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ACQUISITION RESEARCH SPONSORED REPORT SERIES

An Examination of the Technical Product Knowledge of Contracting Professionals at Air Force System Program Offices

12 December 2012

by

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ABSTRACT

The acquisition process for the Department of Defense has recently seen acquisition setbacks characterized by cost overruns, schedule delays, and products that do not meet standards. Part of this problem has been attributed to deficiencies with the acquisition workforce, to include contracting professionals. A partial remedy has recently been to hire more contracting professionals to the acquisition workforce along with a revision of training requirements. But what if the government is not training contracting professionals properly? Are contracting professionals receiving the right education and training to obtain the requisite skills to contract successfully? Research indicates that commercial purchasing professionals must possess certain skill sets in order to be successful purchasing professionals. One of these skills is product knowledge, or knowledge of the product or service for which they contract. Because the government does not provide training or opportunities for contracting professionals to gain product knowledge, these contractors are incapable of performing their job to the maximum potential. As a result of this shortcoming, there are adverse effects on the organization, such as a less motivated and more stressed workforce due to the lack of knowledge. This research examines product knowledge in academic theory, commercial practice, and government practice, and its effect on a government organization.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFLCMC	Air Force Life-Cycle Management Center
AFMC	Air Force Material Command
CFCM	Certified Federal Contracts Manager
CLC	Continuous Learning Credits
CLM	Continuous Learning Modules
CO	Contracting Officer
CPCM	Certified Professional Contracts Manager
CWB	Counterproductive Work Behaviors
DAU	Defense Acquisition University
DAWDF	Defense Acquisition Workforce Development Fund
DAWIA	Defense Acquisition Workforce Improvement Act
DoD	Department of Defense
FAR	Federal Acquisition Regulation
FASA	Federal Acquisition Streamlining Act
FPDS–NG	Federal Procurement Data System-Next Generation
FY	Fiscal Year
GAO	Government Accountability Office
GPS	Global Positioning System
IG	Inspector General
MAIS	Major Acquisition Information System
MDAP	Major Defense Acquisition Program
MILSATCOM	Military Satellite Communications
NASA	National Aeronautics and Space Administration
NCMA	National Contract Management Association
NRO	National Reconnaissance Office
NSA	National Security Agency
O&M	Operation and Maintenance
OCBs	Organizational Citizenship Behaviors

OMB	Office of Management and Budget
PCQ	PysCap Questionnaire
POB	Positive Organizational Behavior
POTUS	President of the United States
PsyCap	Psychological Capital
SMC	Space and Missile Systems Center
USAF	United States Air Force
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

I. INTRODUCTION

A. BACKGROUND

1. Department of Defense Spending

The Department of Defense (DoD) is responsible for executing a yearly budget of $553 billion, which was the fiscal year (FY) 2012 budget request by the president of the United States (POTUS; Office of Management and Budget [OMB], 2012). This budget does not include wartime supplemental appropriations, which can further raise the total dollar amount another $100 billion. Part of that large sum of money is allotted for acquiring and maintaining major weapon systems, service contracts, construction projects, military and civilian personnel, medical benefits, and other high-dollar areas. The DoD's top five contractors, which consist of Lockheed Martin, The Boeing Company, General Dynamics Corporation, Raytheon Company, and the Northrop Grumman Corporation, accounted for one fifth of the FY2011 budget, with $102 billion in DoD spending. This $102 billion is largely spent on the Major Defense Acquisition Program (MDAP) and Major Acquisition Information System (MAIS) throughout the entire procurement process.

The defense industry is a difficult sector for both the government and the contractor. Jacques S. Gansler (2011), the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) from November 1997 until January 2001, defined and characterized the defense industry as a

> major sector of the U.S. economy, but because it has essentially a single buyer (the Department of Defense), it has a small group of major suppliers (essentially an oligopoly in each sector), and is controlled by government laws and regulations, it is not a normal market. (p. 152)

Defense spending is a form of discretionary spending that is politically charged and cyclical in nature. Every major war or conflict within the past 60 years can be characterized by a major increase in defense spending and then a sharp cut in defense spending after the war or conflict draws down. When a reduction in spending occurs, cuts are seen in areas such as weapon system programs, personnel, operation and maintenance (O&M), procurement, and other high-dollar areas. With the end of the Cold War, the DoD saw a major reduction in budget authority and personnel, including the acquisition workforce. The acquisition workforce is a highly trained and professional workforce that is charged with procuring the best value products and services for the military Services. Unlike commercial businesses, the defense acquisition workforce, specifically the contracting workforce, is primarily tasked with seeking the best value for the taxpayer while "maintaining the public's trust and fulfilling the public policy objectives" (Federal Acquisition Regulation [FAR] 1.102). Since 1998, there has been an exponential increase in procurement budget authority, while the defense acquisition workforce, to include contracting personnel, has been steadily decreasing, as noted in Figure 1. With increased spending authority, the acquisition workforce has been strained and has suffered, as evidenced by recent acquisition problems with MDAPs such as the KC-X program. The acquisition workforce "consists of the military acquisition workforce, career civilian acquisition workforce, and senior political appointees" (Gansler, 2011). Within this government workforce are many different careers or functional areas, such as contracting professionals, technical evaluators, pricers, systems engineers, and finance and budget professionals.
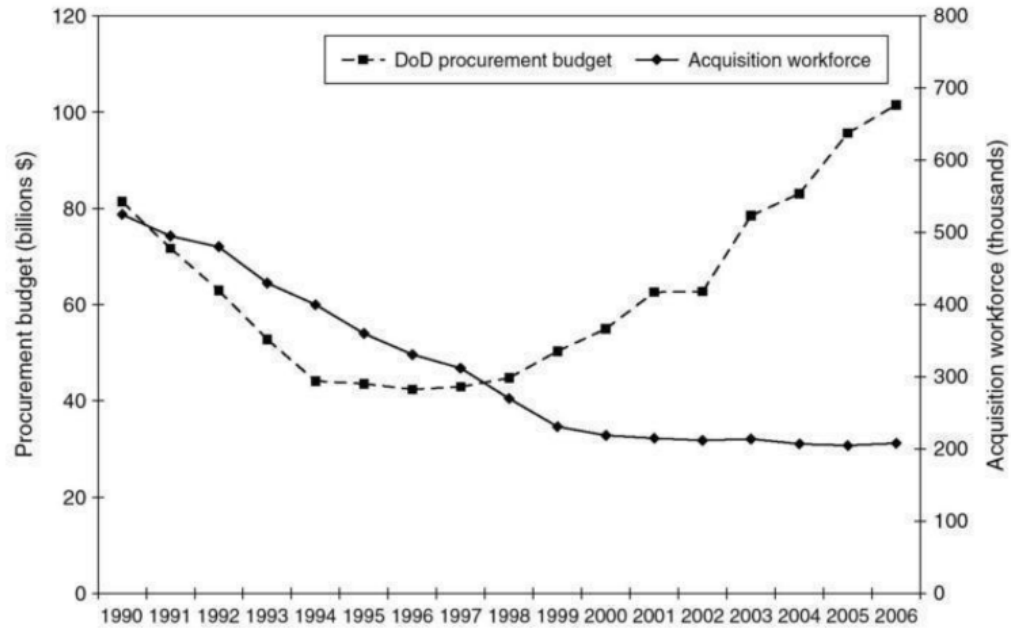
Figure 1.   Budget and Workforce
(Gansler, 2011)

2.   Contracting Professionals

The contracting career field is made up of contract specialists, contracting officers, and contracting managers, who are usually more experienced contracting officers. Typically, based on experience and occupational certifications such as the Defense Acquisition Workforce Improvement Act (DAWIA, 1990), at the bottom are contract specialists or the actual buyers of most products or services. Following contract specialists are contracting officers, or the actual signing and obligating authority for any contract entered into by the government. At the top of this hierarchy are the contracting managers, who organize, manage, and lead the contracting effort for products and services. Contracting professionals are a group of highly educated and trained knowledge experts employed within the federal government as part of a team working on complex acquisitions such as MDAPs and MAISs. The career field is most commonly known for its contracting officers, who hold the important

role as the sole obligators, or spenders, of federal dollars. Contracting officers have the "authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the contracting officer acting within the limits of their authority as delegated by the contracting officer" (FAR 2.101). Charged with acquiring commodities, services, construction, and complex major weapons systems, contracting professionals work with members of the acquisition team to ensure that the right product is procured at the right price.

In order to become a contracting professional within the federal government, a prospective employee must meet certain criteria to be hired to a contracting position (see Appendix A). Some of this criteria includes holding a baccalaureate degree (four-year degree) in any field of study and having at least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management. Once hired, contracting professionals acquire on-the-job training, and they must also receive occupational certification in accordance with the DAWIA, which was signed into law in November 1990. The DAWIA requires that the DoD establish education and training standards for its civilian and military workforce, to include contracting professionals. There are three levels of DAWIA certification: Level I, Level II, and Level III. Each level requires more experience and training in order to receive certification (see Appendix A for further details). Even with these occupational certifications, the DoD has seen many acquisition mistakes within its major weapons systems programs. Specifically, within the United States Air Force (USAF), there has been much attention placed on the KC-X and F-22 acquisition programs, calling the Air Force's acquisition process into major question.

3. DoD Acquisition Problems

The DoD, specifically the Air Force, has suffered a number of embarrassing acquisition missteps within the past decade. The KC-X, in particular, took three acquisition attempts to select a winning proposal. Since the 1990s, the Government Accountability Office (GAO; known as the General Accounting Office until July 2004) has designated the DoD's contract management as a high-risk area for fraud, waste, abuse, and mismanagement. Along with fraud, waste, abuse, and mismanagement, there have been severe cost overruns, schedule delays, and performance shortfalls. From 1992 to 2009, there have been 31 GAO reports and 157 reports from the DoD Inspector General (IG) highlighting shortcomings in the acquisition environment (Seifert & Ermoshkin, 2010). As a result of the many fumbled acquisition programs, the DoD procurement system has been cast in the limelight by Congress, the media, and the public, placing intense pressure on the DoD to change the ways in which it contracts.

4. DoD Response

In 2008, Congress enacted the Defense Acquisition Workforce Development Fund (DAWDF) to increase the size and skill of the defense acquisition workforce. This act came in response to a growing outcry of criticism from many corners of the government, media, and public sectors. Since the 1990s, the acquisition workforce has been decreasing while the workload has been increasing, as previously noted in Figure 1. For example, "from 1995 to 2006, acquisition dollars increased by 382 percent, acquisition actions increased by 359 percent, and the workforce declined by 53 percent" (Gansler, 2011). Although the Gansler Commission reported on Army expeditionary contracting, the report presented a picture of the entire DoD contracting workforce—not enough personnel, not enough experience, and underemphasized importance as a function. As a result, Congress passed the DAWDF in

2008 to increase the number of acquisition professionals, as well as the skill and retention of the current force. The DAWDF was a step in the right direction, but there are still gaps in developing and maintaining the contracting workforce.

5. Product Knowledge

Product knowledge is a technical skill that essentially defines what a purchasing professional is buying. It is implied in parts of the FAR, such as Part 10 (Market Research), as being important and integral to the acquisition process. Research, which is discussed in Chapter II, has shown that this technical skill is a necessity for purchasing professionals in the commercial sector. In the government sector, it has largely been ignored or not recognized at all. A wise consumer would never purchase a new car without obtaining extensive knowledge about the new vehicle and its competitors. Having adequate job knowledge is a necessity for any individual in any career field. Product knowledge is a necessity for acquisition professionals; any lack of product knowledge may negatively affect the employee and his or her workplace.

6. Motivation, Conflict, and Stress

Motivation, conflict, and stress are three psychological factors commonly found in the workplace that can have positive and negative effects on the workplace. In this research, I suggest that a lack of product knowledge may demotivate an employee in the workforce, and inversely, a strong knowledge of the product that a person works on may motivate that person to do better in the workplace. If there is a lack of product knowledge, workplace conflict with contracting professionals and other personnel from other functional areas may increase. If contracting professionals cannot accurately relate to technical evaluators, workplace conflicts are sure to arise. Finally, a lack of product knowledge may increase workplace stress and negatively affect an employee. This research attempts to link product

knowledge to these three psychological factors in order to better understand the impacts that product knowledge has on a professional purchasing organization (see Figure 2). This research is based on the premise that product knowledge is a necessity in order to maintain a positive and healthy workforce climate.
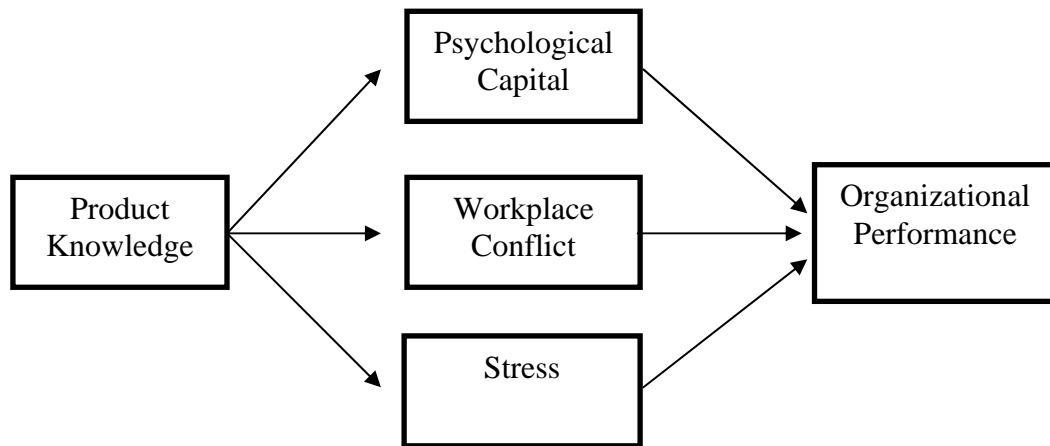
Figure 2.   Product Knowledge Map

B.   PURPOSE

The purpose of this research is to assess the level of product knowledge of contracting professionals at three major Air Force weapon systems centers and to see how this level of product knowledge is related to three human behavioral aspects: motivation, occupational stress, and workplace conflict. The purpose of assessing the level of product knowledge and its relation to motivation, occupational stress, and workplace conflict is to determine whether product knowledge has a negative or positive effect on the organization. This thesis is also designed to highlight areas in which the DoD, specifically the Air Force, may be falling short when providing training and education to its contracting professionals. Contracting professionals need an adequate amount of product knowledge in order to carry out their acquisition duties. Contracting centers that do not provide enough opportunities for

contracting professionals to obtain this essential knowledge will see adverse effects on efficacy, motivation, workplace conflict, and stress. Having better knowledge of what they are contracting for helps personnel make better business decisions and helps motivate personnel by providing a meaningful understanding of the mission. For the purpose of this thesis, I use a definition of product knowledge that is not limited to the specific product or service but one that encompasses market intelligence, the history of the product and the market, market trends, the future of the market, and the future of the product. I further define product knowledge in Chapter II. Contracting professionals who are better prepared for what they are working on can only serve to find more effective ways to acquire better products or services.

C.   RESEARCH QUESTIONS

All of the DAWIA contracting requirements noted in Appendix A share a common theme: They all focus on contracting processes and techniques. None of these requirements mention product knowledge, which is considered a technical skill by academia. Also absent are courses that provide specific training and education as to what exactly a contracting professional may be working on. If a consumer were to decide that he or she wanted to buy a television, it would be prudent to do ample market research to learn about televisions before purchasing one. Market research is an important and vital part of the contracting process— so important that the FAR has given it its own part: FAR Part 10 (Market Research). However, this is the shortest section—and, in my opinion, the most misunderstood section— of the FAR. In this thesis, I collected and analyzed data in order to answer the following research questions.

Research Question 1: Do major system centers provide adequate product knowledge to contracting professionals through training, education, or experience?

Research Question 2: Do major system centers' contracting professionals feel as though they would be more effective members in the procurement process with more product knowledge?

Research Question 3: Does product knowledge have an effect on contracting professionals' motivation?

Research Question 4: Does product knowledge have an effect on contracting professionals' work-related conflict?

Research Question 5: Does product knowledge have an effect on contracting professionals' work-related stress?

D.   BENEFITS AND LIMITATIONS

The intended benefit of this thesis is to create new knowledge on product knowledge research within government acquisition organizations.   With further research, future education and training opportunities may arise to provide this vital technical skill to not only contracting professionals, but also other career fields that are heavily involved in the acquisition process.

This thesis is limited by many factors. First and foremost, it is the first study of its kind.   I could not find any prior research that evaluated product knowledge among contracting professionals—or among any other functional area, for that matter.   Another important limitation is the scope of the data collection that I used in this research.   In this thesis, I examined contracting professionals at only three major systems centers for the Air Force.   At these three centers, contracting professionals primarily focus on MDAPs and

MAISs for the Air Force, but not for other military Services. I did not examine other areas of contracting, such as operational-level support contracting squadrons, expeditionary contracting, or enterprise-level contracting within the Air Force. I also did not examine contracting professionals from other military departments that work on vastly different products from their Air Force counterparts. Finally, I examined only three areas of organizational behavior to draw links between product knowledge and the effects it has on an organization. There are many more areas that a human behaviorist can study in order to draw links between product knowledge and its effect on the workplace environment.

E.   SCOPE AND ORGANIZATION

In this thesis, I looked at three major weapon systems centers: the Space and Missile Systems Center (SMC) at Los Angeles Air Force Base (AFB), CA; the Air Force Life-Cycle Management Center (AFLCMC) at Wright–Patterson AFB, OH; and the Air Force Life-Cycle Management Center at Hanscom AFB, MA. Within these three major centers, I administered a 60-question survey to all contracting professionals, warranted and unwarranted, military and civilian, within each center. I administered the surveys via electronic mail with a web address link to Survey Monkey. The surveys were administered on a voluntary basis; participation was not required.

F.   METHODOLOGY

In this thesis, I first examine needed areas of acquisition improvement within the DoD and the Air Force. There are many GAO and DoDIG reports that call for renewed reform for acquisition improvements within the DoD and the Air Force. Second, I further develop the definition of product knowledge and then examine the importance of product knowledge as an identifiable skill for acquisition professionals. Third, I draw a link between

product knowledge and the effect it has on the organization through the constructs of motivation, workplace conflict, and workplace stress. I then examine ways in which the DoD and the Air Force provide product knowledge to their acquisition workforce through experience, training, and education. Following that examination, I examine contracting professional workforce training. Finally, I use the results of the survey administered to contracting professionals at three major systems centers to see if any level of product knowledge has an effect on the workplace within the constructs of motivation, workplace conflict, and workplace-related stress.

G. SUMMARY

In this chapter, I introduced DoD spending and how obligations have increased while the number of acquisition professionals has decreased since the 1990s. I then introduced contracting professionals as a vital part of the acquisition team and the acquisition process. Contracting professionals are a group of highly trained acquisition professionals that are necessary for any acquisition effort. I then introduced acquisition problems within the DoD and the DoD's response in order to improve upon these identified shortcomings. I introduced the concept of product knowledge as a technical skill that is a basis for any contracting or purchasing professional. I also introduced the psychological constructs of motivation, conflict, and stress and how they can affect the organization. I then introduced the model/theory of how product knowledge can be linked to motivation, conflict, and stress and how these psychological constructs may affect the organization positively or negatively. I introduced the underlining purpose of this research and framed that purpose in order to identify ways to improve the effectiveness of contracting professionals within an acquisition workplace. I then proposed research questions in order to provide areas to explore and offer

data supporting the Product Knowledge Map. Finally, I introduced benefits and limitations, scope and organization, and the thesis methodology to wrap up the chapter. In the next chapter, I introduce academic research that I conducted in order to frame and support this concept of product knowledge and to introduce the psychological constructs and their effect on an organization.

II. LITERATURE REVIEW

A. INTRODUCTION

Over the past few decades, purchasing and contracting within the federal government have been constantly evolving from an operational level to a more strategic level. The government has established new rules to modernize its procurement practices and new requirements to make its contracting corps a more professional workforce. Federal acts and DoD initiatives, such as the Federal Acquisition Streamlining Act (FASA) of 1994 and the more recent Ashton Carter *Better Buying Power* memorandum of 2010, are demonstrated efforts to help improve the workforce and the acquisition processes and techniques within the DoD.

Within the Air Force, commodity councils have been formed to leverage buying power for critical commodities that the Air Force consumes in large quantities. From furniture to information technology equipment, the Air Force is using more and more commercial practices in order to save money and extend Air Force buying power. Because of improving technologies, the DoD and the Air Force have been collecting mass amounts of data, such as data collected on the Federal Procurement Data System–Next Generation (FPDS–NG), to create spend analysis and to determine where the most money is being spent. With this new knowledge, the DoD and Air Force (2010) have been targeting areas to extend their buying power through strategic sourcing and other supply-chain management techniques. The Air Force has defined *strategic sourcing* as "the collaborative and structured process of critically analyzing an organization's spending and using this information to make business decisions about acquiring commodities and services more effectively and efficiently" (Air Force, 2010, p. 2). Integral to these techniques are the people who find

these new areas for improvement and determine which strategies to develop and implement. In order for these employees to create these strategies, a certain skill set is needed, including the ability to recognize needs and to develop strategies. Because contracting personnel are primarily charged with spending taxpayer dollars, they should have a certain set of education and skills necessary to carry out their duties effectively. These skills include knowledge of purchasing and contracting processes, along with technical knowledge such as product knowledge. Currently, the Defense Acquisition University (DAU) only provides training on purchasing and contracting processes. There is a notable absence of any product-related training from the DAU.

B.   WHAT IS PRODUCT KNOWLEDGE?

The purchasing function in the commercial sector within the past decade has "quickly developed from an operational towards a tactical/strategical profession" (Axelsson, Bouwmans, Rozemeijer, & Wynstra, 2005, p. 136). Driven by more available information, and more knowledge, the purchasing function within commercial organizations is rapidly evolving into the supply management profession. Within that function, a certain set of skills is necessary in order for any purchasing/supply management professional to successfully carry out the duties of his or her job.

In 1995, Kenneth Killen and John Kamauff identified what they thought were the necessary skills in order to be a successful buyer and purchasing manager. These skills were grouped into four general areas: product knowledge, principles of purchasing and management, personal attributes, and interpersonal skills, with product knowledge being categorized as a technical skill. For Killen and Kamauff (1995), product knowledge required that a buyer be knowledgeable about the product or materials, prices, major sources, quality

issues, and customer requirements. Product knowledge is a simple concept, yet one difficult to define due to the wide variety of products and services that a buying organization contracts for.

For the purpose of this paper, I define *product knowledge* as the knowledge of the product or materials, market pricing, major sources, and industry with which the product/service is associated. This broad definition allows for a holistic view of a product or service, which is necessary for a wide array of purchasing activities.

C. PRODUCT KNOWLEDGE: A NECESSARY SKILL

Product knowledge is a necessary skill for any purchasing professional. It has consistently been noted in books and scholarly articles such as Killen and Kamauff's (1995) *Managing Purchasing: Making the Supply Team Work*, and it is logical that any professional involved with procurement have this fundamental skill. It seems so obvious that purchasing professionals have knowledge about the products they acquire, yet within the government procurement world, product knowledge is never focused on or defined in training or education. The most closely associated government-recognized term with the concept of product knowledge is market research, which is alluded to in the smallest section of the FAR. Because it is such an obvious necessity for an acquisition, it is often overlooked and can result in procurement professionals acquiring products or services that they know nothing about. If a buyer purchases supplies or services without adequate product knowledge, then the organization may not obtain the requirement as needed. That is why it is imperative that the contracting agency do proper market research and have the product knowledge necessary to have a successful acquisition.

Many scholarly sources, such as Killen and Kamauff (1995), indicate that product knowledge is a necessity within any buying organization. These sources, time and time again, constantly note that product knowledge, a technical skill, is a requisite for any buying organization. If that fundamental skill is absent within a purchasing organization, then the acquisition process will suffer.

1. Procurement Knowledge and Product Knowledge

Axelsson et al. (2005) identified general procurement knowledge as a necessary skill in order for purchasing professionals to successfully carry out their duties in the acquisition environment. For their purpose, they defined *knowledge* as "the ability of a person to perform a task by connecting data (external sources) with their own information, experience and attitude" (Axelsson et al., 2005, p. 137). Going further, they defined knowledge as a function of information, experience, skills, and attitude, resulting in a formula of $K = f(I * ESA)$. To increase knowledge, a purchasing professional simply has to increase any one of these areas, with an increase of experience, skill, and attitude resulting in a greater increase in knowledge than a sole increase in information. Any one of these elements is an important factor in creating knowledge, but knowledge cannot be confined to this simple formula because it is "dynamic, content specific, and is humanistic" (Axelsson et al., 2005, p. 138). Not all information results in new knowledge, nor do all new experiences, skills, and attitudes. Old information does not result in new and useful knowledge, nor does information that is not relevant.

Axelsson et al. (2005) identified six knowledge domains as areas that purchasing professionals need to monitor and develop: organizational knowledge, professional knowledge, supply market knowledge, supplier knowledge, customer knowledge, and product knowledge. Some of these domains, other than product knowledge, could be

considered a part of product knowledge when applied to my definition. When Axelsson et al. (2005) addressed product knowledge, they made an important observation that product knowledge is necessary in order for purchasing professionals to participate in cross-functional teams for complex products or services, and "to be able to offer the customer the best product" (p. 141). Axelsson et al. (2005) also noted that product knowledge is an obvious need because the task of the purchasing professional is to buy products and services. They conducted research at the purchasing areas of many large Dutch corporations, which indicated that knowledge (including product knowledge, one of the six domains) was important to both purchasing managers and buyers.

2.   Procurement Skills and Product Knowledge

In 1995, Killen and Kamauff published a book titled *Managing Purchasing: Making the Supply Team Work*, in which they explored in detail what skills a purchasing professional needs to be successful within an organization. Killen and Kamauff (1995) described the necessary characteristics of a good buyer and then the required characteristics for a good purchasing manager. For a good buyer, an individual must possess (1) product knowledge, (2) principles of purchasing and management, (3) personal attributes, and (4) interpersonal skills (see Figure 3). A purchasing manager must possess (1) technical knowledge, (2) analytical ability, (3) interpersonal skills, and (4) managerial skills (see Figure 4).

Product Knowledge	Principles of Purchasing & Management	Personal Attributes	Interpersonal Skills
Knows major facets of product or materials	Knows purchasing's role in the organization	Integrity	Can work well in teams
		Good mind for details	
Knows the market price, etc.	Understands quality theory & application	Likes to do research	Has good communication skills: good listener, persuasive speaker, good report and letter writer
Knows major sources	Understands pricing theory, policies, & practices	Careful and deliberate decision maker	
Is familiar with quality requirements and problems	Is a good negotiator	Ability to tolerate conflicts and ambiguity	
	Has a workable knowledge of inventory control & management		
Understands external customer requirements and their impacts on internal customers and suppliers	Understands and can apply the right time concept	Takes appropriate risks	Is willing and able to deal effectively with people who hold opposing views
		Has high self-esteem	
	Is able to successfully carry out value analysis projects	Takes initiative	
	Knows purchasing role in capital equipment buying		
	Is able to apply make-or-buy theory		
	Is able to apply supply chain management concepts		
	Knows marketing, accounting, MIS, operations, organizational behavior and financial management theory & practice		

Figure 3. Buyer Characteristics
(Killen & Kamauff, 1995)

Product Knowledge	Analytical Ability	Interpersonal Skills	Managerial Skills
Product Knowledge - Has a good understanding but not necessarily an expert in every product bought by the department	Is able to identify problems	Works well with department members, other departments & suppliers	Knows how to plan materials, budgets, work, etc.
	Is able to solve problems & not get caught up in the symptoms		
	Is good & fast decision maker		Knows how to organize the department's work & people
	Is able to think in the abstract	Is able to reach workable compromise	
Has mastered the principles of purchasing	Is able to analyze various strategic options & their direct potential & indirect impact on the organization	Can handle conflict	
		Is adept at organizational politics	Is a good leader
Is very knowledgeable of the organization's business			Communicates well & is able to articulate the department's needs to top management and the rest of the organization
		Is able to maintain positive mental attitude	
Stays ahead of current trends such as ISO 9000, TQM, & supply chain management			
		Coordinates purchasing departments role with that of organization	Is able to establish a work environment that enhances department memebers' motivation
Is thoroughly familiar with the needs of external customers & their impact on internal customers & suppliers			
			Controls well-able to monitor & adjust department activities to meet plans

Figure 4.   Purchasing Manager Characteristics
(Killen & Kamauff, 1995)

Killen and Kamauff (1995) defined *product knowledge* as "a thorough technical understanding from the perspective of the supplier *and* the customer about the product or service one is expected to buy (depth)" (p. 150). All buyers, whether they be junior or senior buyers, must possess this skill in order to be successful within a purchasing department. In order to be successful, the purchasing manager must possess all the qualities of a good buyer plus those of a good business manager (Killen & Kamauff, 1995). In order to be a good buyer and a good manager, a purchasing professional must have good product knowledge.

Giunipero and Pearcy (2000), along with many other authors, quickly identified that the purchasing function within commercial organizations was rapidly evolving into a very strategic role. Because of this change, they believed it is necessary that commercial organizations provide their purchasing professionals "with the skills and abilities necessary to maximize the purchasing function's contribution to the goals of the organization" (Giunipero & Pearcy, 2000, p. 4). In order to identify what skills are necessary, Giunipero and Pearcy (2000) issued a survey to 136 purchasing professionals requesting them to rank 30 different skills on a Likert scale, where 1 equaled *not important* and 5 equaled *very important*. Giunipero and Pearcy (2000) categorized the 30 skills into seven different areas: strategic skills, process management skills, team skills, decision-making skills, behavioral skills, negotiation skills, and quantitative skills. Out of the 30 skills, based upon my definition, product knowledge would most closely associate with supply base research, a strategic skill, and technical and blueprint reading, a quantitative skill. Giunipero and Pearcy's (2000) results showed that these three skills (supply base research, technical reading, and blueprint reading) did not rank very high as world-class purchasing skills. Although technical and blueprint reading skills are needed, to an extent, the results of Giunipero and Pearcy's (2000) research indicated that "in some environments the ability to read blueprints is an important skill, blueprint reading and specification development are skills more typically related to engineering and technical personnel" (p. 9). Giunipero and Pearcy (2000) did note, however, that technical proficiency, the category product knowledge falls under, is necessary in order to understand and use relevant technical information to communicate with engineers and suppliers. Regardless of the results of the survey, they thought that without a strong technical knowledge, "the purchaser is ill-equipped to challenge

specifications and statements of work" (Giunipero & Pearcy, 2000, p. 9). Product knowledge has been recognized as a vital skill for a purchasing professional, but in order for an organization to be successful, it must properly motivate an individual to obtain and use this vital skill in the appropriate manner.

3. Motivating the Purchasing Professional

Pagell, Das, Curkovic, and Easton's (1996) study on the motivating factors for purchasing professionals focused not on procurement skills needed to make a transformation from the tactical purchasing function to a strategic-level supply management but on how a firm motivates its employees to gain and use these new procurement skills. Pagell et al.'s (1996) proposed solution was to have adequate compensation and performance measurement systems. But in order for any firm to motivate any of its employees, it must provide the requisite skill set in order for its employees to carry out their jobs properly.

Pagell et al. (1996) found that there are three main skill sets that are important to the sourcing function, as adapted from researchers Kolchin and Giunipero (1993): business skills, interpersonal skills, and technical skills. Under technical skills, Pagell et al. (1996) noted that product knowledge, among other areas, was a necessary skill in order for purchasing professionals to make the transition from tactical purchasing to strategic supply management. In their study, Pagell et al. (1996) noted, however, that knowing what type of skills an organization will need is just the first step in getting employees to actually use those skills. Motivating employees largely remains unsolved. They suggested that having compensation and performance measurement systems that are properly designed could positively motivate purchasing professionals.

To conduct their research on motivating purchasing professionals, Pagell et al. (1996) created a model to link compensation and measurement to motivation (see Figure 5). They

tested this model by interviewing 14 purchasing managers at Michigan firms, seeking validation and opinions about the model. They found that (1) the skill sets identified by Kolchin and Giunipero (1993) are very similar to the skill sets valued by the purchasing managers surveyed for this study; (2) firms want to see better cost control, which would lead to positive rewards; (3) some firms see all of the proposed linkages as very important; and (4) firms that tend to view one linkage as important or unimportant tend to view all the linkages the same way. Pagell et al. (1996) drew the following conclusion:

> Having skills and using them are very different things. The company that wants its purchasing professionals to perform at the highest level must provide an atmosphere that motivates them to acquire and use the appropriate skills. Two key elements in motivating purchasing professionals to use the skills they have and to acquire new skills are the compensation program and performance measurement system. (p. 34)

A good company will have a solid combination of compensation programs and performance measuring systems. Employees can then maximize the use of purchasing skills and obtain a drive to acquire additional skills to improve the job that they perform.
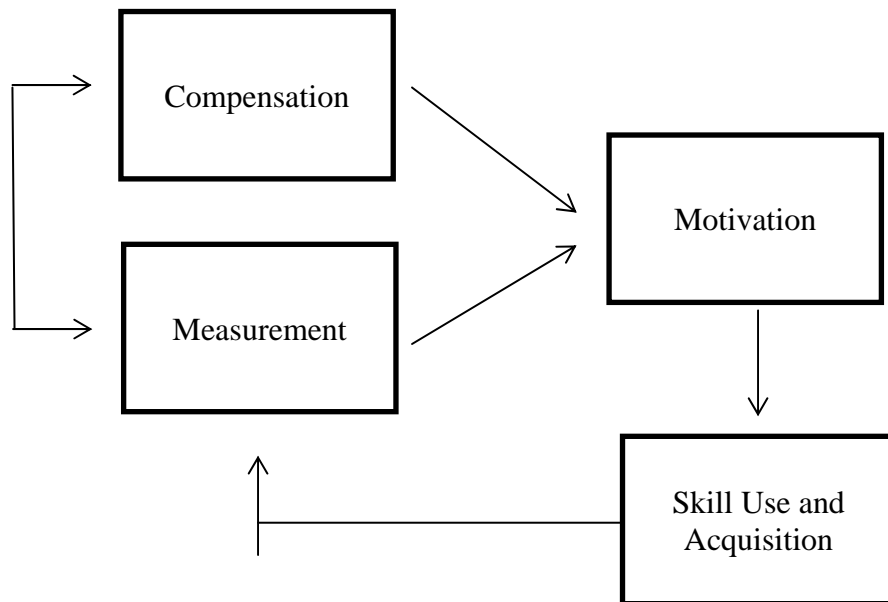
Figure 5.   Interaction Between Compensation and Measurement
(Pagell et al., 1996)

4.   Air Force Procurement Workforce Transformation

The RAND Corporation's Project Air Force was contracted by the Air Force to help support "the U.S. Air Force's efforts to change the way it purchases goods and services to improve performance and reduce costs" (RAND Corporation, Project Air Force, 2004, p. iii). The report, *Air Force Procurement Workforce Transformation*, focused on Air Force Commodity Council development and implementation (RAND Corporation, Project Air Force, 2004). Part of RAND's (2004) research was to identify skills that are necessary for contracting officers to be successful when placed on commodity councils. On a commercial-sector commodity council, there is a wide range of members that bring different skills to the council. In the report, RAND (2004) found that there are six general skills, along with more specific traits to those skills, that are needed for a government commodity council: computer-related skills, teaming and other interpersonal skills, business skills, core purchasing and supply management skills, analytical and technical skills, and contracting skills. Within core

purchasing and supply management skills, RAND (2004) found that commodity council members need to have a good supply base awareness, product forecasting skills, knowledge of the industry and business conditions—needed to construct strategies and conduct negotiations—and value analysis. RAND (2004) collected these skills using literature; commercial-sector interviews with SmithKline Beecham, Harley-Davidson, and United Technologies Corporation; and feedback sought from the Air Force's very first commodity council for information technology.

D. PRODUCT KNOWLEDGE AND JOB PERFORMANCE

As noted by Killen and Kamauff (1995), product knowledge is a job skill that is necessary for the purchasing professional to make purchasing decisions but is also useful for cross-functional teams (such as source selection teams) on more complex acquisitions. Without product knowledge, complex acquisitions may create more difficulties for purchasing professionals to evaluate potential suppliers, assess proposals, make sourcing decisions, provide constructive feedback to cross-functional teams, understand markets and industries, and work effectively with other functional areas within their organizations. If product knowledge is a necessary requisite for purchasing professionals, then any lack of product knowledge may create organizational problems, such as escalating workplace conflict, increasing levels of stress, diminishing feelings of self-efficacy and worker resilience, and difficulty motivating purchasing professionals.

1. Behavioral Constructs Under Examination

Researchers Fred Luthans and Carolyn Youssef (2004) said that "there is growing evidence that human resources are crucial to organizational success, and may offer the best return on investment for sustainable competitive advantage" (p. 143). This statement is very

true in today's government and business organizations. Many funds have been used to research and develop human resources so that humans, as resources, are a more effective component of an organization. For the purpose of this research, I examined psychological capital, occupational stress, and workplace conflict. I chose these three constructs to determine how organizations are affected by job proficiency among employees as well as the effects these traits have on the organization with higher or lower levels of proficiencies. Specifically, I intended to examine how psychological capital, occupational stress, and workplace conflict, when tied to product knowledge, have an effect on an organization's performance.

Psychological capital is similar to motivation and, for this purpose, consists of four components: self-efficacy, hope, optimism, and resiliency. *Efficacy* is defined as "one's conviction (or confidence) about his or her abilities to mobilize the motivation, cognitive resources, and courses of action needed to successfully execute a specific task within a given context" (Stajkovic & Luthans, 1998, p. 66). *Hope* is defined as "a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy) and (b) pathways" (Snyder, Irving, & Anderson, 1991, p. 287). *Optimism* is both a positively oriented future expectation (Carver & Scheier, 2002) and an attributional style that interprets specific positive events through personal, permanent, and pervasive causes, and negative events through external, temporary, and situation-specific ones (Seligman, 1998). *Resiliency* is "the capacity to rebound or bounce back from adversity, conflict, failure, or even positive events, progress, and increased responsibility" (Luthans, 2002b, p. 702).

Workplace stress, or occupational stress, is closely related and linked to workplace conflict, but there is a distinction. Occupational stress is simply stress that occurs as the

direct result of work conditions. Spector (2002) showed that occupational stress "has been recognized as a major health issues for modern work organizations" (Spector, 2002, p. 134). Occupational stress has been linked with heart disease, headaches, stomach distress, and other very real medical problems. Workplace conditions have been closely correlated with occupational stress, demonstrating that a positive workplace condition is necessary to eliminate high levels of occupational stress. There are a number of workplace factors, called *job stressors*, that are attributed to stress. Obviously, the more intense and frequent the job stressor, the more stressful the job. Occupational stress is often recognized as "one of the most significant workplace health hazards for employees in the United States and other developed countries" (Spector, 2002, p. 134). Therefore, it is important that a link be drawn between product knowledge and occupational stress, and their effect on the workplace.

Workplace conflict is interpersonal conflict that occurs at work. It is seen as inevitable and a natural part of the workplace, occurring when there are "perceived incompatibilities between parties in their views, wishes, and desires that impact group outcomes" (Ayoko, Callan, & Hartel, 2003, p. 2). In the workplace, relationship and task conflicts are common. *Relationship conflict* is "associated with disagreements due to high levels of frustration and personal clashes," and *task conflict* can be defined as the "awareness that there are disagreements about the actual tasks being performed in the group" (Ayoko et al., 2003, p. 2). Each type of conflict affects the workplace in different ways, but many researchers see relationship conflict as the most damaging. In this research, I examined the link between product knowledge and task conflict, and their effect on the workplace.

2. Psychological Capital and Positive Organizational Behavior

Many researchers of organizational behavior have studied the concept of psychological capital (PsyCap) and positive organizational behavior. The concept of positive

organizational behavior (POB) was introduced in 2003 (Luthans, 2002a, 2002b; Wright, 2003) as a way to focus on bringing positive psychology (Seligman & Csikszentmihalyi, 2000) to the workplace (Luthans & Avolio, 2009). *POB* is defined as "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement" (Luthans, 2002a, p. 59). POB has been closely linked and is relevant to PsyCap; POB was introduced in order to bring positive psychology into the workplace. PsyCap is an individual's positive psychological state of development that is characterized by (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success (Luthans & Youssef, 2004, p. 3). These four constructs together form the basic definition of psychological capital.

The advantage with PsyCap is that it has been conceptualized, measured, and developed. It can be easily measured within an organization through simple surveys using common Likert scales. One attempt to measure PsyCap and its effect on POB was completed in 2009 by James Avey, Fred Luthans, and Carolyn Youssef. Avey et al. (2009) made an empirical analysis to support the untested theory that it is important to have positive employees. In their research, Avey et al. (2009) theorized that (1) PsyCap will be negatively related to organizational cynicism, (2) PsyCap will be negatively related to intentions to quit the organization, and (3) PsyCap will be positively related to Organizational Citizenship Behaviors (OCBs; i.e., desirable contextual performance indicators). Desirable OCBs

include individual-oriented OCBs and organizational-oriented OCBs. An example of an individual-oriented OCB would be an employee going out of his or her way to mentor and train a new employee or to stay late to help a co-worker complete a task with no benefit to himself or herself. An example of an organizational-oriented OCB would be participating in a volunteer community event that brings awareness to the employer. The fourth hypothesis is that PsyCap will be negatively related to counterproductive work behaviors (CWBs).

In their study, Avey et al. (2009) used a sample of 336 employees from a wide cross section of organizations and jobs who agreed to participate in a large Midwestern university-sponsored research project on leadership and motivation (Avey et al., 2009, p. 443). The researchers used a recently developed 24-item PsyCap questionnaire (PCQ), with questions such as "I feel confident helping to set targets/goals in my work area" (self-efficacy); "Right now, I see myself as being pretty successful at work" (hope); "If I should find myself in a jam at work, I could think of many ways to get out of it" (hope pathways); "When I have a setback at work, I have trouble recovering from it, moving on" (reverse scored resiliency); and "I always look on the bright side of things regarding my job" (optimism). The questionnaire demonstrated adequate internal reliability (Avey et al., 2009, p. 444).

The purpose of Avey et al.'s (2009) study was to "test the relationship of the newly emerging positive core construct of PsyCap within an overarching theoretical framework" (p. 446). That framework consisted of contextual factors related to POB. All four of their hypotheses were found to be substantiated with their results. In accordance with their first hypothesis, they found that PsyCap was negatively related to organizational cynicism. Based on those results, they theorized that "those higher in PsyCap will be more supportive of organizational change, more flexible in the change process, and adapt to change better than

those lower in PsyCap" (Avey et al., 2009, p. 446). In accordance with their second hypothesis, they found that PsyCap was negatively related to the intention to quit. Based on their findings, they suggested that in order to help reduce employee turnover, organizations should try to develop higher levels of PsyCap. In accordance with their third hypothesis, they found that PsyCap was positively related to OCBs, "suggesting that those higher in PsyCap are more likely to engage in highly desirable extrarole behaviors" (Avey et al., 2009, p. 448), which are extremely beneficial in an organization (Lee & Allen, 2002). Finally, in accordance with the fourth hypothesis, they found that those with higher PsyCap engaged in fewer CWBs, validating the final hypothesis.

As a result of their findings, Avey et al. (2009) found that an organization with high PsyCap can expect employees who are less cynical, exhibit fewer CWBs, are good organizational citizens, and intend to remain in the organization for the foreseeable future. Moreover, other scholars have indicated additional benefits associated with psychological capital including increased career competencies, job performance, and well-being (DiRenzo & Greenhaus, 2011; Luthans, Avolio, & Avey, 2007). These findings are desirable for any organization, large or small, in order to maintain a healthy work environment. For these reasons, product knowledge can enhance motivation, or overall PsyCap in an organization, leading to increased organizational performance.

3. Occupational Stress

Occupational stress has been recognized as a major health issue for modern work organizations (Spector, 2002). Human behaviorists and experts in other fields of research study it intensively. Although high levels of occupational stress affect the employee population, Spector (2002) explained other harmful effects of occupational stress. By itself, occupational stress

costs American businesses more than $150 billion per year because of absence, lost productivity, and health risks. Furthermore, occupational stress seems to be endemic to the modern workplace, as national surveys have shown that a large proportion of workers report feeling highly stressed at work. (Spector, 2002, p. 133)

Stressors can be broken down further into chronic and acute job stressors. *Chronic stressors* are "chronic because they are thought constant for an employee" (Beehr, Jex, Stacy, & Murray, 2000, p. 5), while *acute stressors* are short-term. An example of a chronic stressor would be a constant, heavy workload, while an example of an acute stressor would be something quick and dramatic, such as an automobile accident.

Research conducted by Beehr et al. (2000) indicated that "stressors that are more job specific may have the greatest impact on individual strains and performance" (p. 392). Part of Beehr et al.'s (2000) research examined chronic generic stressors and job-specific stressors to help predict both psychological strains and performance. Examples of psychological strains are "anxiety, depression, and frustration" (Jex & Beehr, 1991). Beehr et al. (2000) also hypothesized that "stressors would be related to performance" (p. 393). Finally, they also hypothesized that job-specific stressors would be more strongly related to psychological strains and performance than generic chronic stressors.

What Beehr et al. (2000) found is that chronic generic and job-specific stressors were highly correlated with psychological strains and performance, meaning that most types of stress in the workplace resulted in psychological strain and affected performance. Their second hypothesis received mixed results, with a weaker correlation between stressors and performance. Stressors, however, did have an effect on the number of units that salespeople sold. The final hypothesis also received mixed support, indicating that "occupation-specific

stressors would be more strongly related to the outcomes than generic stressors would"
(Beehr et al., 2000).

Beehr et al.'s (2000) research indicated that there may be a positive relationship
between a lack of product knowledge and chronic occupational stress, resulting in
psychological strain and negative performance. Without adequate product knowledge,
employees at different systems centers could have higher levels of anxiety, depression, and
frustration with their day-to-day functions, resulting in lost productivity at the three different
centers.

Spector (2002) researched the amount of control that employees have and the amount
of occupational stress that the level of control results in. For an employee, "control can be
over any aspect of work, including location, scheduling, and how tasks are done" (Spector,
2002, p. 134). Spector tested many facets of control, from a fast-paced assembly line to an
at-your-own-pace job that high-level management is often given. Using a control-stress
model, Spector theorized that perceptions of control can be linked to several different kinds
of strain (see Figure 6).
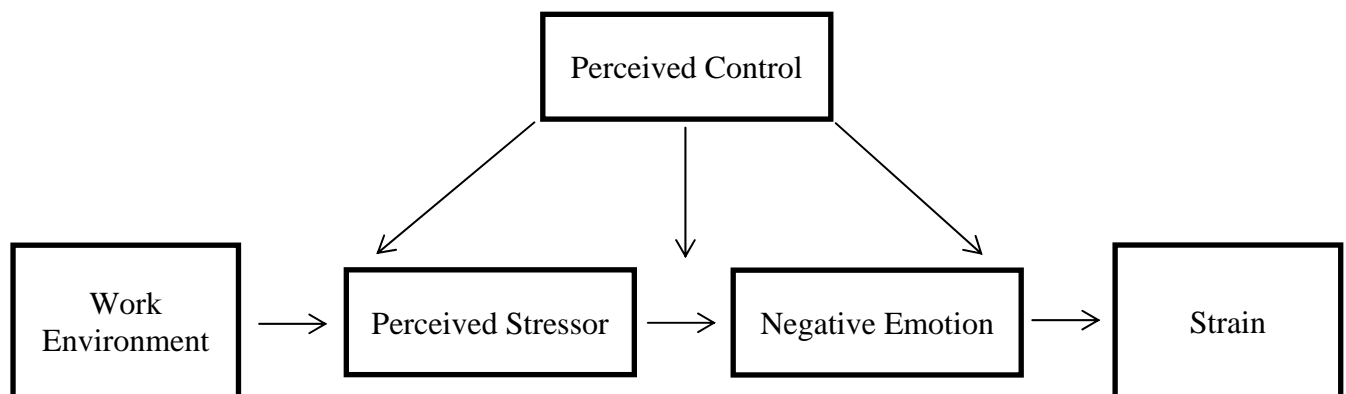
Figure 6.   Control Model of Occupational Stress
(Spector, 2002)

Employees experience and perceive conditions and events, most of which are typically benign and paid little attention. Certain events, however, are perceived and interpreted as somehow threatening to physical as psychological well-being—these are the perceived job stressors. The stressors result in negative emotional reactions, perhaps most commonly anger or anxiety. These emotions then lead to strains, both behaviors and physical conditions associated with stress. (Spector, 2002)

Although Spector did not conduct his own research, he did note that there was plenty of other evidence that supported his theory on perceived control and its effect on occupational stress.

One of the most influential job-stress theories is Karasek's (1979) job demand-control model, in which Karasek theorized that the range of control over one's environmental situation is a crucial dimension in determining health on the one hand and active behavior/learning on the other (Karasek et al., 1998). Jobs that have high strain and low control can affect workers' health, while jobs with high strain and high control allow the worker to determine when to deal with current and new encounters. Much empirical evidence has shown that a combination of high job demands and low job control is an important predictor for psychological strain and illness (Jonge, Dollard, Dormann, Le Blanc, & Houtman, 2000). For these reasons, if there are higher levels of occupational stress due to a lack of product knowledge in an organization, organizational performance can suffer.

4. Workplace Conflict

Workplace conflict is interpersonal conflict that occurs at the workplace. Within that definition, there are two major types of interpersonal workplace conflict: relationship and task conflict (Jehn, 1995). *Relationship conflict*, also called *emotional conflict*, is associated with disagreements due to high levels of frustration and personal clashes (Ross, 1989). These destructive clashes limit group cohesion and efficiency (Pelled, 1996). *Task conflict* is

the awareness that there are disagreements about the actual tasks being performed in the group (Jehn, 1997). Research has shown that relationship conflict has negative consequences on group success (Jehn, 1997) and that task conflict can have a positive effect on group outcomes because it allows members to ask questions and challenge assumptions, and it promotes innovative thinking and creativity (Amason & Schweiger, 1994; Deutsch, 1969; Tjsovold, 1991). Results from a study conducted by Ayoko et al. (2003) indicated that conflict is triggered by interpersonal and task-related problems, which in turn trigger poor group outcomes, such as absenteeism and emotions of anger and frustration. The effect on the workplace employees varies with respect to the length of the conflict. Ayoko et al. (2003) found that conflict that is intensive can have negative repercussions on future interactions in the group while conflict that is prolonged can be inefficient with regard to employees' time and efforts when working together in a group. Workplace conflict is typically associated with adverse effects, and actionable steps are taken to diminish, avoid, or defer the conflict. Conflict resolution is the most common way to address adverse conflict, but for the purpose of this paper, I do not address adverse workplace conflict or conflict resolution.

We have already seen earlier in the chapter that the literature has shown that purchasing professionals need to have adequate product knowledge in order to be successful in their field. Well-trained purchasing professionals must have positive PsyCap, low levels of occupational stress, and minimal workplace conflict in order to have a healthy workplace. Although there are many ways to have these desirable constructs, one critical way is to ensure that the employees within an organization have the proper training and education to carry out the duties of their jobs. FAR 1.603-2, states that in order to be a contracting officer

(CO), an agency head "shall consider the complexity and dollar value of the acquisitions to be assigned and the candidate's experience, training, education, business acumen, judgment, character, and reputation." Not all contracting professionals will have the opportunity to become a warranted contracting officer, but to become a contracting officer, it is required that certain sets of skills be present. For these reasons, if there are higher levels of workplace conflict due to a lack of product knowledge in an organization, organizational performance can suffer.

E.   GOVERNMENT CONTRACTING OFFICER SKILLS AND EXPECTATIONS

A contracting officer is an employee within a government organization that "has the authority to enter into, administer, or terminate contracts and make related determinations and findings. Contracting officers may bind the Government only to the extent of the authority delegated to them" (FAR 1.603-1). As noted in FAR 1.603-2, contracting officers will be appointed based on a certain set of skills, business acumen, character, and reputation. *Business acumen* is defined as "the knowledge and understanding of the financial, accounting, marketing and operational functions of an organization and the ability to make good judgments and quick decisions" ("Business Acumen," 2012; "Acumen," 2012). With that definition, business acumen can be broken down into two areas: having the requisite knowledge of the business and having the ability to make good, well-founded decisions. Having knowledge of the business of procurement includes product knowledge, a logical requisite for any purchasing organization. Therefore, in order to have a successful acquisition, there needs to be adequate product knowledge so that the right product or service is procured for the right price and at the right time.

In FAR Part 10, the FAR further stipulates the requirement that contracting officers have adequate product knowledge. According to FAR 10.002 (Procedures), the "acquisition begins with the description of the Government's need stated in terms sufficient to allow conduct of market research." *Market research* means "collecting and analyzing information about capabilities within the market to satisfy agency needs" (FAR 2.101). Under the section *What is Product Knowledge?* in this thesis, I defined *product knowledge* as "the knowledge of the product or materials, market pricing, the major sources, and the industry with which the product/service is associated." According to that broad definition, product knowledge is similar to market knowledge, but product knowledge is a more specific term because product knowledge demands more knowledge of the product or service instead of just a broad sense of the market capabilities that market research demands. If a contracting professional does not have any product knowledge about the products for which he or she contracts, how can that professional adequately analyze information about market capabilities?

In order for an agency to "ensure that legitimate needs are identified and trade-offs evaluated to acquire items that meet those needs" (FAR 10.001), adequate product knowledge is needed to identify and evaluate potential products or services. Adequate product knowledge, like market research, is needed before developing new acquisition documents, soliciting offers for the acquisition, and awarding any type of contract within any of the thresholds driven by regulation. FAR Part 10, or any other section of the FAR, fails to define what skills are necessary to conduct adequate market research. It also fails to acknowledge what skills are necessary to carry out successful market research, and product knowledge is arguably the most important skill needed for adequate market research.

F.   SUMMARY

In this chapter, I examined the definition of product knowledge; product knowledge as a requisite skill in acquisition; the importance of product knowledge in the acquisition process and its potential effect on organizational behavior through the constructs of PsyCap, occupational stress, and workplace conflict; and the importance of market research in the FAR. Product knowledge is a logical skill for any purchasing professional, but sometimes, something so simple and logical is not closely examined and defined. Concepts as simple as product knowledge can be ignored or thrown by the wayside. Some employees may not possess the skill of product knowledge, a requisite for any successful acquisition professional. As a result of not having this fundamental skill, these employees may be found to have lower levels of PsyCap, resulting in more cynical employees, higher counterwork behaviors, poor organizational citizens, and employees more likely to quit the organization. These employees may also have higher amounts of occupational stress and may be more apt to fight with coworkers on cross-functional teams because of the lack of adequate training, education, or experience, leading to poor performance and unhealthy workers. The FAR (2012) implicitly states that product knowledge is needed in order to conduct adequate market research for a requirement. Because it does not explicitly state what skills are necessary to conduct adequate market research, contracting professionals may not conduct adequate market research. Product knowledge is also needed in other contract management phases such as procurement planning, source selection (evaluation of proposals), and contract administration (managing contractor performance). Product knowledge can also help contracting professionals achieve higher level goals, such as those defined in the former Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) Ashton Carter's (2010) *Better Buying Power* memorandum. Better product knowledge could

help the acquisition team achieve one initiative in particular, *Drive productivity growth through Will Cost/Should Cost management*. Having better product knowledge would allow the acquisition team to scrutinize every element of program cost better, as well as target cost reduction with profit incentives. It is important to remember that product knowledge is just one important skill within the technical skill arena. There are many other skills needed in order to conduct a successful acquisition, but research has shown that product knowledge is necessary, and it cannot be ignored any longer when major programs are being downsized or eliminated completely.

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III. METHODOLOGY

A. INTRODUCTION

Although product knowledge can be assessed in a variety of ways, including knowledge-based assessments or surveys, personal interviews, or working groups, I used a survey-based format because of the number of individuals that I assessed in this research. It is important to have a proper sampling so that the answers are not only statistically significant but also relevant to the three contracting centers I researched. In this research, I have determined that product knowledge is a necessity for purchasing professionals and that if employees are not provided with the proper skills, then psychological problems such as lack of motivation will arise. In order to evaluate levels of product knowledge, motivation, conflict, and stress, I administered a 62-question survey to three centers in order to assess how employees felt about their knowledge with regard to their specific job function. While conducting this research, I recognized that contracting professionals at each acquisition center work on different projects in different stages in the acquisition process that all require varying degrees of product knowledge. Acquisition professionals work at different stages within the Defense Acquisition Management System, such as the Material Solutions Analysis phase, the Technology Development phase, and the Production and Deployment phase. In this chapter, I introduce the acquisition centers that I examined, study what the Air Force does to train and educate its professional workforce with respect to product knowledge, examine what each individual center does, examine the methodology for the administered survey, and state the collected results of the survey.

B. AIR FORCE CONTRACTING WORKFORCE

The Air Force contracting workforce is a highly trained and specialized workforce that is responsible for spending taxpayer dollars in a responsible manner to acquire necessary supplies and services to meet customer requirements. In 1990, the DAWIA was signed into law, requiring that the DoD establish a process through which persons in the acquisition workforce can be recognized as having achieved professional status. Certification is the procedure through which a military Service or DoD component determines whether an employee meets the education, training, and experience standards required for a career level in any acquisition, technology, or logistics career field (DAU, 2012). Within the acquisition workforce, contracting professionals can be found as a subset among pricers, financial analysts, and other acquisition-related career fields. Each specific function within the acquisition workforce that is subject to the DAWIA works to obtain one of the three levels of certification established by the Act. When new contracting professionals enter the workforce, they immediately begin training in order to receive their Level I certification. After receiving their Level I certification, contracting professionals then work towards Level II and Level III certification (see Appendix A for certification requirements). For contracting professionals in the acquisition workforce under the Air Force, these three-level certifications are the primary means for education and training within the contracting profession. There are annual seminars, presentations, and events that some—not all—contracting professionals may attend in order to obtain additional training, education, and experience. These unique opportunities are acute in nature, are not offered Air Force-wide, and are sometimes random in nature. Attending a seminar or meeting for additional training or education to enhance

contracting skills may not be logistically or fiscally possible for furthering the entire contracting workforce's proficiency.

C. PRODUCT KNOWLEDGE TRAINING AT SPACE AND MISSILE SYSTEMS CENTER

The SMC at Los Angeles AFB is one center that I examined in order to assess the level of product knowledge, as assessed by individual contracting professionals. The mission and brief history of the SMC is as follows:

> SMC is the birthplace of military space, and center of military space acquisition excellence. Our mission is to deliver resilient and affordable space capabilities for the nation. We strive to continue to make SMC the most respected, reliable center for responsive and affordable acquisition and sustainment of space systems. (SMC, 2012)

The SMC was effectively born on July 1, 1952, when Brigadier General Benard Schriever founded the Western Development Division at Los Angeles AFB in California. The purpose of the Western Development Division was to develop strategic nuclear missiles for the nation; the division was soon expanded to include the development, fielding, and operation of the nation's first military satellites and launch vehicles. Beginning with the first successful military space launches in the 1950s, rapid progress was made in maturing the technology and know-how to develop and operate reliable and effective systems across a broad array of mission areas. During this period, the Western Development Division underwent multiple reorganizations until it was finally designated in 1992 as the Space and Missile Systems Center. The center spent $8.5 billion with 2,000 contract actions in FY2012 and employs 319 contracting professionals to support the various space programs, such as the Global Positioning System (GPS) Systems Directorate, the Military Satellite Communications (MILSATCOM) Systems Directorate, the Space Superiority Systems

Directorate, the Missile Defense Systems Division, the Space-Based Infrared Systems Directorate, the Defense Weather Systems Directorate, and the Spacelift Range and Network System Division.

Training and education at the SMC not only comes in the form of the three-level certification mandated by the DAWIA, but it also comes from its in-house-developed SMC University. A visit to Los Angeles AFB found that in the mid-1990s, the SMC identified a systematic lack of knowledge of the mission and the products that all functional areas were working on. As a response, the SMC developed and initiated a week-long course for new employees called the Space Enterprise Course and effectively launched SMC University. The Space Enterprise Course provides an introduction to the mission and the products that all new employees eventually work on. The course brings in stakeholders such as the National Aeronautics and Space Administration (NASA), National Reconnaissance Office (NRO), National Security Agency (NSA), Boeing, Lockheed Martin, Northrop Grumman, and functional areas within the SMC to educate new employees about their individual function and how it fits in the SMC mission. The course also imparts general product knowledge to new employees. The intent of the course is for new employees to understand the entire space enterprise. The course ran from 1995 to 2002, was dropped, and then was brought back in 2009. SMC University provides mandatory training to each functional area, such as contracting, engineering, financial management, program management, and process improvement. Courses that fall under those areas are also available to employees of other functional areas who desire to learn more about the different professions within the SMC. Contracting courses include Acquisition Logistics; Contracting Changes Part A: Clauses and Policy; Contracting Changes, Part B: Contract Close-Out; FAR Boot Camp; Fiscal Law

(Color of Money); Fixed-Price Training; Federal Procurement Data System–Next Generation (FPDS–NG) Process; How to Write a PNM, Incentives; Intellectual Property; Negotiation Tips; Operational Contracting; Contracting Journeyman's Conference; Contracting 101; Contracting Recurring Review Observations; Pricing; Proposal Evaluations; Source Selection/Protests; and Space Logistics Linkage, Missions. All of these contracting courses are available to any SMC employee on a new website that is in its beta format. Some classes are computer based while others are done in-house or by a contractor.

Product knowledge is not a specific course taught to contracting professionals, but after discussion with the director of SMC University, I found that product knowledge training can be found in a variety of courses, such as the Space Enterprise course.

D. AIR FORCE LIFE-CYCLE MANAGEMENT CENTER HANSCOM

The Air Force Life-Cycle Management Center (AFLCMC) Hanscom is the second major systems center that I examined for the purpose of this report. AFLCMC Hanscom is one of the five units newly reorganized under the AFLCMC. The mission of the AFLCMC Hanscom is "to deliver affordable and sustainable war-winning capabilities to U.S. and international partners—on time, on cost, anywhere, anytime from cradle to grave" (AFLCMC Hanscom, 2012). AFLCMC Hanscom was responsible for obligating $5.4 billion in FY2011 and $5.2 billion in FY2012, with 7,160 contract actions in FY2011 and 6,355 contract actions in FY2012. AFLCMC Hanscom employs approximately 650 contracting professionals and is responsible for working on electronic systems such as the E-3 AWACs electronics systems suite, airborne radar jamming capabilities, and major computer network operations.

E. AIR FORCE LIFE-CYCLE MANAGEMENT CENTER WRIGHT PATTERSON

The Air Force Life-Cycle Management Center at Wright–Patterson (Wright–Patt) AFB is the third major systems center that I examined for the purpose of this report. AFLCMC Wright–Patt is one of the five units newly reorganized under the AFLCMC and is the host base for the Air Force Material Command (AFMC). AFLCMC Wright–Patt is a major hub for acquisition activities and is commonly known for aircraft procurement such as the KC-46 and F-22 weapons platforms. The mission of the Wright–Patterson AFLCMC is to "Acquire and Support War-Winning Capabilities." AFLCMC Wright–Patt was responsible for obligating $71 billion with 24,000 contract actions in FY2011. AFLCMC Wright–Patt employs approximately 850 contracting professionals.

F. METHODOLOGY

I designed a comprehensive survey to assess product knowledge and the effect it has on workplace performance for three major Air Force systems procurement offices. The survey was an Internet-based, multiple-choice, generic survey that each of the centers' contracting directorates, or the highest level of contracting professionals at each center, administered. The Institutional Review Board assessed and vetted the survey in order to ensure that participants were not adversely affected by the questions in the survey. The survey was issued to approximately 1,400 contracting professionals at Hanscom AFB, Wright–Patterson AFB, and Los Angeles AFB to the AFLCMC Hanscom, AFLCMC Wright–Patterson, and the SMC. The respective centers are responsible for a wide array of products and services, ranging from communications systems to aircraft and satellite life-cycle procurement. Each system that contracting professionals currently work on requires a

wide range of professionals, including contracting people, to be successful. This survey assessed only contracting professionals at these three centers.

G. SURVEY FORMAT AND QUESTIONS

The instrument is a 62-question survey with a wide range of questions that assess overall contracting experience, education, training, professional certification, product knowledge, self-efficacy, hope, optimism, resiliency, occupational stress, and workplace conflict. The questions regarding contracting skills and product knowledge assessment were developed by the researcher, while the questions regarding psychological capital, occupational stress, and workplace conflict were previously developed and were found using various scholarly sources.

Demographic Questions

Questions 1 through 9 are basic demographic questions, such as, "Are you currently a warranted contracting officer?" or "How long have you been a part of the contracting workforce?" The purpose of these first nine questions was to assess the demographics of the total population being examined. I wanted to see the level of experience at each center, how long each individual had been a part of the contracting profession, what level of the DAWIA certification each individual had attained, whether individuals were currently warranted contracting officers, and what National Contract Management Association (NCMA) professional certification they had, if any.

Product Knowledge Questions

The next set of questions was designed to assess the level of product knowledge that contracting professionals have at each center. The purpose was to get employees to rank their level of product knowledge, not assess their level of knowledge. The purpose of this

survey was not to assess a contracting professional's level of product knowledge. To properly assess a contracting professional's level of product knowledge, this survey would have been inappropriate. A more appropriate survey would have been one that assessed the technical knowledge of the product or service that the individual was working on. Due to many different programs that contracting professionals work on at each center, this approach would not have been practical and would have made it difficult to compare results given the total center population size. Question 10 was the only question in the survey that was not multiple choice. Question 10 asked the participant to briefly identify the product/service that he or she contracts for (for example, GPS satellite, F-22, or AWACS systems). The purpose of this question was to build up to the next question, asking the level of complexity of the product or service that the previous question asked about. I acknowledge that some programs are easier to work on for a variety of reasons. A few reasons are the phase of the life cycle of the program, the age of the program, and the dollar value spent on the program. If a program is near the end of its life cycle and contract closeout is beginning, one could reasonably argue that product knowledge is not an essential skill at that phase in the acquisition cycle. If a program is just starting out and is in the technical development stage of an MDAP, one would reasonably expect that the program would be in a very technically complex stage. Therefore, when identifying the product or service that a contracting professional is working on, it is essential to ask that same individual how complex that program is to determine the level of product knowledge needed to perform adequately.

Psychological Questions

Beginning with Question 22 in the survey, I attempted to assess the level of motivation, occupational stress, and workplace conflict. I assessed motivation through the

PsyCap constraints of self-efficacy, optimism, hope, and resiliency. These questions were modified from the PsyCap Questionnaire (PCQ) developed by the Gallup Leadership Institute. The PCQ is a six-point Likert scale; there are six questions for self-efficacy, six for hope, six for resiliency, and six for optimism. In the next category of questions, starting at Question 52 to the end of the survey, I assessed occupational stress and workplace conflict, which are often positively correlated. Although there were fewer questions in this section than in the motivation section, I believe that it was sufficient to help properly assess the level of occupational stress and workplace conflict. Examples of questions in this section are "Relationships at work are strained," "There is friction or anger between colleagues," and "My work places a lot of work-related stress and pressure on me to get the job done." These questions, like the previous PsyCap questions, also used a six-point Likert scale. (For a full list of questions, see Appendix A.)

H.   SURVEY ADMINISTRATION AND POPULATION

This survey was administered to contracting professionals at the three major systems centers, as previously discussed in Chapter III. Each center works on vastly different products and services, and the population size at each center varies. The directors of contracting—who are senior executive service (SES) government employees—approved the surveys, and then the contracting directorate's office administered the survey. The survey was sent out via electronic mail to all contracting professionals that work in the directorate. At the SMC, there are a total of 319 contracting professionals and two geographically separated units at Kirtland and Peterson AFB. At Wright–Patterson AFB, there are a total of 850 contracting professionals who fall under the office of the directorate of contracting. The contracting directorate's office sent the survey out via electronic mail. Finally, at Hanscom

AFB, there are a total of 650 contracting professionals that fall under the office of the directorate of contracting. Like Los Angeles AFB and Wright–Patterson AFB, the director of contracting's office sent the survey out via electronic mail. The total population size I assessed is estimated to be around 1,819 contracting professionals

I.   SUMMARY

The results of this survey are intended to assess the level of product knowledge that individuals feel they have at these centers; to assess their level of motivation, occupational stress, and workplace conflict; and to see whether product knowledge affects these three psychological factors, ultimately affecting performance at these three organizations. This survey was designed to take 10 minutes and used an easy-to-read-and-answer format.

IV. FINDINGS AND ANALYSIS

A. INTRODUCTION

In this chapter, I provide the results of the survey, which helped me answer the research questions I proposed in Chapter I of this thesis. Not every question had to be answered in order to complete the survey, so each question had a unique individual response rate as respondents could decide to answer or skip over a particular question. I pulled all of the raw data from Survey Monkey and analyzed it in a statistical software package to (1) find correlations between questions and (2) pull individual data from each center to compare how contracting professionals at each center assessed their level of knowledge and its psychological effect on the organization. The survey questions and answers can be found in Appendix C.

B. DEMOGRAPHICS

The first set of questions, as previously noted in Chapter III, addressed demographics. The purpose of these questions was to segment the contracting workforce based on type of employment, work experience, type of work, how long the professionals had been a part of the contracting workforce, and other related questions. Interestingly, some of these demographics had significant correlations, which suggests a positive or negative relationship between two questions or variables. A perfect positive correlation was a 1, while a perfect negative correlation was a -1. I identified all correlations over 0.2 or below -0.2 as significant with the potential to yield a relationship.

Of the respondents, 89% (or 177 out of 198, N=198) who answered Question 2 responded that they were DoD civilians; 9% (or 18 out of 198) responded that they were uniformed Service; and 2% (or 4 out of 198) responded that they were DoD contractors.

When examining each center, 19.6% (or 39 out of 198) responded that they worked for the SMC at Los Angeles AFB; 54.5% (or 108 out of 198) responded that they were from AFLCMC at Wright–Patterson AFB; and 25.7% (or 51 out of 198) responded that they were from AFLCMC at Hanscom AFB (see Figure 7). Of the contracting professionals we surveyed, 45.7% had fewer than five years of experience (see Figure 8), and the population sample had an almost even split with DAWIA certification (see Figure 9).

Center	Total Surveyed	Responses	Response Rate
AFLCMC Hanscom	650	51	7.8%
AFLCMC WP	850	108	12.7%
SMC	319	39	12.2%
Total	1819	198	10.8%

Figure 7.   Center Response Rate
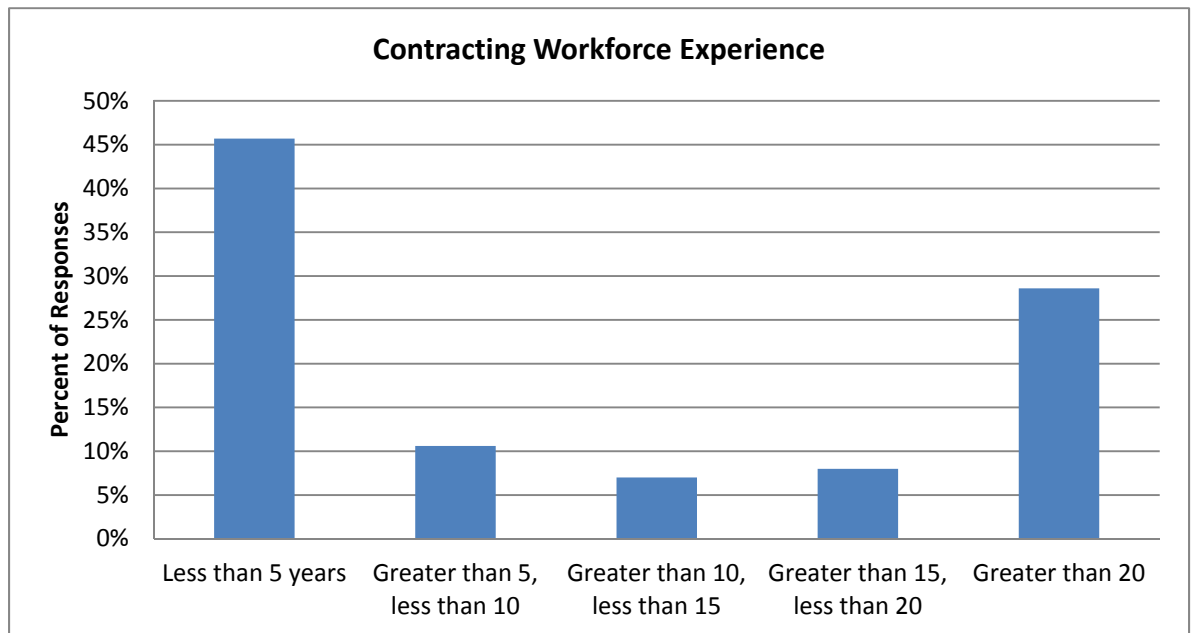
Figure 8.   Contracting Workforce Experience

DAWIA Contracting Certification Level
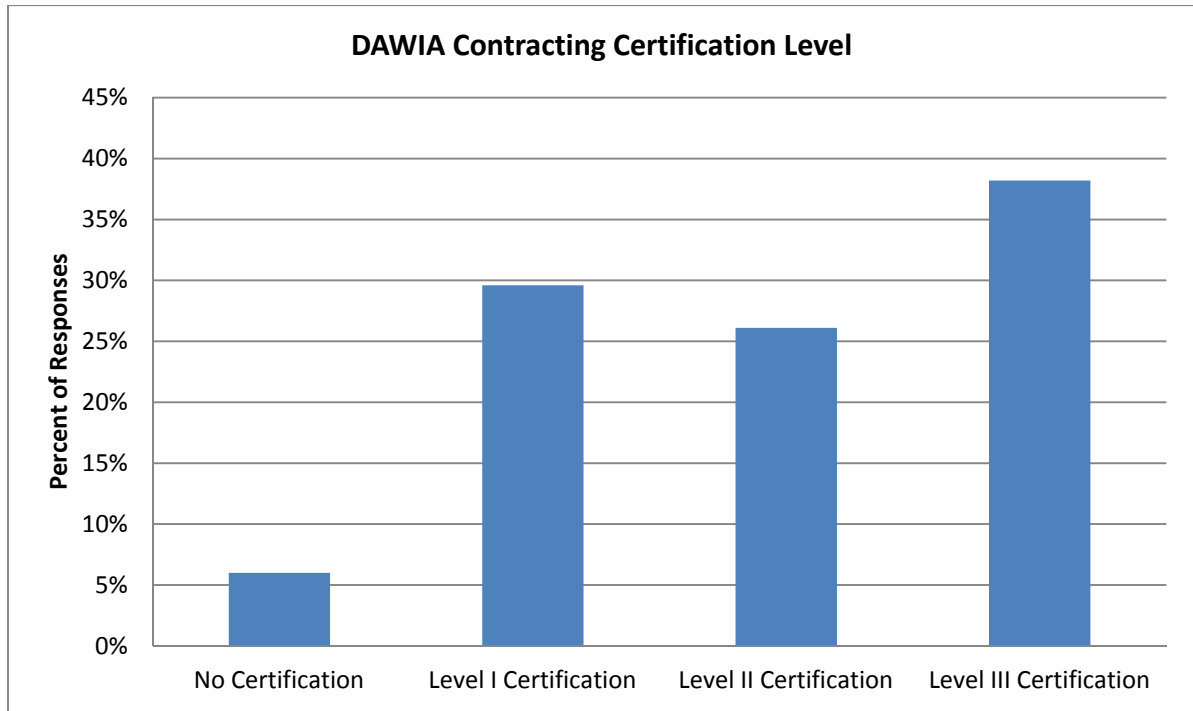
Figure 9.   DAWIA Contracting Certification Level

Of the 199 respondents, 70% were not warranted contracting officers, while 30% were. I also asked in the survey, if any of those surveyed were certified by the NCMA. Only 7% responded that they were a Certified Professional Contracts Manager (CPCM), and only 2.6% responded that they were a Certified Federal Contracts Manager (CFCM). Of the respondents, 89.4% were not certified by the NCMA. Question 10 asked the individuals to identify the product/service for which they contract. (See Appendix B for a list of the most common responses.   The responses listed in Appendix B were just some of the products/services that contracting professionals are working on at the three systems centers.) The next set of questions included the most important questions to this thesis.   These questions ask the respondents to assess the level of product knowledge that they have, the level of product knowledge that they think is required to perform their work, and the complexity of their work.

C. PRODUCT KNOWLEDGE

Of the respondents, 96.9% indicated that their product/service is at or above average in complexity (see Figure 10).
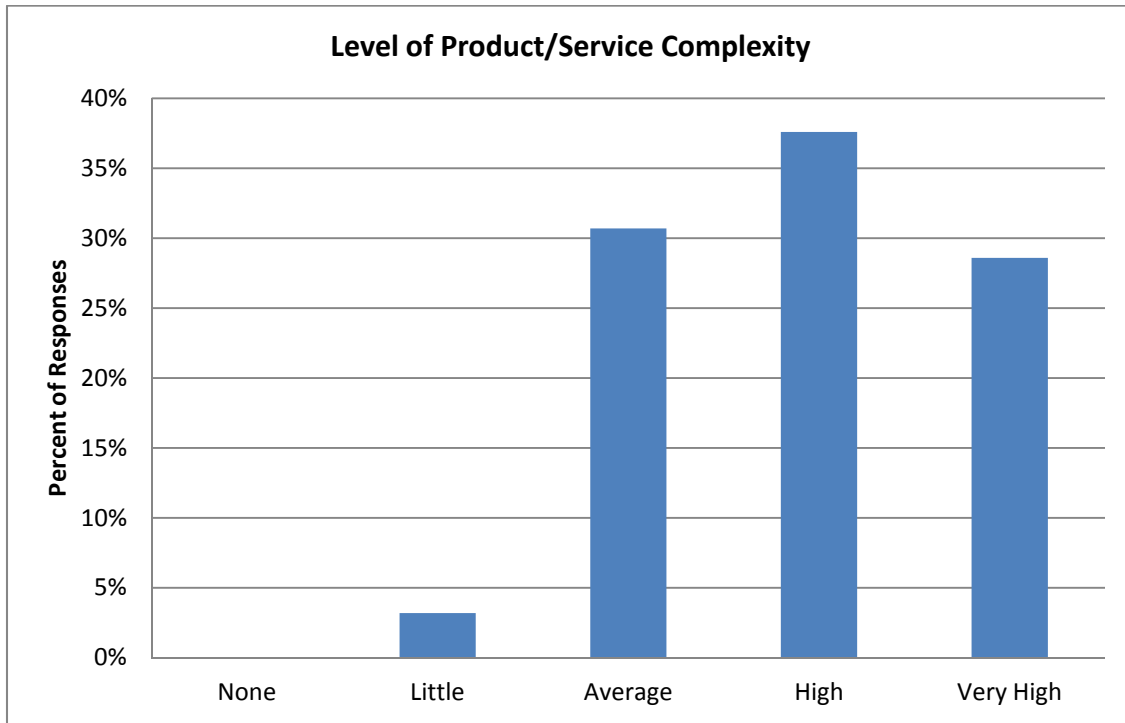
Figure 10.   Product/Service Complexity

Almost 80% of the respondents said they felt they had a sufficient amount of product/service knowledge, while 20% believed that they did not have a sufficient amount of knowledge (see Figure 11). The next question provided one of the most interesting responses out of the entire survey: 95.1% of the respondents said "yes" to the question, "Do you believe that product knowledge is necessary in order to carry out your duties as a contracting professional?" In response to this question, 175 responded "yes" and nine responded "no" (see Figure 12).

Any product knowledge that the survey respondents obtained through training came implicitly through courses that focused on other topics. This lack of center-provided training is evidenced in Figure 13, which shows the amount of product knowledge training that each center provides. Ninety percent of survey respondents indicated that their center provides none to an average amount of product knowledge through training opportunities.
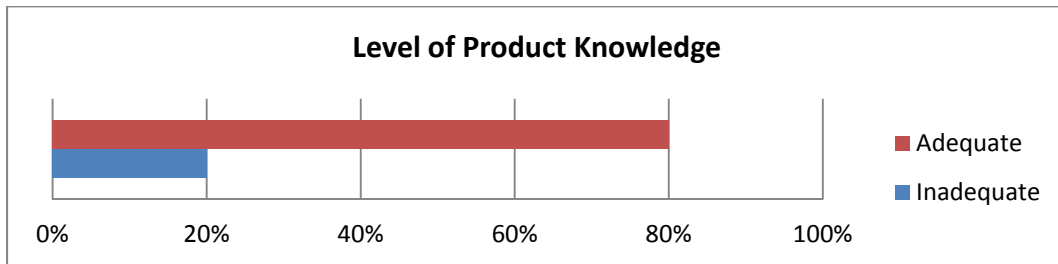
Figure 11. Level of Individual Product Knowledge
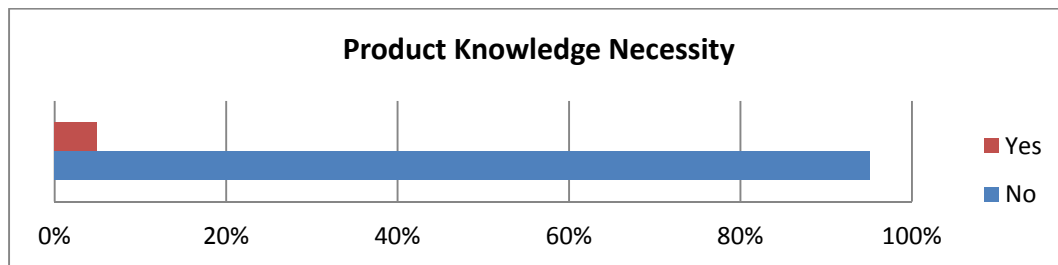
Figure 12. Product Knowledge Necessity to Perform Job

Center-Provided Training
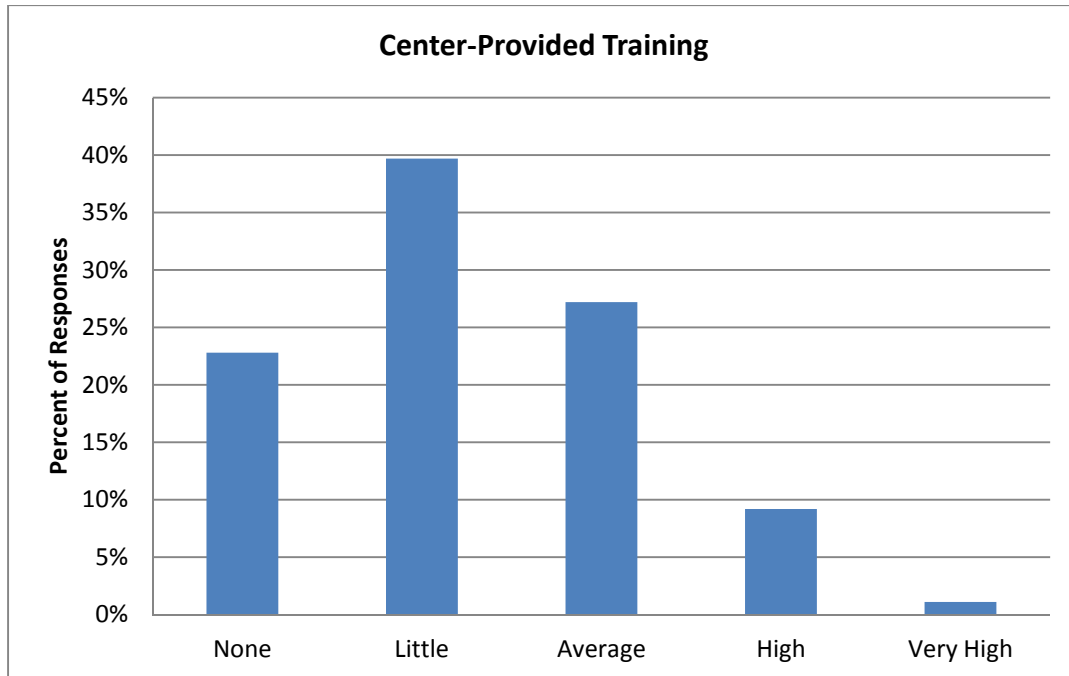
Figure 13.   Level of Product Knowledge Training

A majority of the product knowledge that is obtained by contracting professionals is acquired through (1) work-related experiences and (2) the use of outside sources such as the Internet, magazines, books, and third parties to self-educate and obtain more product knowledge (see Figure 14). These two ways of obtaining knowledge are dependent upon the experiences of the individual contracting professional and the motivation of the contracting professional to learn about the product/service for which they contract. Eighty-five percent of contracting professionals obtained an average to very high amount of product knowledge through work-related experiences, and 63% of contracting professionals obtained an average to very high amount of product knowledge through outside sources.
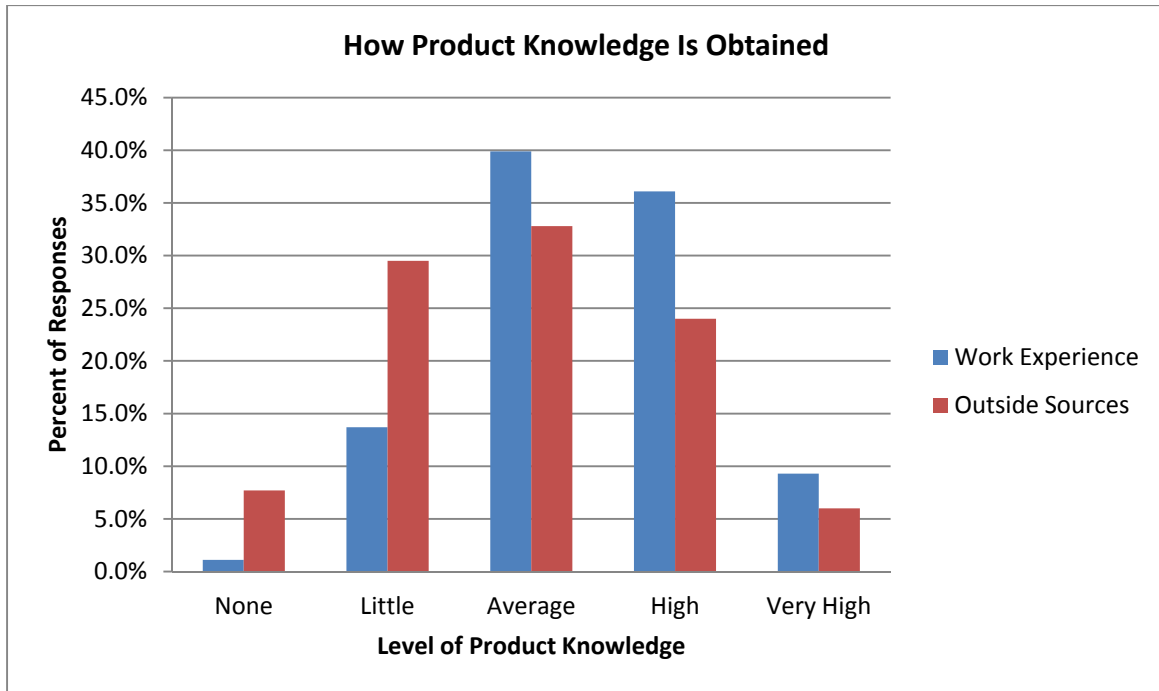
Figure 14. How Product Knowledge Is Obtained

D.   BEHAVIORAL QUESTIONS

The majority of the questions in this research were related to behavioral traits such as self-efficacy, resilience, hope, optimism, stress, and conflict. The purpose of these questions was to see if there was a link between a certain level of product knowledge and its behavioral effect on the contracting professional (see Figure 2, Product Knowledge Map). A majority of the data I collected suggests that higher levels of product knowledge are linked to positive levels of PsyCap.

E.   PSYCHOLOGICAL CAPITAL

Product knowledge obtained through work experience and outside work sources shows a strong correlation with self-efficacy, hope, resilience, and optimism, all of which are PsyCap constructs. This may suggest that those who are motivated will try to gain product

knowledge at work and will use outside resources to learn more about their product or service (see Figure 15).

	Self-Efficacy	Hope	Resilience	Optimism	PsyCap Total
Work Experience	.475	.208	.155	.147	.387
Outside Sources	.388	.344	.268	.232	.428

Figure 15.   Product Knowledge and PsyCap Correlations

Of all the PsyCap constraints, self-efficacy is most closely associated with motivation. Therefore, a more motivated workforce will produce better products and better results. The positive correlations of 0.475 with self-efficacy and work experience, and the 0.388 positive correlation with outside sources were the highest correlations out of all the PsyCap constraints.   These areas show the most promise if contracting professionals are able to obtain additional product knowledge from different sources. Higher levels of knowledge will lead to a more motivated workforce.   These correlations also show that those who obtain a majority of their product knowledge from work experiences and outside sources are motivated within the total PsyCap realm.   All of these correlations, except one, are significant and link product knowledge to PsyCap, which can positively or negatively affect the organization's performance.

F.   STRESS ASSESSMENT

As previously noted in Chapter II, occupational stress can have adverse effects on an individual and an organization. Through this survey, I found that there was a significant correlation of 0.234 between the level of the technical product complexity and the level of

stress, meaning that those who work on more technical products tend to have more work-related stress. The data also suggested that those who obtain product knowledge through work-related experiences will have less work-related stress, which would positively affect the organization. I obtained the negative correlation of -0.196 and -0.169 through two different questions, which tested the respondents on levels of stress and the relationship the stress had to the level of product knowledge the respondent indicated. In the survey, I also found—as expected, because of previous research in the PsyCap area—that those individuals with higher levels of self-efficacy had lower levels of stress. The negative correlation of -0.187 mirrored Fred Luthans' (2002b) research on the concept of PsyCap. Warranted contracting officers also showed a significant positive correlation between the amount of stress they had and the fact that they had a warrant. This correlation may be due to the higher level of authority and responsibility that contracting officers have over contracting specialists. A contract specialist does not carry this kind of responsibility. The correlation of 0.145 possibly indicates that contracting officers, in general, are more prone to higher levels of stress.

G.   WORKPLACE CONFLICT

The test for workplace conflict in the survey did not return any data that would suggest that a certain level of product knowledge would have any kind of effect on workplace conflict. The survey did find that workplace conflict is positively related to stress and is negatively related to hope, resilience, and optimism (see Figure 16). These results are nothing unexpected and are typically seen in surveys where conflict, stress, and PsyCap are being tested.

	Hope	Resilience	Optimism	Stress
Stress/ Conflict	-.224	-.178	-.368	.303

Figure 16.   Stress and Conflict Correlations

H.   ANALYSIS OF FINDINGS

Those professionals with more experience and a higher DAWIA level certification had a significant correlation with higher levels of product knowledge, meaning that a contracting professional with more experience and a higher DAWIA certification tends to have higher levels of product knowledge. The correlation between perceived knowledge and contracting experience is 0.346, and the correlation between perceived knowledge and DAWIA certification is 0.179. For the 30% who responded as being warranted contracting officers, there was a 0.23 correlation between being a contracting officer and the level of product knowledge training that the center provides. This correlation suggests that warranted contracting officers have higher levels of product knowledge when compared to non-warranted contracting professionals.

The survey results and data showed distinct differences between centers. This is not unexpected because they are three different centers, buying vastly different products and services with varying levels of complexity. When asked the question, "How would you rate the level of complexity of the product or service for which you contract?" the SMC responded that their products and services were the most technically complex products and services to contract, while Hanscom AFLCMC answered that their products and services were the least complex of the three centers (see Figure 17).
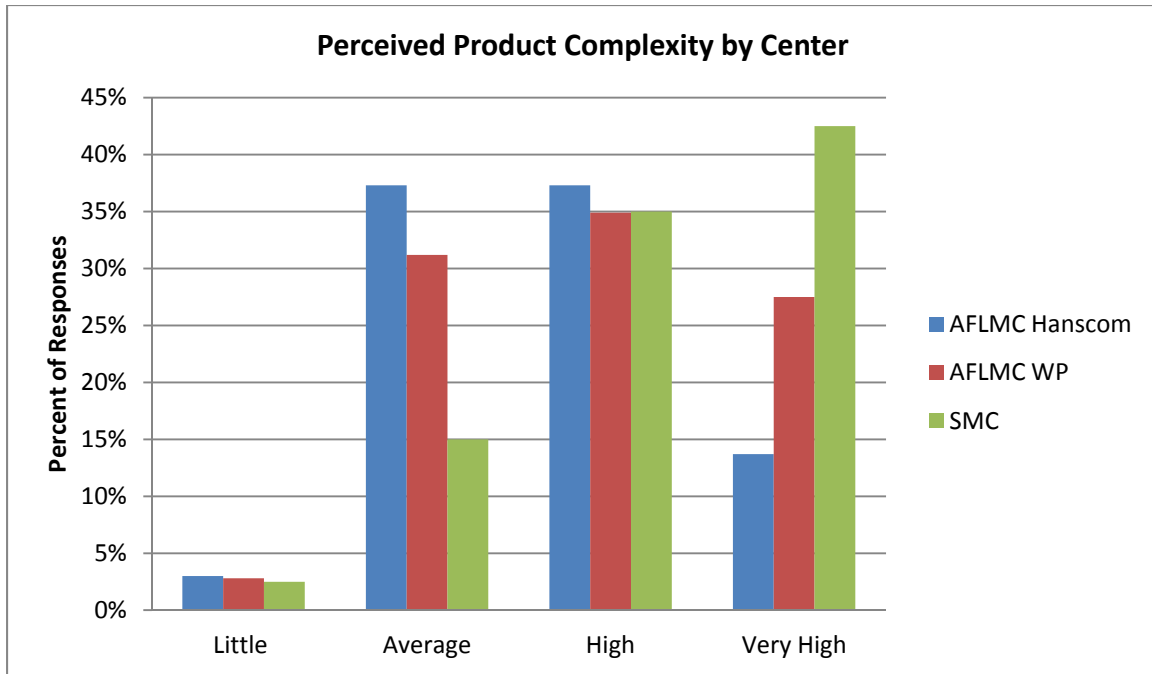
Figure 17. Perceived Product Complexity by Center

In the next question, I asked the respondents to assess the amount of buying center–provided product knowledge. Center-provided product knowledge training could come in a form such as training or education opportunities with the product or service itself. Out of the three centers, respondents at the SMC said that their center provided the most product knowledge training for the products and services for which they contract (see Figure 18). As previously noted in Chapter III, the DAU does not provide any training that is related to product knowledge, and I could find no indication that any specific product knowledge training courses are available at any of the three centers. During my research, I found that the in-house training courses at the SMC, such as the Space Enterprise Course, offers not only exposure and an understanding of the buying center itself but also an exposure, or certain level of product knowledge, that helps contracting professionals raise their level of product knowledge. This course, however, is indicative of the low level of positive responses to the center-provided training, because its intent is not focused on product

knowledge. As seen in Figure 18, the bar graph is skewed to the left, with a majority of respondents from each center indicating that none to an average amount of training was provided by their respective center.
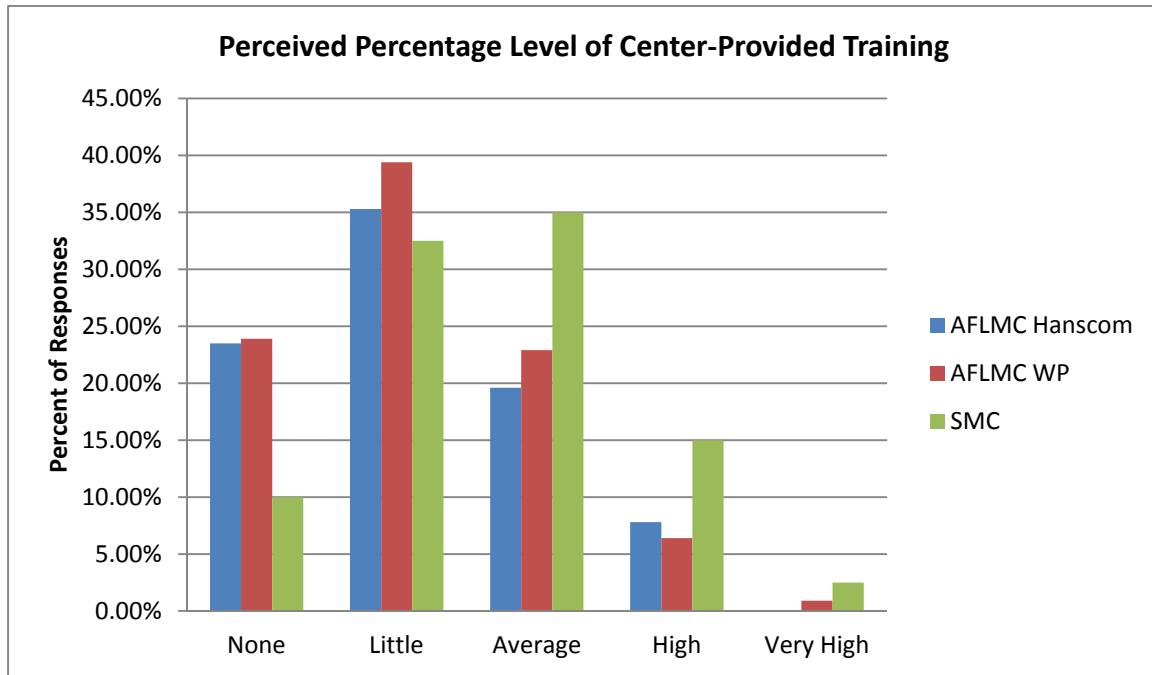
Figure 18.   Perceived Percentage Level of Center-Provided Training

Figures 19 and 20 show the respective levels of product knowledge that the respondents gained through work-related experiences as well as the use of outside sources to obtain product knowledge. As previously noted, a majority of product knowledge was obtained through work-related experiences and outside sources.
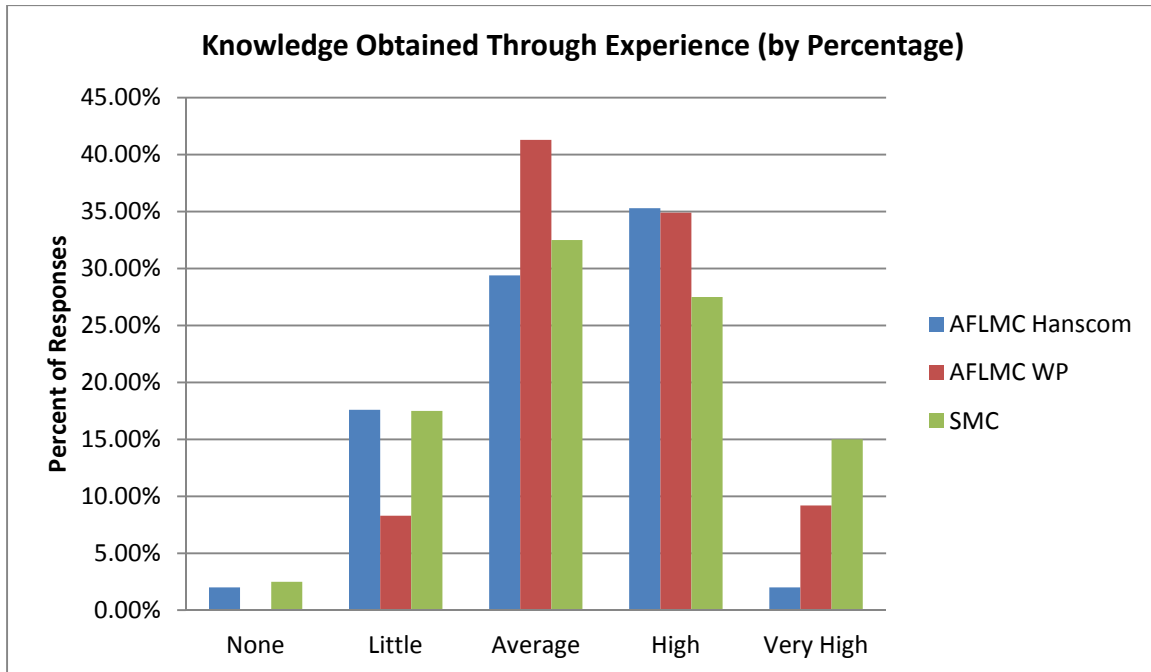
Figure 19. **Knowledge Obtained Through Experience (by Percentage)**
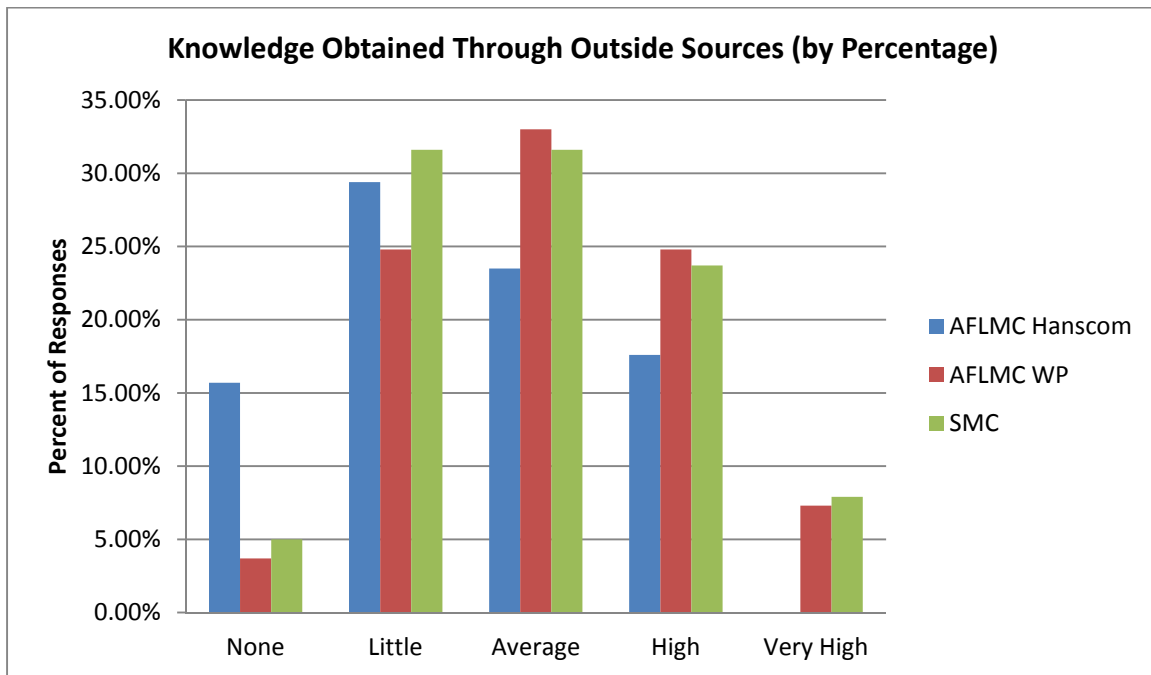
Figure 20. **Knowledge Obtained Through Outside Sources (by Percentage)**

The results from these two questions showed that contracting professionals at the

SMC and AFLCMC Wright–Patterson obtain a majority of their product knowledge from

experience (63.2% and 65.1%, respectively) and outside sources (75% and 85.4%, respectively). Contracting professionals at AFLCMC Hanscom obtained lower levels of product knowledge from outside sources and experience. At AFLCMC Hanscom, 41.1% of product knowledge came from outside sources, and 66.7% from experience, based on my examination of average to very high responses. Product knowledge obtained from outside sources was more prevalent at the SMC and AFLCMC Wright–Patterson, with data skewed to the right, while at AFLCMC Hanscom, the data indicated that respondents obtain little to average amounts of product knowledge from outside sources. AFLCMC Hanscom's data were skewed to the left.

I.   RECOMMENDATIONS

DAU Recommendations

This research shows that no DAU course for contracting professionals provides any level of product knowledge other than acknowledging the importance of market research in the acquisition process. The DAU should recognize the distinct technical skill of product knowledge and should explore ways for more training opportunities to provide product knowledge to the contracting workforce. Training opportunities could come in the form of Continuous Learning Modules (CLM) and Continuous Learning Credits (CLC), which are both distance-learning courses found on a web-based portal.

Center Recommendations

Based on the data previously described, each center should (1) consider developing a course that is product focused. These training courses could be beneficial to all workplace functional areas, such as finance, engineering, logistics, and other areas that are involved with the acquisition process. Having more product knowledge about the products/services

they contract for will provide contracting professionals with more situational awareness and result in better buying decisions. If no specific course for product knowledge is developed, then (2) I recommend that existing courses be supplemented with coverage of product knowledge. Finally, centers should leverage contracting professionals that cross-train from other functional areas (e.g., logistics, civil engineering, operations, or finance) to contracting. These professionals may have specific, technical product-based knowledge and can provide valuable insight to the acquisition team from a more broad-based contracting perspective.

J. SUMMARY

The data showed that contracting professionals feel that product knowledge is an essential element for contracting duties during the acquisition process. A majority of the contracting professionals felt that they had an adequate amount of knowledge that was obtained mostly through experience and outside sources. Data showed that all three centers, for the most part, did not provide product knowledge through training or education opportunities. The data also suggested that a lack of product knowledge would increase stress and decrease motivation within the workforce. Previous research has shown that with higher levels of stress, and lower levels of motivation, organizations will suffer negatively. In this research, I did not attempt to discover how organizations are affected by certain levels of product knowledge. The next chapter is focused on areas for further research.

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V. SUMMARY, CONCLUSIONS, AND AREAS FOR FURTHER RESEARCH

A. INTRODUCTION

This chapter provides answers to the proposed research questions in Chapter I, recommendations for the DAU, and areas for further research. This thesis was not without limitations, and further research into the topic of product knowledge is needed in order to better understand the implications of this technical skill on government contracting organizations. Extensive research has been conducted in this realm for commercial procurement centers, but there is no evidence that it has been extended to public procurement centers. This is also the first type of research conducted to see if a lack of a certain technical skill for a job function could have an effect on certain organizational behavioral aspects, such as stress and conflict. Through this research, I did find that product knowledge could have an effect on PsyCap constraints and certain types of stress. I did not find any relation to workplace conflict, but this research was limited by the lack of workplace-conflict-related questions.

B. SUMMARY

In Chapter I, I introduced DoD spending, contracting professionals, DoD acquisition problems, and the response by the DoD to the acquisition problems. I also introduced the concept of product knowledge, along with motivation, conflict, and stress. Chapter I also served to introduce the purpose of this research, the research questions, benefits and limitations, scope and organization, and the thesis methodology. The next chapter focused on previous literature that talked about product knowledge and the behavioral constraints that I examined.

In Chapter II, I expanded on the concept of product knowledge and the literature that highlights the importance of product knowledge for procurement professionals. Chapter II also served to define the baseline of skills that procurement professionals should have in order to be successful purchasing professionals. Those basic skills include product knowledge, which is notably absent in current DoD and Air Force training methods. This was noted in the RAND Air Force Procurement Workforce Transformation report (RAND Corporation, Project Air Force, 2004). Next, I began to link product knowledge and job performance by examining the behavioral constructs of psychological capital, occupational stress, and workplace conflict. Literature showed that high levels of psychological capital, low levels of occupational stress, and low levels of workplace conflict produced a better work climate, and more productive professionals. In the next chapter, I focused on the methodology of the research that I conducted.

In Chapter III, I introduced the Air Force contracting workforce and product knowledge at SMC. I also introduced AFLCMC Hanscom and AFLCMC Wright–Patterson. In Chapter III, I also introduced the survey that was administered to the three acquisition centers to assess levels of product knowledge, how product knowledge was obtained, and behavioral questions. The next chapter focused on the findings and analysis.

In Chapter IV, I began with the findings based on the demographics of the population that was assessed. Of the total population of 1,819 contracting professionals, 198 responded from the three acquisition centers. In this chapter, I discussed my findings on the product knowledge questions and analyzed the data. I found that contracting professionals receive most of their product knowledge from work-related experience. The next set of questions that I analyzed addressed behavioral questions. Here, I used these findings to draw links

between product knowledge, the behavioral constructs, and its potential impact on the organization, as discussed in Figure 2, the Product Knowledge Map. I found that product knowledge is linked to psychological capital and that high levels of product knowledge could positively impact the organization. In the final chapter of this thesis, I offered a summary, conclusion, and areas for further research.

C. CONCLUSIONS

In Chapter I, I asked five questions related to product knowledge at three major Air Force system procurement offices. I answered these questions through data collection and analysis.

Research Question 1: *Do major system centers provide adequate product knowledge through training, education, or experience to contracting professionals?* Major system centers do not provide adequate product knowledge through training and education. The SMC provides some product knowledge through its innovative in-house training programs, but my data analysis suggested that contracting professionals do not receive a majority of their knowledge through training and education. The centers do, however, provide adequate product knowledge through experience in the workforce.

Research Question 2: *Do major system centers' contracting professionals feel as though they would be more effective members in the procurement process with more product knowledge?* My research findings suggest that of those contracting professionals surveyed, 95% indicated that an average to very high level of product knowledge is necessary in order to be a successful member of the acquisition team. Thus product knowledge is a necessity for complex acquisitions. Of those contracting professionals surveyed, 97% indicated that their respective product or service was average to very high in technical complexity.

Research Question 3: *Does product knowledge have an effect on contracting professionals' motivation?* In multiple questions within the survey, I sought to link product knowledge to motivation. The data suggested that product knowledge, a technical skill, is correlated with motivation in the workplace. In addition, through my literature review, I showed that previous research also strengthens this position.

Research Question 4: *Does product knowledge have an effect on contracting professionals' work-related conflict?* There were not enough data to suggest that product knowledge has a direct effect on work-related conflict. Previous research has suggested that not having knowledge for the work being performed can lead to work-related conflict.

Research Question 5: *Does product knowledge have an effect on contracting professionals' work-related stress?* There were enough data to suggest that product knowledge can have an effect on work-related stress. By and large, the data suggested that only an average amount of work-related stress was felt by contracting professionals at the three different centers.

D.   AREAS FOR FURTHER RESEARCH

This research was the first of its kind to assess the level of product knowledge at any government level and to validate its importance as an integral skill needed by contracting professionals. The following are recommendations for further research.

- Conduct research at the operational contracting level, where a wide array of products, services, and construction projects are conducted. At the operational level, courses that provide product knowledge on services, construction techniques, and other commonly bought products or services will benefit contracting professionals. This wide array of spend demands a varying level of product knowledge, depending on the level of technical complexity of that which is being contracted.

- Expand this research to other DoD agencies or executive departments. Because this research is the first of its kind, more data are needed to further validate its importance within the government contracting profession.

- Expand the scope of this research to see how varying levels of product knowledge affect the contracting professional's respective government organization with respect to behavioral constraints. This recommendation seeks to primarily see how stress, conflict, PsyCap, and other behavioral aspects have an effect on an organization.

- Assess specific product technical knowledge at an organizational level. This can be accomplished by administering a test about a specific product or service that will specifically assess the level of product knowledge that a contracting professional has. This way, any further research will identify specific levels of technical knowledge, which can then be compared to the level of knowledge that contracting professionals assess themselves.

Because there is a lack of research on this subject, there are many areas to be discovered with regards to product knowledge and its effect on an organization. Further research is recommended, but my research also indicates that a majority of contracting professionals believe that product knowledge is an essential element of their job. Therefore, buying centers should not hesitate to integrate product knowledge into new or existing training courses.

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APPENDIX A. DAWIA CONTRACTING CERTIFICATION (DAU, 2012)

E.   **LEVEL I CONTRACTING CERTIFICATION REQUIREMENTS**

    1.   **Training Requirements**

CON 090 – Federal Acquisition Regulation (FAR) Fundamentals

CON 100 – Shaping Smart Business Arrangements

CON 115 – Contracting Fundamentals

CON 170 – Fundamentals of Cost and Price Analysis

CLC 033 – Contract Format and Structure for DoD e-Business Environment

CLC 058 – Introduction to Contract Pricing

    2.   **Education Requirements**

At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, organization and management

Baccalaureate degree (In any field of study)

    3.   **Experience Requirements**

1 year of contracting experience

F. LEVEL II CONTRACTING CERTIFICATION REQUIREMENTS

1. Training Requirements

ACQ 101 – Fundamentals of Systems Acquisition Management

CON 200 – Business Decisions for Contracting

CON 216 – Legal Considerations in Contracting

CON 270 – Intermediate Cost and Price Analysis

CON 280 – Source Selection and Administration of Service Contracts

CON 290 – Contract Administration and Negotiation Techniques in a Supply Environment

CLC 051 – Managing Government Property in the Possession of Contractors

CLC 056 – Analyzing Contract Costs

CLC 057 – Performance Based Payments and Value of Cash Flow

HBS 428 – Negotiating

2. Education Requirements

At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, organization and management

Baccalaureate degree (In any field of study)

3. Experience Requirements

2 years of contracting experience

G. LEVEL III CONTRACTING CERTIFICATION REQUIREMENTS

1. Training Requirements

ACQ 201A – Intermediate Systems Acquisition, Part A

CON 360 – Contracting for Decision Makers

1 additional course from the Harvard Business Management Modules

Additional requirement will be to select one of the below courses

ACQ 265 – Mission-Focused Services Acquisition

ACQ 370 – Acquisition Law

CON 232 – Overhead Management of Defense Contracts

CON 235 – Advanced Contract Pricing

CON 244 – Construction Contracting

CON 250 – Fundamentals of Cost Accounting Standards – Part I

CON 334 – Advanced Contingency Contracting Officer's Course

2. Education Requirements

At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, organization and management

Baccalaureate degree (In any field of study)

3. Experience Requirements

4 years of contracting experience

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APPENDIX B. QUESTION 10 RESPONSES

B-1, B-2, B-52, F-15, F-16, F-22, F-35, KC-46, C-5, C-17

Launch vehicles and space vehicles

Spacelift range

Simulators

JSTARs

Aircraft equipment and services

Operational contracting

FMS: Identification friend or foe

Predator and Reaper

Combat system radar

GPS IIF satellite

Delta II rocket

EELV launch services

MILSATCOM

ISR-related products and services

Big Safari Prime Systems

NASIC intelligence products

IT equipment

Cryptologic systems

Aircraft engines

Agile Combat Support

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APPENDIX C. SURVEY QUESTIONS AND RESULTS

Product Knowledge ☁ SurveyMonkey

1. Proceed

		Response Percent	Response Count
Proceed		100.0%	204
	answered question		204
	skipped question		0

2. Please pick the best option that describes you.

		Response Percent	Response Count
Uniformed Service		9.0%	18
DoD Civilian		88.9%	177
DoD Contractor		2.0%	4
	answered question		199
	skipped question		5

3. Please select your organization.

		Response Percent	Response Count
SMC - Los Angeles AFB		20.1%	40
AFLCMC - Wright Patterson AFB		54.3%	108
AFLCMC - Hanscom AFB		25.6%	51
	answered question		199
	skipped question		5

4. How long have you been working at this center?

	Response Percent	Response Count
Less than 5 years	61.8%	123
Greater than 5 but less than 10 years	7.5%	15
Greater than 10 but less than 15 years	6.5%	13
Greater than 15 but less than 20 years	4.0%	8
Greater than 20 years	20.1%	40
	answered question	199
	skipped question	5

5. How long have you been a part of the contracting workforce at this center?

	Response Percent	Response Count
Less than 5 years	64.0%	126
Greater than 5 but less than 10 years	8.1%	16
Greater than 10 but less than 15 years	6.1%	12
Greater than 15 but less than 20 years	4.6%	9
Greater than 20 years	17.3%	34
	answered question	197
	skipped question	7

6. How long have you been a part of the contracting workforce?

		Response Percent	Response Count
Less than 5 years		45.7%	91
Greater than 5 but less than 10 years		10.6%	21
Greater than 10 but less than 15 years		7.0%	14
Greater than 15 but less than 20 years		8.0%	16
Greater than 20 years		28.6%	57
	answered question		199
	skipped question		5

7. What is your contracting DAWIA level certification?

		Response Percent	Response Count
No certification		6.0%	12
Level I certification		29.6%	59
Level II certification		26.1%	52
Level III certification		38.2%	76
	answered question		199
	skipped question		5

8. Are you currently a warranted contracting officer?

	Response Percent	Response Count
Yes	29.9%	56
No	70.1%	131
answered question		187
skipped question		17

9. What National Contract Management Association (NCMA) professional certification, if any, have you earned?

	Response Percent	Response Count
None	89.4%	169
Certified Federal Contracts Manager (CFCM)	2.6%	5
Certified Commercial Contracts Manager (CCCM)	0.5%	1
Certified Professional Contracts Manager (CPCM)	7.4%	14
answered question		189
skipped question		15

10. Briefly identify the product/service for which you contract; for example GPS satellite, F-22, or AWACS systems.

	Response Count
	191
answered question	191
skipped question	13

11. How would you rate the level of complexity of the product/service for which you contract?

		Response Percent	Response Count
None		0.0%	0
Little		3.2%	6
Average		30.7%	58
High		37.6%	71
Very High		28.6%	54
	answered question		189
	skipped question		15

12. Rank your level of product knowledge of the product/service for which you contract.

		Response Percent	Response Count
None		2.1%	4
Little		23.4%	44
Average		44.7%	84
High		22.3%	42
Very High		7.4%	14
	answered question		188
	skipped question		16

13. Do you believe that you have sufficient product/knowledge for your procurement responsibilities?

		Response Percent	Response Count
Yes		79.2%	145
No		20.8%	38
	answered question		183
	skipped question		21

14. Rank your level of work-related stress as a result of the specific product/service you work with.

		Response Percent	Response Count
None		3.8%	7
Little		20.0%	37
Average		47.6%	88
High		20.5%	38
Very High		8.1%	15
	answered question		185
	skipped question		19

15. Rank your level of work-relate stress when serving on a source selection team as a result of product knowledge deficiencies.

	Response Percent	Response Count
None	5.9%	11
Little	9.7%	18
Average	24.3%	45
High	10.3%	19
Very High	5.4%	10
I've never worked on a source selection	44.3%	82
answered question		185
skipped question		19

16. Do you believe that product knowledge is necessary in order to carry out your duties as a contracting professional?

	Response Percent	Response Count
Yes	95.1%	175
No	4.9%	9
answered question		184
skipped question		20

17. What level of product knowledge do you believe that contracting professionals should have for the product/service for which they contract?

	Response Percent	Response Count
None	0.0%	0
Little	3.3%	6
Average	40.8%	75
High	45.1%	83
Very High	10.9%	20
answered question		184
skipped question		20

18. What level of product knowledge training does your center provide contracting professionals?

	Response Percent	Response Count
None	22.8%	42
Little	39.7%	73
Average	27.2%	50
High	9.2%	17
Very High	1.1%	2
answered question		184
skipped question		20

19. What level of product knowledge is gained through work related experiences at your center?

		Response Percent	Response Count
None		1.1%	2
Little		13.7%	25
Average		39.9%	73
High		36.1%	66
Very High		9.3%	17
	answered question		183
	skipped question		21
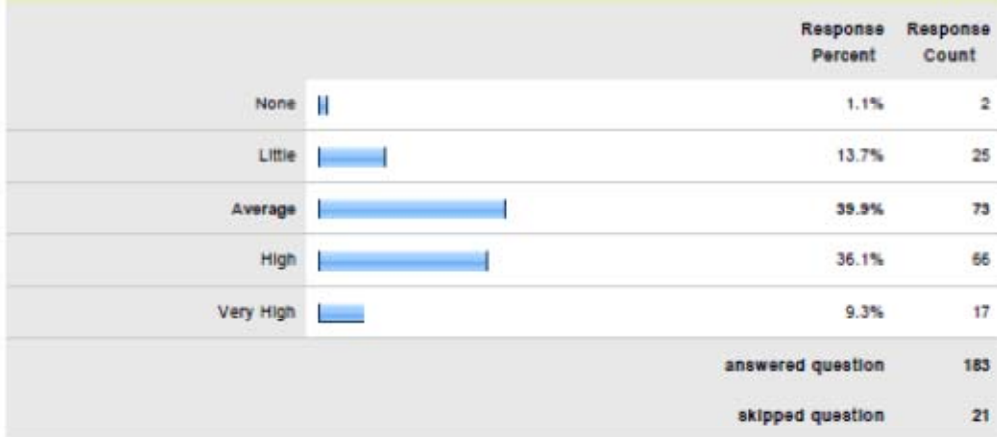
20. To what extent do you use other means outside your command (internet, magazines, books, third parties, etc.) to educate yourself to gain more product knowledge for which you contract?

		Response Percent	Response Count
None		7.7%	14
Little		29.5%	54
Average		32.8%	60
High		24.0%	44
Very High		6.0%	11
	answered question		183
	skipped question		21
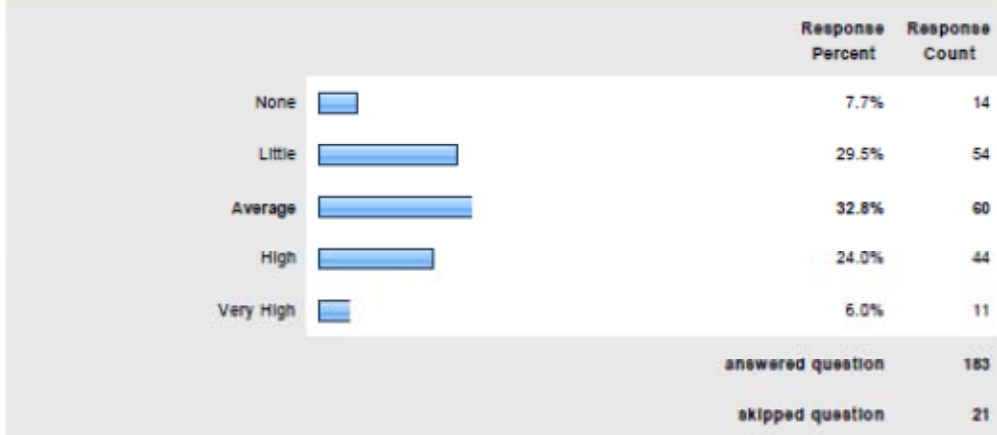
21. To what degree do you believe that market knowledge makes you a more effective contracting professional?

	Response Percent	Response Count
None	0.5%	1
Little	4.9%	9
Average	26.2%	48
High	47.5%	87
Very High	20.8%	38
answered question		183
skipped question		21

22. I feel confident evaluating contractor proposals for the products/services I buy.

	Response Percent	Response Count
Strongly Disagree	2.7%	5
Disagree	4.9%	9
Somewhat Disagree	9.9%	18
Somewhat Agree	30.2%	55
Agree	36.3%	66
Strongly Agree	15.9%	29
answered question		182
skipped question		22

23. I feel confident in representing the contracting function in meetings with other functional areas.

		Response Percent	Response Count
Strongly Disagree		1.7%	3
Disagree		4.5%	8
Somewhat Disagree		8.4%	15
Somewhat Agree		20.1%	36
Agree		41.9%	75
Strongly Agree		23.5%	42
	answered question		179
	skipped question		25

24. I feel confident contributing to product/service focused discussions throughout the contracting process.

		Response Percent	Response Count
Strongly Disagree		3.4%	6
Disagree		6.7%	12
Somewhat Disagree		12.3%	22
Somewhat Agree		26.3%	47
Agree		36.9%	66
Strongly Agree		14.5%	26
	answered question		179
	skipped question		25

25. I feel confident helping to set targets/goals in technical meetings.

		Response Percent	Response Count
Strongly Disagree		5.6%	10
Disagree		16.3%	29
Somewhat Disagree		14.6%	26
Somewhat Agree		33.7%	60
Agree		21.9%	39
Strongly Agree		7.9%	14
	answered question		178
	skipped question		26

26. I feel confident contacting people outside the organization (e.g., suppliers, customers, contractors) to discuss problems.

		Response Percent	Response Count
Strongly Disagree		1.7%	3
Disagree		5.1%	9
Somewhat Disagree		7.3%	13
Somewhat Agree		28.2%	50
Agree		40.7%	72
Strongly Agree		16.9%	30
	answered question		177
	skipped question		27

27. I feel confident presenting product information to a group of colleagues (contracting or other functional areas).

	Response Percent	Response Count
Strongly Disagree	3.4%	6
Disagree	10.7%	19
Somewhat Disagree	15.7%	28
Somewhat Agree	30.9%	55
Agree	28.7%	51
Strongly Agree	10.7%	19
answered question		178
skipped question		26

28. I am confident that I could deal efficiently with unexpected events.

	Response Percent	Response Count
Strongly Disagree	1.1%	2
Disagree	1.1%	2
Somewhat Disagree	6.2%	11
Somewhat Agree	27.0%	48
Agree	47.2%	84
Strongly Agree	17.4%	31
answered question		178
skipped question		26

29. Thanks to my resourcefulness and ability to figure things out, I know how to handle unexpected or unforeseen situations.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	0.6%	1
Somewhat Disagree	2.8%	5
Somewhat Agree	24.3%	43
Agree	52.0%	92
Strongly Agree	19.8%	35
answered question		177
skipped question		27

30. I can solve most problems if I invest the necessary effort.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	0.0%	0
Somewhat Disagree	2.3%	4
Somewhat Agree	11.9%	21
Agree	52.3%	92
Strongly Agree	33.0%	58
answered question		176
skipped question		28

31. When I am confronted with a problem, I can usually find several solutions.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	0.0%	0
Somewhat Disagree	3.4%	6
Somewhat Agree	27.7%	49
Agree	48.6%	86
Strongly Agree	19.8%	35
	answered question	177
	skipped question	27

32. If I am in trouble, I can usually think of a solution.

	Response Percent	Response Count
Strongly Disagree	0.0%	0
Disagree	0.6%	1
Somewhat Disagree	3.4%	6
Somewhat Agree	26.6%	47
Agree	46.3%	82
Strongly Agree	23.2%	41
	answered question	177
	skipped question	27

33. I can usually handle whatever comes my way.

	Response Percent	Response Count
Strongly Disagree	0.0%	0
Disagree	0.0%	0
Somewhat Disagree	2.8%	5
Somewhat Agree	18.6%	33
Agree	52.5%	93
Strongly Agree	26.0%	46
	answered question	177
	skipped question	27

34. If I should find myself in a jam at work, I could think of many ways to get out of it.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	0.6%	1
Somewhat Disagree	2.8%	5
Somewhat Agree	32.6%	58
Agree	41.0%	73
Strongly Agree	22.5%	40
	answered question	178
	skipped question	26

35. At the present time, I am energetically pursuing my work goals.

		Response Percent	Response Count
Strongly Disagree		2.3%	4
Disagree		2.3%	4
Somewhat Disagree		4.5%	8
Somewhat Agree		16.4%	29
Agree		50.8%	90
Strongly Agree		23.7%	42
	answered question		177
	skipped question		27

36. There are lots of ways around any problem.

		Response Percent	Response Count
Strongly Disagree		1.1%	2
Disagree		2.2%	4
Somewhat Disagree		7.3%	13
Somewhat Agree		37.1%	66
Agree		36.5%	65
Strongly Agree		15.7%	28
	answered question		178
	skipped question		26

37. Right now I see myself as being pretty successful at work.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	1.7%	3
Somewhat Disagree	2.2%	4
Somewhat Agree	20.8%	37
Agree	50.0%	89
Strongly Agree	24.7%	44
	answered question	178
	skipped question	26

38. I can think of many ways to reach my current work goals.

	Response Percent	Response Count
Strongly Disagree	1.2%	2
Disagree	1.2%	2
Somewhat Disagree	8.1%	14
Somewhat Agree	25.4%	44
Agree	49.7%	86
Strongly Agree	14.5%	25
	answered question	173
	skipped question	31

39. At this time, I am meeting the work goals that I have set for myself.

	Response Percent	Response Count
Strongly Disagree	1.7%	3
Disagree	1.2%	2
Somewhat Disagree	5.8%	10
Somewhat Agree	26.0%	45
Agree	51.4%	89
Strongly Agree	13.9%	24
answered question		173
skipped question		31

40. When I have a setback at work, I have trouble recovering from it, and moving on.

	Response Percent	Response Count
Strongly Disagree	17.3%	30
Disagree	45.7%	79
Somewhat Disagree	23.1%	40
Somewhat Agree	8.1%	14
Agree	3.5%	6
Strongly Agree	2.3%	4
answered question		173
skipped question		31

41. I usually manage difficulties one way or another at work.

		Response Percent	Response Count
Strongly Disagree		0.6%	1
Disagree		0.0%	0
Somewhat Disagree		1.7%	3
Somewhat Agree		19.1%	33
Agree		63.0%	109
Strongly Agree		15.6%	27
	answered question		173
	skipped question		31

42. I can be "on my own," so to speak, at work if I have to.

		Response Percent	Response Count
Strongly Disagree		0.6%	1
Disagree		0.6%	1
Somewhat Disagree		2.3%	4
Somewhat Agree		13.9%	24
Agree		45.7%	79
Strongly Agree		37.0%	64
	answered question		173
	skipped question		31

43. I usually take stressful things at work in stride.

	Response Percent	Response Count
Strongly Disagree	0.0%	0
Disagree	0.6%	1
Somewhat Disagree	9.2%	16
Somewhat Agree	25.4%	44
Agree	52.0%	90
Strongly Agree	12.7%	22
answered question		173
skipped question		31

44. I can get through difficult times at work because I've experienced difficulty before.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	1.7%	3
Somewhat Disagree	5.2%	9
Somewhat Agree	13.9%	24
Agree	51.4%	89
Strongly Agree	27.2%	47
answered question		173
skipped question		31

45. I feel I can handle many things at a time at this job.

	Response Percent	Response Count
Strongly Disagree	0.0%	0
Disagree	1.7%	3
Somewhat Disagree	2.3%	4
Somewhat Agree	17.9%	31
Agree	54.3%	94
Strongly Agree	23.7%	41
answered question		173
skipped question		31

46. When things are uncertain for me at work, I usually expect the best.

	Response Percent	Response Count
Strongly Disagree	1.2%	2
Disagree	4.0%	7
Somewhat Disagree	14.5%	25
Somewhat Agree	31.2%	54
Agree	42.8%	74
Strongly Agree	6.4%	11
answered question		173
skipped question		31

47. If something can go wrong for me work-wise, it will.

		Response Percent	Response Count
Strongly Disagree		7.6%	13
Disagree		43.6%	75
Somewhat Disagree		27.9%	48
Somewhat Agree		15.1%	26
Agree		2.3%	4
Strongly Agree		3.5%	6
	answered question		172
	skipped question		32

48. I always look on the bright side of things regarding my job.

		Response Percent	Response Count
Strongly Disagree		1.7%	3
Disagree		1.7%	3
Somewhat Disagree		7.6%	13
Somewhat Agree		30.2%	52
Agree		45.3%	78
Strongly Agree		13.4%	23
	answered question		172
	skipped question		32

49. I'm optimistic about what will happen to me in the future as it pertains to work.

	Response Percent	Response Count
Strongly Disagree	3.5%	6
Disagree	2.3%	4
Somewhat Disagree	5.2%	9
Somewhat Agree	17.4%	30
Agree	57.0%	98
Strongly Agree	14.5%	25
	answered question	172
	skipped question	32

50. In this job, things never work out the way I want them.

	Response Percent	Response Count
Strongly Disagree	16.9%	29
Disagree	48.3%	83
Somewhat Disagree	20.9%	36
Somewhat Agree	9.3%	16
Agree	2.3%	4
Strongly Agree	2.3%	4
	answered question	172
	skipped question	32

51. I approach this job as if "every cloud has a silver lining."

	Response Percent	Response Count
Strongly Disagree	1.7%	3
Disagree	9.3%	16
Somewhat Disagree	8.7%	15
Somewhat Agree	40.1%	69
Agree	31.4%	54
Strongly Agree	8.7%	15
answered question		172
skipped question		32

52. I am clear what is expected of me at work.

	Response Percent	Response Count
Strongly Disagree	1.2%	2
Disagree	2.9%	5
Somewhat Disagree	9.3%	16
Somewhat Agree	22.1%	38
Agree	44.8%	77
Strongly Agree	19.8%	34
answered question		172
skipped question		32

53. I often feel that I am overworked.

	Response Percent	Response Count
Strongly Disagree	6.4%	11
Disagree	24.4%	42
Somewhat Disagree	18.6%	32
Somewhat Agree	29.1%	50
Agree	15.1%	26
Strongly Agree	6.4%	11
answered question		172
skipped question		32

54. My work places a lot of work-related stress and pressure on me to get the job done.

	Response Percent	Response Count
Strongly Disagree	4.7%	8
Disagree	15.1%	26
Somewhat Disagree	19.2%	33
Somewhat Agree	27.9%	48
Agree	25.0%	43
Strongly Agree	8.1%	14
answered question		172
skipped question		32

55. I know how to go about getting my job done.

	Response Percent	Response Count
Strongly Disagree	0.0%	0
Disagree	1.2%	2
Somewhat Disagree	4.1%	7
Somewhat Agree	14.5%	25
Agree	53.5%	92
Strongly Agree	26.7%	46
answered question		172
skipped question		32

56. I have to work very intensively.

	Response Percent	Response Count
Strongly Disagree	0.6%	1
Disagree	4.7%	8
Somewhat Disagree	16.9%	29
Somewhat Agree	34.3%	59
Agree	33.1%	57
Strongly Agree	10.5%	18
answered question		172
skipped question		32

57. I feel stressed at work.

	Response Percent	Response Count
Strongly Disagree	4.7%	8
Disagree	21.1%	36
Somewhat Disagree	19.3%	33
Somewhat Agree	32.2%	55
Agree	13.5%	23
Strongly Agree	9.4%	16
answered question		171
skipped question		33

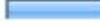## 58. I am clear about what my duties and responsibilities are at work.

	Response Percent	Response Count
Strongly Disagree	1.2%	2
Disagree	4.7%	8
Somewhat Disagree	7.0%	12
Somewhat Agree	20.5%	35
Agree	45.0%	77
Strongly Agree	21.6%	37
answered question		171
skipped question		33

59. I have to neglect some tasks because I have too much to do.

	Response Percent	Response Count
Strongly Disagree	7.0%	12
Disagree	22.7%	39
Somewhat Disagree	24.4%	42
Somewhat Agree	24.4%	42
Agree	13.4%	23
Strongly Agree	8.1%	14
	answered question	172
	skipped question	32

60. There is friction or anger between colleagues.

	Response Percent	Response Count
Strongly Disagree	13.4%	23
Disagree	38.4%	66
Somewhat Disagree	18.6%	32
Somewhat Agree	18.6%	32
Agree	8.1%	14
Strongly Agree	2.9%	5
	answered question	172
	skipped question	32

61. I have to work very fast.

		Response Percent	Response Count
Strongly Disagree		2.3%	4
Disagree		16.9%	29
Somewhat Disagree		23.3%	40
Somewhat Agree		**30.2%**	52
Agree		19.8%	34
Strongly Agree		7.6%	13
	answered question		172
	skipped question		32

62. Relationships at work are strained.

		Response Percent	Response Count
Strongly Disagree		14.5%	25
Disagree		**47.1%**	81
Somewhat Disagree		16.9%	29
Somewhat Agree		15.1%	26
Agree		3.5%	6
Strongly Agree		2.9%	5
	answered question		172
	skipped question		32

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