

An outcome of the primary purpose of this study is the secondary assessment of the possible link between business-management skill growth, technical atrophy among specialized employees, and the resulting promotion trends. There is no quantitative data to support technical skill deterioration as a precursor for employees choosing to focus on business management work. There is qualitative support for the argument that managerial promotions for technical specialists are more abundant when such personnel have received proficiency assessments of their business management abilities (Prasad, 2009; Custodio, Ferreira, & Matos, 2013).

This study finds that organizations promoting an environment encouraging employee career success have a better understanding of how individual self-efficacy influences career development. There is acknowledgment that career management habits are significant to how employees handle career progression. Maurer et al. (2002) discusses how previous on-the-job performance, tenure, and the ability to enhance of KSAs influences the perceptions of decision-

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makers regarding the ability of a managerial candidate to meet promotion expectations influences promotions in a positive or negative manner.

There is inconsistency in the number of promotions of technical workers because people, who are excellent at the individuality of the tasks, are not routinely equipped with the wide breadth of management tasks. Attainment of promotions is easier in an organization that has multiple career track opportunities and variations in job levels and promotion patterns. Technical employees seeking promotions receive the best support in the organization structure because there is greater flexibility to fulfill a broader variety of roles. Based on the work of Baruch and Peiperl (2000), this study found that employees, who bridge the gap between technical supervisors and business management leadership, in a technical and individual contributor ladder environment, see substantial increases in promotion potential.

Ballout (2009) noted that engineers and other technically educated personnel in technical and individual contributor ladder organizations have fewer opportunities for business management promotions because of the cultural beliefs of leaders within the technical fields. Evidence shows that organizations supportive of employee career success promote an environment where employees develop KSAs that increase their career commitment (Ballout, 2009). Previous research implies that employees on the business management side of a technical and individual contributor ladder structure find gaining promotions easier when in an organization that has multiple career track opportunities and variations in job levels and promotion patterns (Baker et al., 1994).

While technical and individual contributor ladder organizations allow engineering employees to advance their professional careers, this approach impedes business management development of most engineers. Evidence indicates the lack of technical and individual

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contributor ladder promotions stems from mistaken alignment of professional beliefs and experiences of supervisory personnel. Any belief that engineers working for gatekeepers—*senior leadership personnel responsible for assessing the readiness of junior staff for future promotions*—are more likely to receive managerial promotions is disputed by previous studies. In previous studies, the promotion of technically leaning employees was infrequent when competing against employees who had management or both management-and technology-related skills (Hutchins, 2004; Simard et al., 2008).

Technical and individual contributor ladder organizations are not advantageous to technology professionals seeking business management promotions because of the lack of business expertise achieved during their time in a technology-specific assignment. Additionally, there is considerable evidence expressing the negative professional outlook of technical supervisors towards technical specialists seeking professional progression separate from the technical grades (Baruch & Peiperl, 2000). The technical and individual contributor ladder system has attractiveness and importance to organizations due to a robust technical knowledge base; however, it falls short of providing the level of support technical employees need to obtain a business management promotion. When assessed against each other, business management education and ability surpass technical competence in the context of promotions over the length of a career that can span 30-40 years.

### **Education Attainment - Technical vs. Business Management Promotion Results**

The growth in business skill ability at incrementally higher levels has led to the belief that business management careers are more prominent in the middle to senior years of a career (Ferreira & Sah, 2012). Long-term career development objectives require a mixture of business and technology management skills because of the greater emphasis by employers on the

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importance of technology (Siegel, 2009; Clarysse, Mosey, & Lambrecht, 2009). Competitiveness for promotion to managerial positions requires education and training needed to support new or enhanced skills that go beyond the specialized expertise possessed by most engineers.

Experience and skill in one area can be counter-productive to the anticipation that managers be operationally proficient, hence, “the integration of the business school with the scientific and engineering faculties is path breaking and, again, poses significant challenges to other business schools that aim to excel in technology management...” (Clarysse, et al, 2009).

The current study found that traditional business school academics typically lack the appropriate context-specific business creation skills that are increasingly in alignment with technology management education. In agreement with the findings of Phan, Siegel, & Wright (2009), business schools must expand curriculums to include science-based programs through greater collaboration with technology-oriented organizations. An additional finding is that critical thinking skills and the assessment of risks are some areas science and business management workers need to be more competent at in order to be more effective at traditional technology management Barrella & Buffington (2009); and Phan, Siegel, & Wright, (2009).

Additional research by Mallick and Chaudhury (2000) and Barrella and Buffinton (2009) supports the conclusion that business management trained employees possessing an acceptable amount of specialized education and training needed within the industry they are employed, will advance in their careers faster. There is evidence that the perceived value of MOT curricula in the U.S. is growing because they help managerial candidates limit shortfalls in KSAs (Clarysse, et al, 2009; Phan, et al, 2009; Siegel, 2009).

**Knowledge expansion and promotions.** The argument that business management knowledge and development is more beneficial to employee promotions than technical

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knowledge development is more obvious because of the research. Similar to Mallick and Chaudhury (2000), the articles found that since employees do not all share the same academic backgrounds, the most common approach for selecting candidates rests with the competence of employees at various work tasks (Skipper & Bell, 2006; Skipper & Bell 2008). Management skills such as decision-making, problem-solving creativity, critical thinking, collaboration, and communication are essential to professional development. Therefore, senior Acquisition leaders must understand the difference between their careers and those of their engineer counterparts. This is especially important in an environment where the technical and individual contributor ladder career progression model does not align with business management promotions.

Although the belief of engineering managers is that development of new engineering management talent is crucial, other conclusions find that there are a variety of cases where technical employees have attained senior leader positions, but were unprepared for the tasks of managing people with business management skills that are broadly embedded within organizations (Skipper & Bell, 2008). As a result, the evidence suggests that engineers will finish behind business management personnel if they allow a strict focus on technical issues to dominate their careers. Drage (2009) concludes that students and professionals must have a holistic set of organizational management and leadership skills in order to be competitive for future career progression. Evidence supports the supposition of numerous studies that the U.S. academic system is not keeping up with dynamic and short turnaround professional growth academic demands.

Manufacturing sector leadership and managerial career growth for technical educated employees requires mastering the basics of business management. Just as personnel with managerial aspirations take on additional responsibility and seek promotions, personnel on the

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technical track have similar aspirations but face different problems, especially when managed by a technical superior. Unlike engineering personnel, there is no requirement for business management professionals to have a firm understanding of all engineering matters; however, there is an expectation each will have a working knowledge of engineering or the technology utilized in their organization. Barrella and Buffinton (2009) conclude that business management personnel who are successful at accomplishing both sets of professional tasks will experience success equal to or superior to their engineering or technology counterparts.

The compilation of findings leads to a conclusion that education and skill development are crucial to leadership and managerial promotions. Of greater importance, the findings show there is a greater need for future managers—*leaders*—to possess both business management and technical skills. The possession of technical skills should also be a concern, but more important to organizations is the ability of managers to limit specialization in science related fields and better understand the tradecraft of finance, business management, and other skills that are mostly the soft skill required in leading an organization.

The results of this study provide evidence that employees in possession of a substantial amount of technical KSAs are influential on their technical supervisors. However, these employees still experience lower managerial and leadership promotions because of a lack of business management skills. If one looks at the evidence of promotions from a historical perspective, the relationship between career path and managerial promotion, promotions for employees working on the technical side of organizations are less frequent than on the business management side because the mindset of gatekeeper technologists does not appear to support career broadening.

### **Conclusion**

The overall conclusions from this study are:

- Engineers and other technically educated personnel who report to supervisors whose career and education have been strictly technical have fewer opportunities for leadership and managerial promotions when compared to their business management counterparts.
- Individual career self-management beliefs and practices play a significant role in how employees manage their career progression and serve as a mechanism for technically educated employees to gain proficiency in both the technical and managerial aspects of the organizations.
- In the last decade, the post-secondary institutions have started to prepare the current and future labor force with a mixture of technological and managerial skills via undergraduate engineering and management programs.
- Organizations that are supportive of employee career success promote an environment where employees can develop KSAs that increase knowledge and potential career advancement.

One of the more significant findings to emerge from this systematic literature review is the finding that organizations heavily oriented toward technology development are not likely to promote technical personnel ahead of individuals who possess educational credentials in business management. Authors such as Hannah (2009), Clarysse, Mosey, & Lambrecht, (2009) and Skipper & Bell 2008 all provide content that supports the findings that personnel possessing the right mix of technical and business management skills are more likely to experience promotions because these personnel possess multi-faceted skills crucial to organizational success.

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Additionally, employees seeking managerial promotions must be cognizant of the need for their skills to complement the needs of the organization (Piva & Vivarelli, 2009). Throughout the study, the decisive factors are the areas of academic attainment and development of KSAs in predicting an employee's professional success at attaining promotions. This study supports the conclusion of this research that technical employees do not experience significantly higher organizational management and leadership promotion rates in comparison to business management employees.

Personnel who recognize there is a need for competent business managers as much as there is a need for proficient technical supervisors are thus more likely to be promoted. Another outcome of this study is identification of a lack of understanding by most employees within an organization regarding career development promotions. Additionally, management skills and processes are not included in management studies in sufficient detail. A more in-depth assessment utilizing surveys and questionnaires of personnel on both the technical and business management tracks of organizations should provide additional information on the influence of technical and business education on leadership and managerial promotions.

## **Chapter 5: Consequences for Army Acquisition Leadership and Talent Management**

The purpose of this qualitative study was to seek and provide information that could assist senior Army leaders in executing a talent management strategy that effectively facilitates the Army's long-term Strategy post 2028 and the Army Vision. This is accomplished through a greater understanding of whether a mixed type education, consisting of technical or business management knowledge enables managerial and leadership promotions within the Army Acquisition community. Throughout the study, there was a presentation of information focused on the main points of the research question, which were education, required experience, leadership, and organizational enhancements.

This chapter discusses the implications of these focus points on management theory, management practice, and future trends regarding the Army Corps employee base. The chapter discusses the following key issues:

- A discussion on the U.S. Army Strategy, U.S. Talent Management Strategy, and U.S. Army Vision, all of which are important throughout the examination of this research question.
- A discussion on how changing industrial technology requirements are influencing knowledge, skill, and ability (KSA) development, career progression opportunities and selections.
- The implications for the management practice section explains why leaders must be cognizant of the multi-disciplinary skills possessed by the employee and the importance of employee performance evaluations and how employee commitment influences performance measurement.

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- The implications for management education, the significance of academic attainment to professional success, the changing needs of employees to attain one or more of these skills, and the implication of academic attainment to KSA development.
- A discussion on the implications for future research.

When assessing the U.S. Army Vision and U.S. Army Strategy documents, as signed by then Army Secretary Esper and Chief of Staff General Milley, the expectation is the Army is comprised of a military and civilian force that are exceptional leaders. The U.S. Army Strategy states, “The Army will prioritize development and promotion of smart, thoughtful, and innovative leaders of character who are comfortable with complexity and capable of operating from the tactical to strategic level” (U.S. Army Strategy, 2018, p. 2). The expectation as the Army moves forward is smart leaders who are both technical and management savvy, should be more comfortable overseeing the highly complex systems in development by the Acquisition community.

As part of the development of smart leaders, the study points to the needs for leaders who are both technical and management educated. Line of Effort #3, Reform, in the U.S. Army Strategy, discusses the need to “push authorities that is competent and capable of using them to allow for expeditious actions and decisions” (U.S. Army Strategy, 2018, p. 9). Again, the findings in Chapter 4 makes clear that the decision on who “that leader” is must be arrived at based on a strong consideration of the multi-faceted nature of the leader or manager from a knowledge perspective. This means current leaders and managers must eliminate the old practice of hiring whom they knew—*regardless of KSAs*—or hindering the mobility of top performers. Both of these result in poorly executed human capital initiatives.

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From a Talent Management perspective, the U.S. Army Talent Management Strategy states the labor market needs employees who can add knowledge to the Army Enterprise. The Army Workforce Management Framework subsection of the Talent Management Strategy discusses the need for hiring authorities to include personnel who have developed KSAs to fill what were previously developmental gaps. The study findings imply the Army must open the human resources aperture and enforce greater tech and business training, while also promoting personnel with both knowledge basis. Specific to Acquisition leaders, civilian personnel excellence is a judgment of KSAs that result in the ability to execute tasks in a manner that is beneficial to the Army. As concluded in the 2016 Talent Management Strategy, there must be a retention of personnel with in-demand talents, broad KSA possession, and a desire to want to add value to the Army Enterprise.

### **Consequences to Management Theory and Practice**

When considering the HCT and CDT theories, the implications regarding employee attainment of skills and knowledge improvements directly focusing on forthcoming advancement of education and skill training and the effects of such on the value an employee gives to the organization. The commitment of an employee is directly proportional to the level and amount of investment an organization makes towards his or her development. The results of this study show that skill development, knowledge enhancement, organization commitment, and training require greater emphasis and managerial oversight to aid employee progression. The need for further study on how the Army Acquisition community can better shape these areas lay with the findings that personally funded employee skill and knowledge enhancement activities and commitment to the organization goals and values are not meeting expectations or are not considered important to the employee.

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From a CDT perspective, career success is heavily dependent on environmental characteristics of the organizations within which employees work. The Theory of Work Adjustment (TWA) supports the findings leading to additional implications on CDT, which is that personal career development is a combination of characteristics of a continual process of employee adjustment to the organization. Similar to how KSA development revolves around TWA as an aspect of CDT, employee self-efficacy, expectation of outcomes and career growth fall within the confines of a person's social cognitive abilities and his or her theory of self-improvement.

This study suggests not only that technical or business management academic knowledge is significant, but also stresses the importance to management and leader career development and progression in the manufacturing sector. In the various aspects of the manufacturing industry, technical skill development will vary and is reliant on the technologies in use to achieve goals. From a business management perspective, skills are not specialized and are in all aspects of the industry. For this reason, an employee's ability to manage and lead should be a primary focus on deciding and influencing career progression. The role of the firm in providing continuous and meaningful career development preparation is even greater once leaders take into account that organizational specific and other forms of training are most useful if the worker invests in a set of specific skills to benefit the firm in the future.

Regarding the declaration that business management employees receive managerial promotions faster, Army leaders should examine the significance of this manufacturing sector assessment on making Talent Management decisions. The consequence of management decision-making more mentorship will allow employees to demonstrate potential by actively obtaining business management education to complement specialized education and expertise. Based on

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general managerial skills becoming a deciding factor in promotions to higher ranks, there needs to be further assessment by organizations on the type of skills that are most important within the respective industries.

Ferreira and Sah (2012) and Custódio, Ferreira, and Matos (2013) all identified business management educated personnel working in the generalist track of an organization are more prominently sought after for leadership positions. The Army Acquisition corps should reassess its talent management strategy to understand whether the current human resource strategy aligns with what the private sector manufacturing companies are implementing. The findings of the study highlight technical employee promotions to senior leadership and management positions they were not equipped to execute.

Finally, Acquisition and all other Army employee skill sets must receive performance feedback and assessments that are consistent across the organization. In conjunction with ratings, organizations must find a way to facilitate advancements for employees across the organization. Aside from the conditions organizations must meet, self-efficacy results in a higher level of employee motivation and resilience to employment issues that are challenging and simultaneously enhance to professional success.

### **Requirements in a Technical and Individual Contributor Ladder Environment**

This analysis offers substantiation that in a dual-career track setting, there must be processes in place that ensures technically educated employees receive an adequate level of professional developmental support. This accomplishment occurs by holding managers and supervisors more accountable for employee training, supplementary education opportunities, on-the-job rotational assignments, and accomplishment of professional certifications. Such

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development opportunities and feedback aid better accountability and results in the outline of an achievable career that supports professional development and career success.

Personnel actions suggested by managers and leaders should ensure activities such as enrollment in courses to augment or diminish academic gaps, while ensuring skill proficiency that are supportive of organization goals. Managers must be involved with the tracking of performance, delivering primary feedback, recommending employees for rotational positions, and recommending specialized accreditations. This is essential because managerial actions that support KSA development can range from the completion of MOT education courses to employee participation in internships and company sponsored training.

Additionally, Army and private sector organizations should reassess policies regarding the frequency and quality of assessments based on environmental conditions change. Leaders at all levels should ensure their subjective opinions and professional experiences do not result in unjustified effects on employee opportunities. Assessments of employees must show consistency in comparisons of employees vying for a managerial or leadership positions. When evaluators do not share the same view of an employees' performance, it becomes challenging to assess the employee's performance. There needs to be a remedy to the absence of consistency in ratings in order to purge erroneous and often generic evaluations criterion.

Actions by both Army and private sector leaders and managers must ensure that a lack of management experience by technical employees is not detrimental to career enhancing opportunities. Achievement of this activity can occur via an organizational strategy focusing on rotational assignments that provide training and proficiency development for higher-level positions. Additionally, leaders should ensure managerial candidates are knowledgeable and capable in areas such as general management, operations management, marketing management,

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quality and process management, human resources management, finance, accounting, information technology, corporate control and governance and international business.

**Employee commitment to non-technical skill development.** The study findings suggest competence in the areas of decision-making, problem solving, resource management, finance, business management, and many other soft skills are progressively important to managerial promotions. Upward mobile management and leadership candidates should seek professional mentoring from senior leaders who can foster a better understanding of career progression challenges, while also providing a greater level of motivation regarding on-the-job performance. A person who is more inclined to understand new things and to work to increase their competence and skills through the pursuit of challenging and developmental opportunities, such as managerial promotions, stands a much greater chance of achieving professional aspirations and adding value to the organization (Dykeman, Wood, Ingram & Herr, 2003).

Employees with a strong focus on skill development should set professional goals that are stimulating, success enhancing for them personally, and the organization. Organization leaders must engage employees through mentoring, counseling, performance evaluations, and informal knowledge transfer opportunities to nurture employee creativity, resourcefulness, and other skills that adds value to both the employee and organization. There must be a continuous investment of time and resources to improve employee KSAs because constant shifts in the worker skill requirements will continue to be the standard.

**Organizational commitment.** Supervisors and leaders at all levels in government and the private sector must clearly understand individual occupational needs and commit to supporting employee career enhancing activities. Employees must also display commitment to organization goals and values, along with the loyalty to stay with the organization in order to

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acquire the leadership support needed for promotions. However, while commitment is necessary to roles and task execution, research focusing on the relationship link between organizational commitment and employee behaviors has been limited in demonstrating a definitive link between the as related to public sector (government) organizations; a significant lack of research exists as related to government employees. The consequence to organization management is the need for employees and leaders to concentrate on factors that displays trust in the organization, conviction in professional abilities, confidence in the employee and support for career progression.

**Performance assessment.** Employees who are successful at executing assigned tasks are more prone to receive appraisals that strongly support career advancement. How personnel appraisals are accomplished must therefore remain a characteristic when assessing the value of the Technical and Individual Contributor career ladder. Managers and supervisors must conquer challenges to providing evaluations against a set of performance standards that form the basis of a managerial position. A well-defined methodology must be in place when making an assessment of the different skills sets required of future leaders to eliminate the unintended action of promoting one category of employees ahead of the other, or worse, promote the lesser qualified of employees. Additionally, organizations must take action to better-understand how factors such as job title, years of specialized experience, ethnicity, gender, age, duration with the organization, and education influence an employee's performance evaluation.

### **Consequences to Management Focused Learning**

From a general organization viewpoint, there is an argument that business management education is more beneficial to career progression and will result in a faster career advancement for managerial professionals. As a result, MOT type training should become a requirement for employee candidates. The development of critical soft skills is a necessity in the manufacturing

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environment. The requirement for employees to possess a mixture of business and technology management skills has led to a conclusion that MOT type programs are needed to complement shortfalls in management or technical skill (Clarysse, et al, 2009; Phan, et al, 2009; Siegel, 2009).

Organization human resource departments and other leaders must begin evaluating how much business management related academic experience and knowledge complements technical expertise. There is a requirement for opportunities such as pre-employment internships to provide employees with a realistic experience, while also allowing the organization to assess the potential employees fit. Fullan (2001) advocates for greater education reform to guarantee the KSAs employees will need are considered as changes to underlying theories influencing career decision making and the new styles of teaching, such as MOT, are addressed between businesses and universities. The provision of additional internships and technical work opportunities before graduation will also complement the possible lack of job readiness skills.

As a whole, reform to modern education must focus more on the practical and subjective managerial decisions that are required to manage challenges 21<sup>st</sup> Century manufacturing managers and leaders encounter. Organization management must be comprised of personnel capable of interpreting business management and technical facts. Even more important for engineers and other technology-focused employees, they must strengthen their managerial expertise because continuation of past academic beliefs has led to the declining status and importance business programs.

### **Consequences for Future Leader and Management Trends**

The effects that technical employees will have trouble transitioning from their primary field due to ratings, commitment, and KSA development, supports the need for additional

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research. There is a need for research to establish whether changes to academic curriculums result in noticeable differences in promotion disparities among technical or business management employees. An aspect of future trends is the need for human resource policies to support employees seeking promotions, job rotations, and other opportunities external to the technical field. These opportunities should reduce the level of difficulty associated with gaining upper-level support and approval for managerial promotions outside of their field. Technology supervisors must therefore ensure more technologists receive training in non-science related fields to understand the tradecraft of finance, business management, and other skills that are soft in nature.

Findings also indicate the link between experience of the employee and the transition to manager needs a reassessment of a lack of technical supervisory support to employee promotions. Additionally, the influence of personal and professional relationships on promotions. Facts from this study indicate that engineers are less likely to receive managerial promotions. There is a greater need to understand how incentivizing senior technology supervisors will support personnel development within the organization. Evidence raises questions about the significance and relevance of technical employee skills in the area of management when compared to their business management counterparts. Therefore, of great importance that organizations strive to understand how incentives and recognition facilitates a high level of motivation among professionals.

Organizations must seek to guarantee their constructs and career paths facilitate the ability of technical personnel to focus on technically related issues. There should be additional investigation into development of a third track, which would permit technologist the ability to sidestep the dual-ladder career-track and vigorously partake in value-added business

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management related projects. The establishment of a third ladder serve to compensate engineers and scientists—*more than business personnel*—with prospects to engage in challenging and exciting research activities and projects regardless of promotion. Hebda, et al (2012) surmises there to be an overwhelming preference for this "third-ladder" promotion track.

### **Army Acquisition Corps Recommendations**

The findings should result in the enactment of Army Acquisition Corps policy from the perspective of hiring and promoting leaders with a MOT type academic background. There is room for improvement within the Acquisition community in order to ensure the *non-bias or blind* selection of the best personnel to fill critical Acquisition positions. The following are a list of actions that must be part of plans to advance the Acquisition community beyond the current state.

First, Program Executive Offices and all organizations that employ Acquisition workforce members should provide employees knowledge and skill enhancement education and training that is relevant to future—*not past*—Acquisition endeavors. Business and technical employees seeking career progression must have the opportunity to enhance the breadth of their knowledge by taking courses in the academic area that is directly opposite of their primary academic background – specific to business and technical personnel. Additionally, training needs to be a continuous series of activities and not a single or one-time check the block regimen.

Second, within the Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA (ALT)), senior leaders need to provide *definitive* guidance for training and hiring personnel to support the talent management strategy. The strategy, as currently written, provides general suggestive guidance that offers no specific actions. Generalized guidance is understandable for a holistic Army-wide document during a period not demanding

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change, but in order to ensure action that results in noteworthy change, specifics are necessary. Specifically, guidance is needed regarding the before mentioned skills across the Acquisition community in order to ensure hiring officials and organization leaders do not continue to operate in the same manner that helped put the community in the current leadership dilemma. Actions such as promoting only technical employees, promoting only business management personnel, or promoting individuals with close leadership bonds, but lacking the skills and abilities that are necessary to focus on the future.

Third, at the Army Acquisition Center of Excellence level, the United States Army Acquisition Support Center (USAASC) should implement a more rigorous selection process for civilians seeking positions ranging from Project Manager (PM) to Product Director (PD). Blind selections are similar to what the Army is doing for battalion command selections – no picture, visual, or personal relationship should influence selection of leaders. The basis of leadership selections must rely on a variety of individual's abilities not primary focus areas in the current leadership selection process. The current process of using the Senior Rater Potential Evaluation (SRPE) as a decider along with the Acquisition Career Record Brief (ACRB) and annual evaluations needs revision to a process that awards for the possession of crosscutting technical and managerial skills, while also eliminating external personal influences. Skills include cognitive, creative thinking, written-communication, oral-communication, and strategic planning and thinking abilities of individuals competing for coveted positions of PM and PD.

Subjective interpretation of personal relationships between senior raters and applicants indicate such relationships influence the SRPE write-up, which means personnel who are “liked,” stand a much better chance of getting a strong write-up and other will be less successful. The influence on the ACRB is less likely than with the SRPE and the annual evaluation, but the

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placement of personnel in positions of higher responsibility is a primary aspect of the ACRB.

Eliminating personal bias is a challenge that ASA (ALT) and USAASC leaders achieve in order to ensure selection of the best personnel for coveted leadership positions. There must be a mandatory requirement for personnel seeking leader roles to be technically and business management competent—*not a subject matter expert*. In order to ensure this, there must be career development policy mandating experience in both business and technology management at the GS-12 to GS-13 (NH-03) level for personnel considering application for PM and PD positions at a later stage in their careers.

Finally, an analysis of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P) results in changes to Personnel, Training, and Policy. In the area of Personnel, all major organizations within the Acquisition community must be more selective on personnel selections relating to filling billets. Not all billets are critical positions, but the community needs to ensure recruiting and hiring personnel with the right mix of technical and business management skills. This is a fundamental change with implications to the Joint Capabilities Integration and Development System (JCIDS) and DOTMLPF-P and will broaden the pool of personnel with the minimal skill sets needed to fill the PM and PD jobs of the future (JCIDS Process DOTMLPF-P Analysis).

At the October 2019 Association of the U.S. Army's annual meeting, Army Chief of Staff General James McConville made a similar argument for personnel development and leadership selection when discussing the changes to battalion command selections. His specific statement was “If successful, the new assessment effort will likely be used in selecting enlisted personnel, as well as Army civilians, for leadership assignments” (Cox, 2019, para. 7). The challenge is implementing this as a policy to eliminate bias and put the best personnel in the hardest and

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coveted positions. For Acquisition professionals, the GS-14 (NH-04) PM position is the equivalent of an Army battalion command.

In the context of Training, the current Defense Acquisition University (DAU) system of training must incorporate certifications that broaden the previous academic attainment of the workforce. Specifically, personnel should no longer receive training that keeps them in a single community stovepipe. Career development requirements must ensure personnel broaden their skills to be competitive in an environment that is more technical at the junior levels up to GS-13 (NH-03) and transition to management at the GS-14 (NH-04) and higher levels. Organizations must continuously coordinate civilian personnel cross-training opportunities that broadens technical and managerial abilities, while also emphasizing cognitive ability, creative thinking, written-communication, oral-communication, and strategic planning and thinking. These skills are a primary focus for battalion command selection and unlike the annual evaluation, which is an assessment of past, the skills assessment focuses on potential. DAU, the DoDs primary training institution for Acquisition professionals, must implement training to support this evolving standard of leadership selection.

Finally, Policy at the DoD and Army level must support enhancing the workforce, while also making sure the Acquisition community is postured to support the lines of efforts listed in the Army Strategy. Failure to enact policy changes that are meaningful will result in the continuation of a system of hiring, training, and progression that is flawed and do not provide the best results. The Army Acquisition community must look to the future because operating with a past mindset will not result in the best leaders and will not ensure PEOs rapidly deliver capability to the Warfighter as a means of ensuring our continuous dominance in the areas of national security and defense.

### **Conclusion**

The implications section of this study covered a broad variety of categories. Regarding the issue of management theory, skill development, knowledge enhancement, organization commitment, and training require greater emphasis and managerial oversight. The CDT and HCT theories serve as the grounds for the employee KSA development procedures. For this reason, the business management component of human capital should be the major emphasis of manufacturing sector promotions.

The conclusions offer confirmation that specialist employees need the support of organizational policies in order to lessen the complexity of acquiring backing for managerial promotions. Regarding the implication to Management Practice, employee raters must maintain a focus on performance. The provision Management of Technology training would provide employees with the required business management and technical knowledge. Finally, enactment of recommendations within the Acquisition Corps is necessary in order to support the Army Vision, Army Strategy, and Army Talent Management Strategy.

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**Acronyms**

ABS	Association of Business Schools
ACRB	Acquisition Career Record Brief
ASA (ALT	Assistant Secretary of the Army (Acquisition, Logistics and Technology)
CDT	Career Development Theory
CEO	Chief Executive Officer
DAU	Defense Acquisition University
DoD	Department of Defense
DOTMLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy
GAO	Government Accountability Office
GS	General Schedule
HCT	Human Capital Theory
JCIDS	Joint Capabilities Integration and Development System
KSA	Knowledge, Skills, and Abilities
MG	Major General
MG (R)	Major General Retired
MOT	Management of Technology
NH	Technical Management Professional
OPSEC	Operations Security
PD	Product Director

## Development of the Acquisition Workforce

PM	Project Manager
R&D	Research and Development
SBCT	Skilled-biased Technological Change
SRPE	Senior Rater Potential Evaluation
SSCF	Senior Service College Fellowship
TWA	Theory of Work Adjustment
U.S.	United States
UMGC	University of Maryland Global Campus
USAASC	United States Army Acquisition Support Center

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