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An Analysis of the Effectiveness of the U.S. Navy's Strategic Sourcing Policy for Service Contracts

15 June 2010

by

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Abstract

Recent research conducted at the Naval Postgraduate School has proven that applying a pricing optimization model to Base Operations Support Services (BOSS) contracts on US Air Force installations results in both significant cost savings and optimization of contracting resources. This project will attempt to prove that similar improvements can be made by applying the same model to installation service contracts for use by the Naval Facilities Engineering Command (NAVFAC).

Key words: Strategic sourcing, services, contracting, NAVFAC, pricing optimization

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List of Acronyms and Abbreviations

ACQ	NAVFAC Headquarters Acquisition Directorate
BL	Business Lines
BOSS	Base Operations Support Services
BRAC	Base Realignment and Closure
BuDocks	Bureau of Yards and Docks
CAO	Chief Acquisition Officer
CEC	Civil Engineering Officers
CFO	Chief Financial Officer
CIO	Chief Information Officer
CNI	Navy Installations Command
CNO	Chief of Naval Operations
COMFISC	Navy Command, Fleet Indsutrial Supply Center
CPL	Confidence in Performance Level
DAU	Defense Acquisition University
DLA	Defense Logistics Agency
DoD	Department of Defense
DoN	Department of the Navy
DPAP/SS	Defense Procurement and Acquisition Policy, Office of Strategic Sourcing
DRC	Disaster Recovery Centers
DSCO	DLA Contracting Services Office
DWSS	DoD-wide Strategic Sourcing
FEMA	Federal Emergency Management Agency
FPDS-NG	Federal Procurement Data System – Next Generation
GAO	Government Accounting Office
ITCC	Information Technology Commodity Council
LGCC	Landing Gear Commodity Council
NAVFAC	Naval Facilities Engineering Command

NMC	Navy Material command
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
PO	Pricing Optimization
PPT	Performance-price Tradeoff
PWS	Performance Work Statement
RD&T	Research, Development, and Testing
SBA	Small Business Administration
SCP	Set-covering Problem
SCORE	Supplier Cost Reduction Effort
SL	Support Lines
SMS	Strategic Material Sourcing
SOW	Statement of Work
SSDB	Strategic Sourcing Directors Board
TCPL	Total Confidence in Performance Level
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
VA	Value Analysis
VE	Value Engineering

I. Introduction

A. Background

Faced with new government-wide mandates for cost reduction, budget cuts, and increased public scrutiny, the Navy must find more proficient and effective methods to procure goods and services. One way to achieve this is through strategic sourcing, defined by the Office of Management and Budget (OMB) (OMB, 2005, p. 1) as "A collaborative and structured process of analyzing an organization's spend and using the information to make business decisions about acquiring commodities and services more efficiently and effectively." A steadily increasing reliance on contracted services at military installations is further justification for more efficient and effective source selection methods.

B. Purpose

Recent research conducted by Apte, Rendon, and Salmerón (2009) at the US Naval Postgraduate School has proven that using a pricing optimization model to Base Operations Support Services (BOSS) contracts on US Air Force installations results in both significant cost savings and optimization of contracting resources. Within this document, the term “BOSS” refers to support services, which include lawn maintenance, refuse removal, and janitorial services. This project will attempt to prove that similar improvements can be made by applying the same model to installation service contracts for use by the Naval Facilities Engineering Command (NAVFAC).

C. Research Objectives

Our research objectives, identified below, were developed to identify the effectiveness and efficiency of the strategic sourcing methods currently used by NAVFAC for BOSS contracts. Our research objectives:

1. Primary research objective:

Identify whether the NAVFAC is currently using strategic sourcing practices for BOSS contracts.

2. Subsidiary research objectives:

1) Analyze current data to determine if these strategic sourcing methods are both efficient and effective,

2) Attempt to improve the current methods, if any, by applying actual data to a proven decision model, and

3) Provide recommendations to senior Navy acquisition leaders.

D. Expected Benefits

Currently, the Navy is contracting for basic operating and support services on naval installations. We have examined the Navy's ability to use strategic sourcing in these contracts by collecting and analyzing data that is available through NAVFAC contracting activities. By applying this information to a known pricing optimization model, we will determine if the Navy could benefit from using this model and what policies could be implemented to help them become even more efficient and effective. Based on our findings, we intend to provide recommendations that could potentially improve the source selection strategy of the NAVFAC.

E. Scope and Organization

Within the contents of this study, we only examine current BOSS contracts provided through NAVFAC. We do not compare contracts earlier than 2009, and we caution the reader that the techniques we used in this study may not be applicable to other contract types. We apply a known model that was developed for Air Force BOSS contracts to NAVFAC BOSS contracts in order to determine whether improvements similar to those identified in the Air Force study can be

made by applying proper strategic sourcing methods in an attempt to achieve significant cost savings.

To achieve the thesis objectives, we have organized our research into six chapters. In the Chapter I, we present our research objectives and an overall roadmap of the follow-on chapters. In Chapter II, we conduct a literature review in which the development of strategic sourcing is discussed, as well as how it applies to the acquisition of services in the Department of Defense, specifically in the Navy. Chapter III describes NAVFAC and its overall strategy and contracting environment. The research provided by Professors Apte, Rendon, and Salmerón was pivotal to the thesis. Chapter IV, Service-Based Strategic Sourcing Model, describes the model they developed and how it applies to service-based strategic sourcing. This chapter also details the process by which we organized the data provided by NAVFAC in such a way that it could be easily entered to the pricing optimization model. In Chapter V, Results and Analysis, a comparison of the pricing optimization model results to both the lowest cost and best Confidence in Performance Level (CPL) selection processes is conducted. Finally, in Chapter VI, we provide a summary of our research, conclusions, recommendations based on our results, and suggested areas of further research.

F. Methodology

The results of the optimization model are dependent on obtaining usable and accurate data. Initially, we understood that each Service handled services acquisition differently. Through the extensive research that we performed to map out the history of service-based strategic sourcing, we found that NAVFAC was the organization responsible for administering BOSS contracts in the Navy. Through NAVFAC, we were able to obtain data for use with the PO model.

For our evaluation of the NAVFAC data using the pricing optimization model, we utilized the same underlying assumptions that were made by Apte, Rendon, and Salmerón (2009) in their problem. We made these assumptions

simply to ease the development of our scenarios. In addition, we continued to use five installations as the maximum number of installations on which a single offeror can submit a proposal. The remaining assumptions are as follows: (1) each offeror submits proposals on numerous solicitations, but the maximum number of installations in a solicitation is fixed; (2) all offerors offer the same percentage of quantity discounts that are based on the number of installations included in the proposal; and (3) all installations have the same preference in CPL of the offerors. For consistency, we utilized the same notation as the Apte, Rendon, and Salmerón model. Unlike the data provided to Apte, Rendon, and Salmerón by the US Air Force, NAVFAC did not provide data that contained combined proposals by any offeror.

G. Summary

In the first chapter, we presented our research objectives and described the contents of the subsequent chapters. This chapter identified the background, purpose, and objectives of our research. In addition, we described the expected benefits of our research. We provided a detailed description of the scope and organization of the research as well as the methodology used to conduct the study. In the next chapter, we will conduct a literature review in which the development of strategic sourcing is discussed, as well as how it applies to the acquisition of services in the Department of Defense, specifically in the Navy.

II. Literature Review

A Introduction

The purpose of this chapter is to conduct a literature review of the development of strategic sourcing. In addition, we will describe how strategic sourcing applies to the acquisition of services in the Department of Defense and specifically in the Navy.

The Office of Management and Budget (OMB) defines 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" (OMB, 2005). Additionally it helps government agencies to optimize performance, minimize price, increase achievement of socioeconomic acquisition goals, evaluate total lifecycle-management costs, improve vendor access to business opportunities, and otherwise increase the value of each dollar spent (OMB, 2005). Though both strategic sourcing and operational sourcing require buyers to develop relationships with suppliers, strategic sourcing is differentiated from standard operational sourcing by managing relationships with critical suppliers, developing electronic purchasing systems, implementing companywide best practices, negotiating companywide supply contracts, and managing critical commodities (Monczka et al., 2009).

When discussing the subject of strategic sourcing, the conversation must begin with the roots of its implementation. Our current methodology of strategic sourcing is a borrowed idea that originated with the Japanese. Like many ideas that other countries have initialized, from military strategy to shipbuilding, the United States has adopted strategic sourcing and made limitless attempts to make it even better. With federal strategic sourcing, however, the Department of Defense has arguably taken too long to climb onboard this cost-saving initiative. In the following section of this paper, we will discuss how and why strategic sourcing was

implemented, who developed it, what private industries in the United States were the first to adopt this procurement strategy, and whether they were successful in doing so.

Since 1955, the federal government had been issuing policies to promote competition between the public and private sectors for the performance of services. These early policies encouraged federal agencies to compete commercially when they found such an action to be cost effective. Additionally, as administrations and budgets have changed, Congress has passed legislation to increase reporting requirements and to regulate spending for the acquisition of necessary goods and services.

The Department of Defense (DoD) faces several challenges in its attempt to implement strategic sourcing initiatives. Some of these challenges can be resolved by looking to industry's innovative solutions to similar challenges. Others are said to be specific to the DoD. Some of these challenges include socioeconomic concerns and the DoD's inability to access valuable spending information, which we will discuss later.

Despite those challenges, the DoD has had some success at the agency level in strategic sourcing for both goods and services. These successes may serve as positive examples in the implementation of a DoD-wide strategic sourcing policy.

B. Development of Strategic Sourcing

Until nearly 1950, Japan did not find a need for what is known today as strategic sourcing. Their businesses, up until this time, were largely single-unit production companies. These businesses did not find a need to outsource to contractors because of the country's technological state. With no mass telecommunications systems, transportation systems, or large-scale production lines in place, major corporations in Japan did not yet realize what was to come (Nishiguchi, 1994).

By 1960, Japan's long road to recovery from the devastating effects of World War II had finally come to an end. With Japan's economy on the rise, there was much more diversification between small and large firms. This size range of businesses, coupled with the fact that the country's economy was on a rebound, created an increasingly complex variety of goods and services produced and delivered. Increased competition between similar producers of goods and services was the welcomed side effect of this development. Without fail, Japanese businesses small and large rose to the occasion. Companies realized that they had to find a way to reduce costs while simultaneously delivering a quality product or service. Achievement of this objective required a complete overhaul of procurement business practices for companies within all industries (Nishiguchi, 1994).

Prior to this, contractors for large businesses in Japan served merely as distrusted associates that would produce or fabricate only individual pieces of a part or product. However, this was exactly the element that Japanese companies would transform. With the threat of other competition, executives decided to develop a new, enriched relationship with their contractors. This relationship would be one of trust and dependence on each other (Nishiguchi, 1994).

Before this shift in corporate strategy, contractors were responsible only for subassemblies of a product for which the design and specifications were provided. Today these same contractors would be charged with the responsibility of manufacturing a complete product, with the opportunity to propose designs and specifications to the buyer in an effort to induce what is known as Value Engineering (VE). VE is defined by *The Purchasing Machine* (Nelson, Moody & Stegner, 2001) as the careful analysis of design early in the new-product cycle, to determine best materials, best tooling, and best manufacturing processes. This change in strategy was a win-win situation for both parties involved with the product or service. By outsourcing to contractors in this manner, the company was able to focus on more research and development projects to stay ahead of its competition and reap reduced production costs by purchasing in volume. By willingly accepting the

proposal of a closer business relationship that involved production of a product from start to finish, the contractor was able to enjoy increased revenues as well as a widened skill set and knowledge of the niche (Nishiguchi, 1994).

This responsibility was not offered as an open-ended relationship to contractors. A company's ability to decide whether to make or buy, or to select a specific contractor, was critical to the success of the business transformation. In fact, these Japanese companies based their contracting decision of whom to award to on several factors. As stated by Nishiguchi (1994), in order to ensure the continuous output of low-cost and high-quality products, new practices were designed. These new practices were based on commitments to problem solving by both companies and contractors. Some examples include Value Analysis (VA), VE, the cost-planning method of product development, and profit-sharing rules, to name a few.

It is important to include what Nishiguchi (1994) believed to be the most important result of this Japanese procurement development, which was simply a change in the fundamental approach to developing contractual affiliations. He believed that synergistic effects of bilateral problem solving would be achieved by allowing both the company and contractor to benefit from the business transactions under newly established rules.

C. Adoption by US Businesses

There is no doubt that the strategic sourcing strategies of the Japanese in the 1960s were effective. In fact, their effectiveness at achieving their objective of cost reductions and improved efficiencies was noticed across the globe. Major corporations in the United States adopted strategic sourcing as early as the mid 1960s. In the automotive industry, major changes were made by the procurement executive at Chrysler in order to realize exponential cost reductions and, thus, healthier bottom lines and returns for shareholders. This change did not happen immediately, though (Rudzki, Smock, Katzorke & Stewart, 2006).

For decades, the automotive industry, along with the majority of other American-owned businesses, strong-armed their suppliers. They threatened their suppliers into reducing prices or facing elimination from future procurement. While this may have worked in the short term, long-term profits were not realized by doing so. A shift in procurement strategy was needed, and Thomas Stallkamp, Chrysler's procurement executive in the early 1990s, had the answers (Rudzki et al., 2006).

Faced with detrimental losses at the close of the 1980s, Chrysler's procurement team had become an integral part of the executive team's struggle with achieving profits. Knowing that nearly 70% of the total vehicle cost resulted from purchased components, Chrysler made the first move in the auto industry to change the relationship with their suppliers. Under Stallkamp's leadership, Chrysler created a program called Supplier Cost Reduction Effort (SCORE), which targeted 150 of the company's principal suppliers (Rudzki et al., 2006).

From design to build, SCORE encouraged contractors to think outside of the box when it came to producing a product. Chrysler offered half of the return on any proven savings to their suppliers from the onset of this plan. All suppliers quickly realized that this program was not only helping them keep a business relationship with their customer, but also it was positively affecting their profit margins each reporting period. By incorporating this sort of VE approach into the SCORE program, Chyrsler realized tremendous savings that could not have been achieved without it. In fact, one of its suppliers proposed a way to save $4 per unit "by switching from cast metal to injection molded nylon intake manifolds" (Rudzki et al., 2006). Like the Japanese, Chrysler incorporated into this program a way to properly grade supplier performance through a specific set of metrics that integrated the amount of money saved with how much of the savings they kept.

D. Realization by the US Government

In the mid 1980s, Ronald Reagan, then President of the United States, had received numerous reports of inefficient procurement practices within the

Department of Defense that were using taxpayer dollars. He immediately ordered the formation of the Blue Ribbon Commission to not only investigate these specific allegations but also to propose new ways of doing business that would ultimately save taxpayer dollars and improve performance. The commission's chairman, David Packard, who is also the author of the final report on the board's findings, said the following:

> Chances for meaningful improvement will come not from more regulation but only with major institutional change. During the last decade or so a new theory of management has evolved. It has been developed by a limited number of U.S. companies, and it has flourished in Japan. These practices have resulted in much higher productivity and much higher quality in the products being produced. They involve participation of all of the people in the organization in deciding among themselves how the job can best be done. They involve, above all, trust in people. (1986b, XXIV)

In the end, the Blue Ribbon Commission made seven specific recommendations to the President for improvement of the Department of Defense acquisition system: streamline the acquisition organization and procedures, use technology to reduce costs, balance cost and performance, stabilize programs, expand the use of commercial products, increase the use of competition, and enhance the quality of the acquisition personnel (Rudzki et al., 2006).

David Packard believed that by instituting these changes, it would be possibile to reduce the acquisition lifecycle by half. This achievement would not come easily, however, and, in fact, would require a significant amount of support from each branch of the US federal government, especially the executive and legislative branches. Packard believed that the implementation of practices similar to those proven to be successful in the corporate sector would ulitimately save the taxpayers an enormous amount of money each year.

E. Initiation of Strategic Sourcing Within US Government

OMB Circular A-76, *Performance of Commercial Activities*, established federal policy regarding the performance of commercial activities with the intent that

"the Government should not compete with its citizens" and that the Government was "to rely on commercial sources to supply the products and services the Government needs" (OMB, 1983). This national policy originated in the Bureau of the Budget Bulletins in the late 1950s and was restated in *OMB Circular A-76*, published in 1966 (OMB, 1983). *Circular A-76* has continued to be updated through changing administrations (OMB, 2003). In 1979, *Circular A-76* was supplemented with a handbook of procedures for conducting cost comparison studies (OMB, 1996).

In August 1995, the DoD "made the [*A-76*] process a priority so as to reduce operating costs and free funds for other priorities" (GAO, 2002, March). That same year, the effort was subsequently incorporated as a major initiative under the *Secretary of Defense's Reform Initiative* and referred to as "competitive sourcing" (GAO, 2002, March). In the *Hearings on* National Defense Authorization Act for Fiscal Year 2003 *and Oversight of Previously Authorized Programs Before the Committee on Armed Services*, part of the House's Military Readiness Subcommittee hearings, the Honorable Joel Hefley, a Representative from Colorado, said in a brief that the DoD claimed that no matter who won the competitions between public and private sectors using *A-76*, there would be substantial savings. He continued by saying that the "DoD was so confident of the savings that $11.3 billion was removed from the fiscal years 1999 to 2004 defense agencies and military services operation and maintenance accounts and placed into the modernization accounts" (House of Representatives, 2002).

However, without a detailed listing of what services were available to be outsourced, the OMB had no visibility of the needs of the various federal agencies. On October 12, 1998, Public Law 105-270, the *Federal Activities Inventory Reform (FAIR) Act of 1998*, was passed with the intention "to provide a process for identifying the functions of the Federal Government that are not inherently governmental functions, and for other purposes" (US Congress, 1998, p. 2). It required that the head of each executive agency (e.g., the Department of Defense) annually submit to the Director of the Office of Management and Budget a detailed

list of activities that were not inherently government functions that had been performed for that agency by federal government sources. The OMB would review the list and consult with the head of each agency. Once the review was complete, the OMB would provied the list to Congress, and it would be made available to the public. When the executive agency considered contracting with a private-sector source for the function on the list, it was recommended by the OMB to use a competitive process to select the source and ensure that all costs were realistic and fair. The *FAIR Act* was subsequently included in the 1999 edition of *OMB Circular A-76* (US Congress, 1998).

In 1995, the DoD (specifically, the Navy) "made the [strategic sourcing] process a priority so as to reduce operating costs and free funds for other priorities" (GAO, 2000). Although the Navy's effort focused on research, development, and testing (RD&T), it was important across the spectrum because it was the DoD's first look at strategic sourcing. In 1995, motivated by the Navy's policy needs in connection with the 1995 round of Base Realignment and Closure (BRAC) and its longer-term need to make the best use of its resources, a study was performed by RAND's National Defense Research Institute, a federally funded research and development center supported by the Office of the Secretary of Defense (OSD), the Joint Staff, and the defense agencies. The study's recommendation had three parts: focus on developing funding priorities, discuss alternative procurement arrangements that were seeing increasing use in the private sector and that had been used in various parts of the government, and combine the first two parts. In addition, it suggested a way to help determine which parts of the Naval RD&T infrastructure were best suited for alternative procurement arrangements and a possible way to determine which facilities might be involved (Saunders et al., 1995).

But as of 2000, the Navy was the only Service with a definite plan to use the strategic sourcing program to achieve the goals of the *A-76* program. The US Government Accountability Office (GAO) visited Naval Sea Systems Command's weapons station at Crane, Indiana, where they had begun a strategic sourcing

program in fiscal year 1998. This program served as the strategic sourcing pilot for the Naval Sea Systems Command and anticipated a savings of $158 million by fiscal year 2005. At the time of the GAO report on competitive sourcing, both the Army and Air Force "had stated their intentions to consider the use of strategic sourcing to obtain the savings goals established for A-76 efforts" (GAO, 2000). However, Marine Corps officials stated that they had not made any commitments to a strategic sourcing effort at that time. They further explained that within the "latest business plan, the Marine Corps is placing a strong emphasis on A-76 as the primary tool for efficiencies in commercial functions" (GAO, 2000).

It was not until 1999 that the "DoD [officially] began to augment its A-76 program with what it term[ed] strategic sourcing" (GAO, 2001). The Honorable Joel Hefley also stated, "In 1999, the Department recognized that the anticipated savings could not be achieved from the A–76 process alone, so the Department turned to something called 'strategic sourcing' as a means to make up the shortfall" (House of Representatives, 2002). A memorandum from the Under Secretary of Defense (Acquisition and Technology) in April 2000, titled *DoD Strategic and Competitive Sourcing Programs Interim Guidance*, stated that strategic sourcing "provides a broader approach than the traditional OMB Circular A-76 process" and "should not be interpreted as avoidance or replacement of A-76" (Secretary of Defense (A&T), 2000). The DoD also stated that the Strategic Sourcing Program was consistent with the reinvention process described in the *OMB Circular A-76 Revised Supplemental Handbook*:

> The reinvention of government begins by focusing on core mission competencies and service requirements. Thus, the reinvention process must consider a wide range of options, including: the consolidation, restructuring or reengineering of activities, privatization options, make or buy decisions, the adoption of better business management practices, the development of joint ventures with the private sector, asset sales, the possible devolution of activities to state and local governments and the termination of obsolete services or programs. In the context of this larger reinvention effort the scope of this Supplemental Handbook is limited to the conversion of recurring

commercial activities to or from in-house, contract or ISSA [Inter-Service Support Agreement] performance. (OMB, 1996, p. 3)

In addition, the DoD stated that "the key step in the Strategic Sourcing Program is to define properly the whole function, activity, or organization in order to optimize or improve the level of performance or service at a reduced cost" and that the "process is continual […] and can result in various outcomes depending on how functions or organizations are defined" (Secretary of Defense (A&T), 2000). The interim guidance also lists the criteria to be met in order to use the Strategic Sourcing Program, including management requirements, accounting requirements, cost savings, focus on the *A-76* process, and compliance with statutory regulations. The flow chart in Figure 1 details the Strategic Sourcing Program.

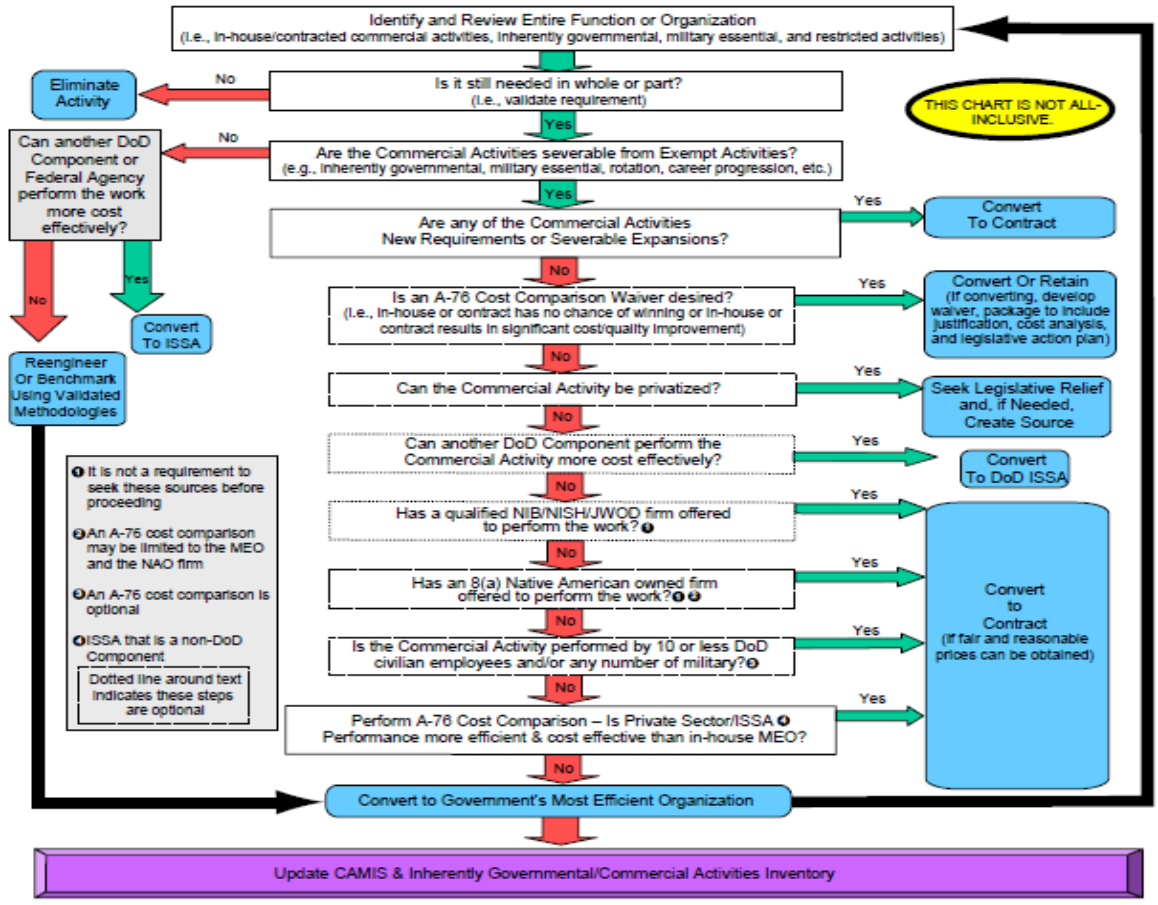

Figure 1. Strategic Sourcing Program Decision Tree
(Secretary of Defense (A&T), 2000)

In June 2001, the Commercial Activities Panel detailed various issues with the *A-76* process that developed in fiscal year 2000. Government workers' concern over job stability, industry representatives' complaints about unfairness in the process, and governmental concerns about oversight of future performance had led Congress to enact section 832 of the *National Defense Authorization Act for Fiscal Year 2001*. The legislation required the comptroller general to convene a Commercial Activities Panel to study the policies and procedures governing the transfer of commercial activities for the federal government from government to contractor personnel. The panel found that the most serious shortcoming of the *A-76* process was that it had "not worked well as the basis for competitions that seek to identify the best provider in terms of quality, innovation, flexibility, and reliability" (GAO, 2002, June). Additionally, it stated that "while cost is always a factor, and often the most important factor, it is not the only factor that may need to be considered" and concluded that the *A-76* process "may no longer be as effective a tool" (GAO, 2002, June). In its summary, however, one of the key points that the panel raised was that "sourcing decisions require a strategic approach" (GAO, 2002, June).

In a 2003 report regarding contract management and the acquisition of services, the GAO made the recommendation that the "Secretary of Defense should direct the Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L) to work with the military departments and the defense agencies to further strengthen the management structure" (2003, September, p. 18). Subsequently, Congress required this structure to be established in response to section 801 of the *National Defense Authorization Act for Fiscal Year 2002* and stated that it

> should promote the use of best commercial practices such as centralizing key functions, conducting spend analyses, expanding the use of cross-functional commodity teams, achieving strategic orientation, achieving savings by reducing purchasing costs and other efficiencies, and improving service contracts' performance and outcomes. (GAO, 2003, September, p. 18)

In response, the USD (AT&L) launched the DoD-wide Strategic Sourcing (DWSS) Program to pilot the use of best commercial practices. The program included two pilots: the Spend Analysis Technical Solution and the Spend Analysis Operational Solution. The Spend Analysis Technical Solution built an information technology system that would pull data from disparate databases for analysis by DoD buying teams. The Spend Analysis Operational Solution tested the use of cross-functional teams to coordinate and manage support service procurements in the same way as commercial best practices identified by the GAO. The spend analysis initially focused on analyzing the Administrative Services commodity and was to define how, from an operational perspective, a commodity group would be analyzed for identifying strategic sourcing opportunities. In January 2005, after completing the DWSS pilot, the DoD approved a concept of operations for the full implementation of the DWSS program, which, according to the DoD, “further strengthens the department's management structure for the acquisition of services” (GAO, 2003, September 10). Under the new plan, the DoD planned to further strengthen the management structure for acquiring key services and products by creating "Strategic Sourcing Coordinating Groups" within each military department and within other defense agencies running commodity teams, who are responsible for a specific portfolio of commodities (GAO, 2003, September). However, because the DoD lacked the plan to coordinate across agencies in regard to services acquisitions, Air Force, Army, and Navy headquarters developed initiatives to better manage services acquisitions (US Congress, 2001).

In October 2002, the Army Contracting Agency was established to centralize installation-support contracting. The agency was also responsible for Army-wide purchases of general information technology and electronic-commerce purchases. The agency assigns regional responsibility for managing services acquisitions and also includes a council to oversee strategic approaches to installation-support services (GAO, 2003, September).

Also in 2002, the Navy conducted an independent spend analysis of purchasing data and estimated that approximately $115 million could be saved by taking a more strategic approach to $1.5 billion in services acquisitions. Earlier that year, to initiate a pilot test for consolidated services acquisition, the Secretary of the Navy approved a new position for a Director of Program Analysis and Business Transformation within the Office of the Deputy Assistant Secretary for Acquisition Management (GAO, 2003, September).

In 2003, the GAO reported that the Air Force Deputy Assistant Secretary for Contracting called for rethinking business processes, noting that the Air Force spent over half of its discretionary dollars on services, yet most of the Air Force's attention went to managing goods. In July 2003, in the first such effort to take advantage of its overall buying power, the Air Force formed a commodity council that was responsible for developing department-wide strategies for buying and managing information-technology products. The Air Force also noted that it was considering a future commodity council for construction services (GAO, 2003, September).

Additionally, in April 2003, the Secretary of the Navy issued rough guidance to the Navy and Marine Corps, including the *Strategic Sourcing Program Guidance*. Those principles included divesting of functions that are not critical, retaining the skills necessary to support the core competency of the Navy and Marine Corps, establishing a system for accounting and tracking these efforts, conducting *A-76* studies on a minimum of 20% to 30% of billets studied, sharing and implementing best business practices, and leveraging the market place advantages inherent in a broader grouping of functions (Secretary of the Navy, 2003). The flow chart in Figure 2 is currently used by the Navy to determine if an activity should be competitively sourced (Secretary of the Navy, 2005).

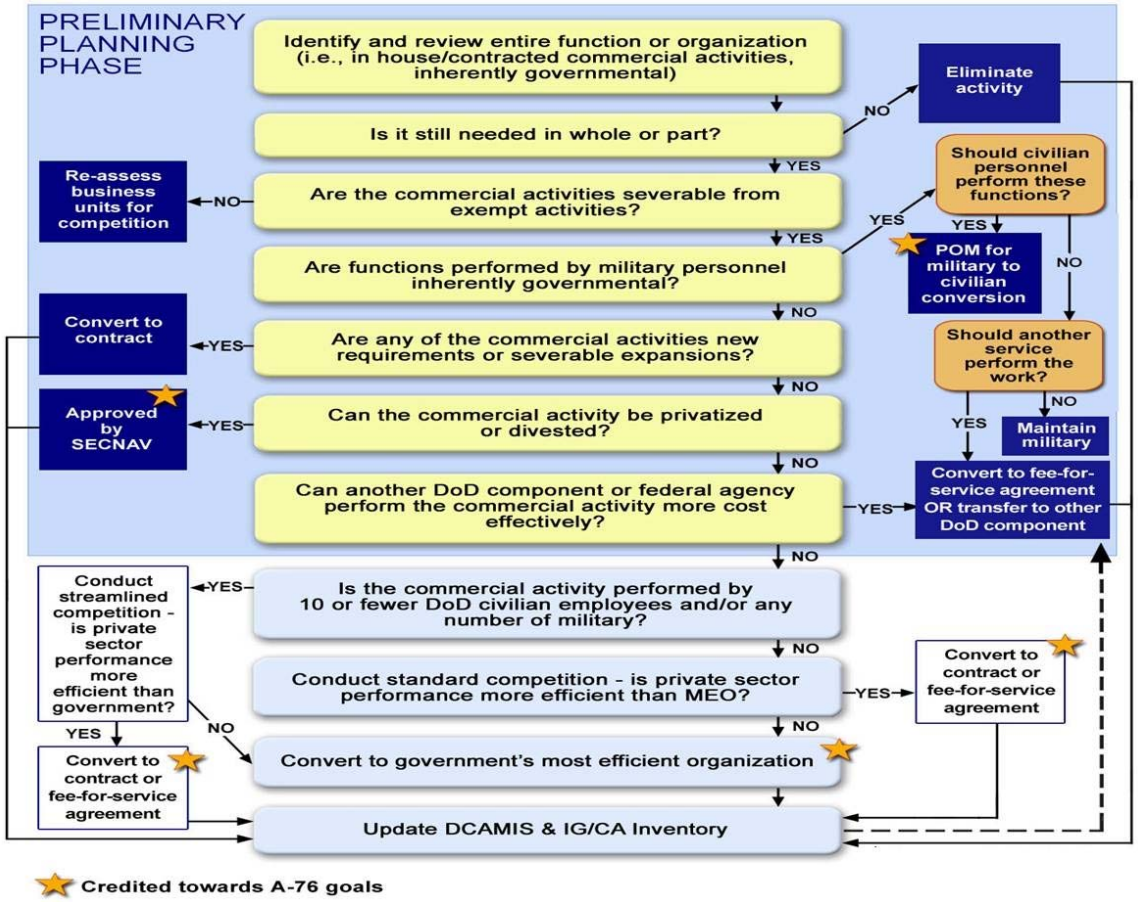

Figure 2. Strategic Sourcing Process Chart
(Secretary of the Navy, 2003)

The OMB published a memorandum in May 2005 that was directed to the Chief Acquisition Officer (CAO), Chief Financial Officer (CFO), and Chief Information Officers (CIOs) of all federal agencies and that cited the increasing annual cost of goods and services; the memorandum identified "not fewer than three commodities that could be purchased more effectively and efficiently through the application of strategic sourcing" (p. 1). It also expressed the goal that unlike *A-76*, which is merely cost based, strategic sourcing helps "optimize performance, minimize price, increase achievement of socioeconomic acquisition goals, evaluate total lifecycle management costs, improve vendor access to business opportunities, and otherwise increase the value of each dollar spent" (p. 1). These goals fell well outside of the

bounds of *A-76* and applied more closely to the Commercial Activities Panel's findings (OMB, 2005).

F. Challenges to Transformation

The Department of Defense (DoD) faces several challenges in its attempt to implement strategic sourcing initiatives. Some of these challenges can be resolved by looking to industry's innovative solutions to similar challenges. Others are said to be specific to the DoD. Each of these challenges is discussed below.

1. Public Policy Concerns

The DoD's procurement process is subject to many public laws and statutes, some of which pertain to the implementation of certain public policy objectives. Some of these public policies include providing opportunities to small and disadvantaged businesses and allowing for maximum competition in order to achieve the best possible value for the government (Rendon, 2005). Advocates of small business are concerned (Searle, 2006) about the impact of strategic sourcing on their ability to compete. They argue that a DoD transformation to strategic sourcing would hinder competition and the opportunities that are currently available to both small and disadvantaged businesses (Rendon, 2005).

Small businesses are concerned because they make tremendous contributions to private industry. Table 1 highlights statistics provided by the Small Business Administration (SBA) and illustrates the value of small-business contributions to the US economy. Clearly, small businesses play an important role in the US economy, which poses a significant challenge to transforming the DoD procurement policy to a strategic one.

Table 1. Statistics from the Small Business Administration
(SBA, 2009, September)

Small Business Contributions in the US
• Employ more than 50% of all private-sector employees
• Generated 64% of all new jobs in the last 15 years
• Employ more than 40% of high-tech workers
• Make up 90% of all exporters in the US
• Produce 13 times more patents than large firms

Other public offices are not so supportive of the small-business approach to procurement (Rendon, 2005). As an example, the state procurement office in Pennsylvania strategically sourced office supplies in 2004. This move reduced the state's supplier base from more than 1,800 to just 1 for all state agencies. In addition, the state reduced its number of state-run warehouses from 14 to 4, resulting in a savings of more than $4.5 million (Patton, 2006). State officials indicated that they conducted internal discussions regarding the economic impact of reducing the number of suppliers. However, they decided that their responsibility was to the taxpayer, not to subsidizing businesses through procurement (Patton, 2006). Although this may be an extreme example, the state of Pennsylvania may have provided, at a minimum, a wake-up call for government in general, reminding us that not only do we have a responsibility to the warfighter, but also to the taxpayer.

A recent GAO report suggests that this challenge is not specific to the DoD. Industry has overcome similar challenges during their own transformation to a more strategic approach to procurement (GAO, 2003, June). By conducting spend analysis, the GAO suggested that companies in industry are able to track and generate reports that identify spending with small and disadvantaged business (GAO, 2003, June). Of course, this depends upon a company's ability to collect accurate data so that this type of information can be extracted, another challenge that the DoD faces that we will discuss later. Spend analysis has provided these companies with data that has allowed them to balance goals for corporate savings

with small business–utilization goals (GAO, 2004). Although DoD small-business concerns are more policies than goals like those in private industry, perhaps the DoD can take an approach similar to those adopted by industry that would balance savings goals and social responsibilities.

2. Access to Accurate Spend Data

Another challenge preventing the DoD from implementing a change to strategic sourcing is its inability to access data required for spend analysis (Rendon, 2005). This is a tremendous roadblock to transformation because a detailed spend analysis is necessary in order to identify areas in which money can be saved by implementing a sourcing strategy. There are several reasons for this lack of accessibility.

The GAO has reported that the data systems used by the federal government are wrought with weaknesses (GAO, 2009). In particular, the Federal Procurement Data System–Next Generation (FPDS–NG)—which was developed to collect and provide information regarding actions and trends in government contracts and to track socioeconomic goals—contains data that is not accurate or is not entered correctly. Data may also not be entered at all (Rendon, 2005). In addition, each agency within the DoD is performing its own purchasing to support its own specific needs. Although in some cases these agencies are purchasing the same items, there is little to no coordination among procurement offices (Rendon, 2005).

Commercial businesses have experienced similar challenges to their own efforts to conduct spend analysis. Many companies have found it difficult to collect spend data because different parts of the company were purchasing the same supplies or services but were not necessarily sharing purchasing data (GAO, 2004). In addition, companies experienced similar issues with inaccurate, incomplete, or non-existent data. In other words, this is not a challenge that is unique to the DoD. Although the DoD is a much larger organization than many of the companies that have successfully implemented a spend analysis program and a strategic sourcing

plan, it is still possible to take advantage of industry success by tailoring and implementing private-sector practices within the DoD. This is particularly true in the area of efficient procurement (GAO, 2004).

Companies that have ultimately adopted strategic purchasing systems overcame the data challenge and went on to develop automation information systems that compile and store spend data to support a formal spend-analysis program (GAO, 2004). The GAO identified five key processes for spend analysis: automation, extraction, supplemental information, organization, and analysis and strategic goals (GAO, 2004). These processes can be seen in Table 2.

Table 2. Key Spend Analysis Processes
(GAO, 2004)

	Spend Analysis: Key Processes
1	**Automation:** Data automatically compiled.
2	**Extraction:** Essential data culled from accounts payable and other internal systems.
3	**Supplemental information:** Additional data sought from other internal and external sources.
4	**Organization:** Data reviewed to ensure accuracy and completeness; data organized into logical comprehensive commodity and supplier categories.
5	**Analysis and strategic goals:** Using standard reporting and analytical tools, data analyzed on a continual basis to support decisions on strategic sourcing and procurement management in areas such as cost-cutting, streamlining operations, and reducing the number of suppliers; scope generally covers an organization's entire spending.

The DoD is aware that accurate data is critical to transforming its procurement process through spend analysis. In 2004, it initiated the Spend Analysis Pilot Program. Although this 90-day pilot was very limited in scope, it was a step in the right direction. The goal of the pilot was to combine several separate

databases into a single database that could be accessed by DoD commodity teams conducting spend analysis. The DoD expected that these teams would be able to use the data provided by the database to spot trends in purchasing that would create opportunities for the use of strategic sourcing (GAO, 2004).

Much like companies within industry, the DoD has realized the need for a transformation in the way that it does business. However, there are challenges. Despite roadblocks, companies within the private sector have transformed their business processes into more modern ones through automation, setting goals for savings, and using metrics to measure progress towards achieving those goals (GAO, 2003, September). The DoD will undoubtedly experience similar challenges, albeit on a much larger scale due to its sheer size. However, industry can serve as a model for the DoD to implement its own transformation. For example, the GAO identified several broad principles that were critical to industry success. Despite the different methods employed to achieve success among the companies that the GAO studied, the same basic practices were common among them (GAO, 2003, September). Table 3 describes each of those common principles.

Table 3. Broad Principles and Practices of Strategic Sourcing at Leading Companies
(GAO, 2003, September)

Commitment…*Secure up front commitment from top leaders*

- Recognize and communicate the urgency to change service spending practices
- Provide clear and strong executive leadership, including goals and targets

Knowledge…*Obtain improved knowledge on service spending*

- Develop information system to identify how much is being spent with which service provider for what services
- Analyze the data to identify opportunities to reduce costs, improve service levels, and provide better management of service providers

Change…*Create supporting structure, processes, and roles*

- Create or identify organizations responsible for coordinating or managing service purchases
- Establish proactive business relationships between end users, purchasing units, and other stakeholders
- Implement more integrated team-based sourcing processes
- Create commodity/service experts

Support…*Enable success through sustained leadership, communication, and metrics*

- Obtain sustaining support from senior leadership to facilitate change
- Establish clear lines of communication between all affected parties
- Demonstrate value and credibility of new processes through the use of metrics

G. Evolution in the DoD's Sourcing Strategy

Since 2004 when it implemented its Spend Analysis Pilot Program, the DoD has continued to commit itself to a change in the way that it does business. In 2009, the DoD completed its first department-wide spend analysis for equipment and supplies (DoD, 2009). This spend analysis, along with a strategic plan developed by the DoD, has paved the way for a strategic sourcing strategy for service contracts.

The DoD seems to be following the four broad principles of strategic sourcing that the GAO identified as common among companies within industry, listed in Table 3. Each of these basic practices has proven to be critical to the success of a transformation to a more strategic approach to procurement and has led to significant savings, as well as improvements in the services that these companies are receiving (GAO, 2003, September).

1. Commitment

The DoD's commitment to a transformation really began with the 2002 *Defense Authorization Act*. This act, also known as Public Law 107-107, laid out a requirement for the DoD to establish a new management structure for the procurement of services. In addition, the act called for a data collection system that would provide management information for services purchased within the DoD (US Congress, 2001). This congressional commitment to change has resulted in the establishment of the Strategic Sourcing Directors Board (SSDB). The SSDB is responsible for providing the direction, goals, and guidance for the implementation of the DoD's strategic sourcing vision (DoD, 2009).

The DoD's commitment is further evidenced by the establishment of the Defense Procurement and Acquisition Policy, Office of Strategic Sourcing (DPAP/SS). In 2008, this office established a charter that identified board members and outlined the roles and responsibilities of those members (DoD, 2009). Members of the board include representatives from all of the military departments and other defense agencies. In addition, the board includes advisors from such agencies as the Office of Small Business and the Defense Acquisition University (DoD, 2009). This board further emphasizes the DoD's commitment to a transformation to a more strategic approach to procurement for both goods and services.

2. Knowledge

The DPAP/SS is tasked with conducting annual spend analyses on the procurement of supplies and services throughout the DoD in order to provide accurate data in support of strategic sourcing efforts. It is anticipated that these analyses will result in procurement trends. This will help the DoD identify goods and services that could be procured using strategic sourcing. In addition, the reports generated from these analyses have the potential to show whether a sourcing decision was the right one (DoD, 2009).

The knowledge gained from the spend analysis that was conducted by the DPAP/SS allowed them to identify eight broad categories of services that would benefit from strategic sourcing decisions and to organize them using a portfolio approach (DoD, 2009). In 2008, the DPAP/SS abandoned their portfolio approach and implemented goals and objectives through the *Strategic Plan for the Strategic Sourcing of Services*. This strategic plan was intended to transform the DoD's procurement culture to one that uses strategic approaches for acquiring goods and services (DoD, 2009). The DoD conducted a spend analysis to gain knowledge of what was being purchased by agencies within the DoD, as well as to gain knowledge of how much was being spent; doing so was critical to achieving the DoD's transformation goals.

3. Change and Support

For the DoD, the commitment has been made and knowledge has been gained through a comprehensive spend analysis. What is required now is to create an environment throughout the DoD that will foster a change in the procurement culture. The DoD will need to continue to support its agencies through the change. Undoubtedly, there will be some resistance to such a radical transformation. However, through support, communication, and training, the DoD can achieve compliance with its new objectives (GAO, 2003, June).

In industry, companies faced similar challenges in achieving buy-in from their employees. To foster this change, companies restructured their organizations and gave their procurement organizations more responsibility and authority. In addition, they set realistic goals and used metrics with which those goals could be measured (GAO, 2003, June).

A change in the way the DoD does business may require a change in core competencies that are needed to successfully implement those changes. The DoD-wide Strategic Sourcing Program has a primary objective to improve the skills of the DoD workforce by using processes and resources similar to those used in industry

(Rendon, 2005). Decreases in staffing, greater workloads on DoD employees as a result of the War on Terror, and this shift to a more strategic approach to procurement will force the DoD to identify the skills required of its acquisition workforce that will allow the DoD to meet the challenges associated with such a transformation (GAO, 2003, June).

Once the DoD has identified the core competencies required of its procurement force, it can begin to provide training to that force. This training, combined with the assistance from leadership in overcoming obstacles to success, as well as the establishment and communication of goals and metrics, will result in buy-in of the new strategic policy throughout the DoD (GAO, 2002, June).

H. Potential Savings of Strategic Sourcing In DoD

At the agency level, the DoD has already experienced some success with strategic sourcing. Several examples will illustrate the positive effects of a strategic effort for the purchase of goods and services within the DoD.

1. Department of the Air Force

One of the first uses of a strategic approach to procurement occurred in 2003 (Rendon, 2005). The Air Force was able to leverage its purchase of computer products, including both desktops and laptops, with standard features. In order to achieve this, the Air Force's Information Technology Commodity Council (ITCC), which is tasked with the development of procurement strategies for the purchase of IT products and services, collected input from Air Force's major commands. The result was an agreement on three different configurations for one desktop and two notebook computers, of which the Air Force planned to purchase 10,000 (Temin, 2003). In a contract awarded to Dell in August 2003, the Air Force was able to leverage its purchase by only contracting for the commonly configured machines. The savings that resulted from this strategy allowed the ITCC to purchase 2,500 more computers than they had originally planned, representing all unfunded requirements (Rendon, 2005).

More recently, the Air Force's Landing Gear Commodity Council (LGCC) was formed in an effort to reduce administrative lead-time for receipt of parts, costs, and the number of long-term sole source contracts for landing gear parts (Koenig, 2004). In 2007, the Air Force awarded a multiple-award, Indefinite Delivery, Indefinite Quantity (IDIQ) contract as a small business set-aside. Award of this contract, combined with the spend analysis that preceded it, permitted the LGCC to exceed its administrative lead-time goal of 90 days for these parts. The lead-time achieved in 2008 was 69 days. In addition, the LGCC reduced the number of contracts it held for these parts by 61% between 2007 and 2008 (DoD, 2009). The Air Force anticipates an annual cost reduction of more than $8 million through the use of strategic sourcing by the LGCC (DoD, 2009).

2. Defense Logistics Agency

The Defense Logistics Agency (DLA) has set the bar high in achieving savings through the use of strategic sourcing for the procurement of both goods and services. The Strategic Material Sourcing (SMS) Program has been their most successful effort. Under SMS, the DLA conducted a spend analysis on more than three million hardware items (Koenig, 2004). Through this spend-analysis process, the DLA identified those items that were most critical to its customers (DoD, 2009). The DLA narrowed their focus to 320,000 items that were critical to the DoD, and although these items represented only 12% of all hardware items procured by the DLA, they represented more than 88% of all DLA procurement actions (DLA, 2010). Of those, 156,000 items are currently being purchased via long-term contracts. As a result of this analysis, production lead-time for those items has decreased by 63% compared to noncritical hardware items, and material availability has increased by (10% (DoD, 2009).

The DLA is currently involved in an analysis of how it procures support services in an attempt to identify opportunities to strategically source for those services. The DLA Contracting Services Office (DSCO) hopes that this will allow the

DLA to leverage its buying power by combining requirements for similar services at various agency locations (DoD, 2009).

3. Department of the Navy

The Department of the Navy has also experienced some success with strategic approaches to procurement. Most notably, the Navy has implemented its SeaPort-e program. The purpose of this program is to provide a means for contracting support services, such as financial, program management, and engineering services (DoD, 2009). Currently, Seaport-e boasts more than 1,800 IDIQ contracts, each with multiple awardees (Branch, 2010). In addition, 85% of these contracts have been awarded to small businesses. This effort has resulted in savings of more than 7% in the procurement of services to support the Navy (DoD, 2009).

These examples illustrate that a strategic sourcing approach is possible within the DoD. Through spend analysis, agencies within the DoD have been able to leverage purchases by buying common goods or services in bulk, allowing them to realize significant savings. In several cases, this savings was not realized at the expense of small business. In fact, small business played a significant role in both the Air Force LGCC procurement and the DLA SMS program. It is conceivable, then, that strategic sourcing of goods and services on a DoD-wide scale could be accomplished through a thorough spend-analysis program.

I. Strategic Sourcing Training and Education

Despite the fact that strategic sourcing has become an accepted policy, academic institutions are slow to adjust their curriculums to properly educate the acquisition workforce. The Naval Postgraduate School, for example, offers two curricula containing three courses that are specifically focused on strategic sourcing. One of them is a distance learning opportunity offered to military service members and DoD civilians. The other is a residence program only offered to Air Force students. However, Navy students are only offered the first course in the series, and

Army students do not take any of the strategic sourcing courses. In addition, the Defense Acquisition University (DAU) only offers one 4.5-hour continuous-learning module, titled *Strategic Sourcing Overview*, but does not offer an overall curriculum in Strategic Sourcing. In order to implement strategic sourcing approaches to procurement, it is necessary for these institutions to train acquisition professionals by modifying their curricula to include the relevant education.

J. Summary

Strategic sourcing, as we know it today, is a borrowed idea that originated with the Japanese. Accordingly, the United States has adopted these ideas and made limitless attempts to make them even better. With federal strategic sourcing, however, the Department of Defense has arguably taken too long to climb onboard this cost-saving initiative. Strategic sourcing was created by the Japanese to adapt to an expanding economy with an intensifying business sector. Many US companies implemented these practices with success; however, the US government has failed to put this into practice in a timely fashion due to the barriers of bureaucracy.

As the acquisition of services has evolved through the years, the federal government has taken steps to ensure that taxpayer dollars are spent wisely. From the implementation of the *A-76* program to the development of strategic sourcing initiatives, regulations and policies have been changed by policy-makers, but not always for the better. With strategic sourcing, the ability to employ industry best practices has become critical, and the federal government has started to include them into common operating practice.

There are many barriers to the DoD's transformation of its procurement process to a more strategic one. Challenges include the DoD's inability to access accurate spend data and socioeconomic responsibilities that are governed by public law, such as the requirements for the use of small businesses. This report has shown that both companies in industry and agencies within the DoD itself have

overcome these challenges through the use of an extensive spend-analysis program.

The GAO identified five key processes to effective spend analysis in industry: automation, extraction, supplemental information, organization, and analysis and strategic goals. In addition, the GAO identified broad principles used by leading companies to implement a strategic approach to the procurement of goods and services. Those principles include commitment, knowledge, change, and support (DoD, 2009). The DoD seems to be adapting these principles to its own transformation. First, it is establishing policy and securing commitment from top leaders. Second, the DoD has conducted spend analysis, at both the department and agency levels, in an attempt to identify opportunities to implement strategic sourcing initiatives. Certainly, there will be resistance to this transformation; however, the DoD is on the right track to thwart resistance by identifying organizations to manage strategic purchase in the form of commodity teams and by establishing relationships between stakeholders. In addition, the DoD has established goals and metrics with which to track progress towards those goals (GAO, 2004).

Finally, there are many examples within the DoD of successful strategic efforts. Some of these even proved that barriers, such as socioeconomic concerns, can be overcome through the use of a detailed spend analysis. In those cases, competition was not compromised, and small businesses were a major part of the resulting contracts. These agencies continue to develop innovative ways to procure goods and services and experience tremendous cost savings, while still meeting the requirements of the public laws and statutes that often hinder government procurement.

This chapter presented a literature review in which the origin of strategic sourcing was examined. We provided a foundation of strategic sourcing principles and how they apply to the acquisition of services in the Department of Defense and specifically to the Navy. The following chapter will describe NAVFAC's organization,

its overall strategy, and its contracting method. Because the data used in this study is provided by NAVFAC, it is important that the reader be familiar with the organization as a whole.

III. Naval Facilities Engineering Command

A. Introduction

Since the data used in this study was provided by NAVFAC, it is important that the reader have a fundamental understanding of the NAVFAC organization and how it operates its respective regions. This chapter will provide an in-depth description of NAVFAC's organization, its overall strategy, and its contracting method.

Naval Facilities Engineering Command (NAVFAC) Headquarters is located at the Navy Yard in Washington, DC. Nearly 450 personnel are assigned to NAVFAC Headquarters, including a mixture of active and reserve officers, active and reserve enlisted military, and civilians. NAVFAC Headquarters is an Echelon II command led by a Rear Admiral who reports operationally to the Chief of Naval Operations (CNO) and administratively to both the CNO and the Secretary of the Navy for Real Estate and Contracts Authority.

B. Organization

It would be utterly impossible for the mission of NAVFAC to be executed solely by the personnel at its headquarters; therefore, many subordinate field components have been established and are under the command of NAVFAC Headquarters. These are composed of both Echelon III and IV commands, with both general and specialty functions. NAVFAC's Echelon III commands consist of NAVFAC Atlantic and NAVFAC Pacific, and the specialty centers of Naval Facilities Engineering Service Center, Naval Facilities Expeditionary Logistics Center, and the Navy Crane Center. In addition, there are numerous Echelon IV commands under the control of NAVFAC Atlantic and Pacific. NAVFAC Atlantic oversees NAVFAC Mid-Atlantic, Washington, Midwest, Southwest, Southeast, Northwest, Europe, and Southwest Asia. NAVFAC Pacific manages NAVFAC Hawaii, Marianas, and Far East (see Figure 3).

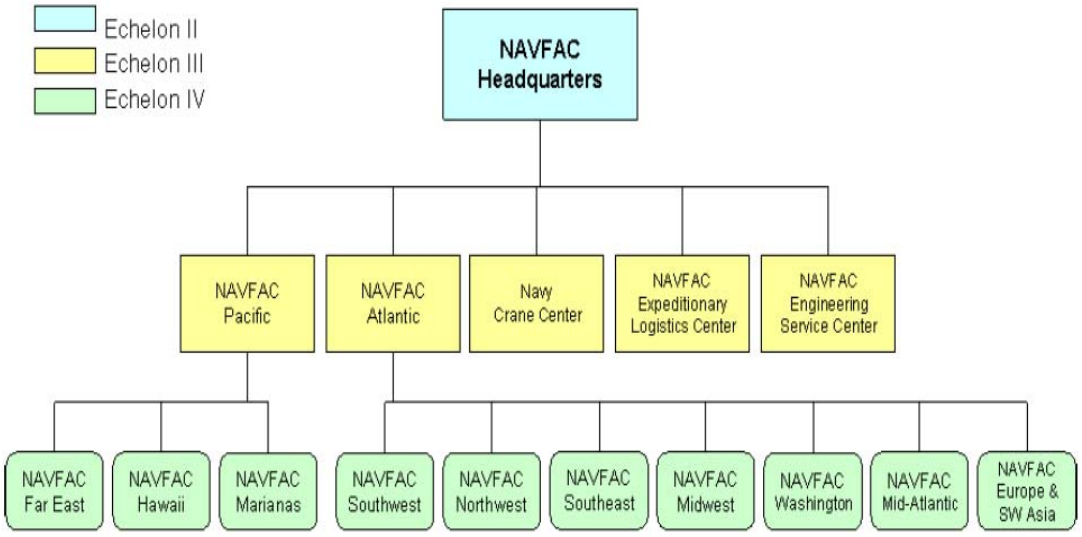

Figure 3. NAVFAC Organizational Chart
(NAVFAC, 2008)

C. History

The original organization was established in 1842 and was known as the Bureau of Yards and Docks (BuDocks). At this time, BuDocks was responsible for virtually all buildings and equipment, boats, police, and contracts that were associated with any of the seven Navy yards scattered along the east coast of the United States (NAVFAC, 2008). Numerous Navy yards were added throughout the 19th and 20th centuries, with preparations for the Civil War and World Wars I and II. This increase in funding allowed the Navy to expand and build additional yards not only in various strategic locations throughout the east and west coasts of the United States, but also all throughout Europe and Southeast Asia.

By 1911, BuDocks was to assume even more responsibility. Congress enacted a law stating that BuDocks would be responsible for both the design and construction of all Navy public works. This was followed by Navy regulations in 1913 that declared, "The duties of the Bureau of Yards and Docks shall comprise the design and construction of the public works and public utilities of the Navy and their

repair, upkeep, and operation" (NAVFAC, 2008). Moreover, during this same time period, BuDocks made a significant change to the way it managed its projects. The role of project managers was created, and because of this, each project within BuDocks was assigned a project manager who would supervise his or her respective projects from cradle to grave.

BuDocks made its first significant organizational restructuring in the early 1940s. This new organizational plan was created by one of the most illustrious Civil Engineering Officers (CEC), Rear Admiral Ben Moreell. His new plan would partition BuDocks into five main sectors: "Planning and Design, Construction, Administration and Personnel, Progress Control and Statistical, and Finance and Operating" (NAVFAC, 2008). Another important change that he implemented affected how the designs for public works construction projects were created and who would create them. As stated earlier, all designs were to be created by BuDocks for these sorts of projects; however, the preparation required to enter World War II created more requirements of BuDocks. These necessities stretched the bureau's engineers too thin, and, as a result, contracts were written to have civilian architectural engineers build the designs for these construction projects. This change paved the way for BuDocks to write contracts for private engineering companies to both design and build a majority of the required public works construction projects.

BuDocks grew even larger following the attack by Japan on our naval base in Pearl Harbor. Funding for BuDocks skyrocketed, and shore facility construction increased worldwide as a result. Moreover, construction projects were required inside combat zones, but the majority of civilian contractors were unwilling to perform in this environment. In response to this shortfall in the combat zones, BuDocks created an organization called the Seabees. The creation of the Seabees in 1942 required BuDocks to actively recruit 325,000 personnel, most of whom were employees of companies the government had previously contracted with. This growth continued throughout World War II, the Korean War, and the Vietnam War.

As the Vietnam War drew to a close, funding was decreased for shore installation construction and upkeep. In addition, there were other major organizational realignments within the Department of the Navy (DoN). As a result of this restructuring, the DoN made the decision to give BuDocks a new name. BuDocks was now identified as NAVFAC and reported directly to the Commander of Naval Material Command (NMC), until NMC was later decommissioned during Ronald Reagan's presidency. After this point, "NAVFAC began reporting directly to the Chief of Naval Operations" (NAVFAC, 2008).

Navy Installations Command (CNI) was introduced and established in 2003. The formation of CNI resulted in a fundamental transformation in the role NAVFAC would play in all future shore installation command construction and maintenance. Immediately following CNI's founding, it was charged with "providing a unified program, policy, and funding management for all naval shore installations" (NAVFAC, 2008). In addition, according to NAVFAC's *Command Annual Operations Report*, it would now be responsible for assisting CNI in all areas of NAVFAC's expertise. NAVFAC supported CNI by managing the planning, design, acquisition, and construction of facilities for US Navy activities throughout the world. NAVFAC also provided CNI with technical expertise and services related to real estate, utilities, facilities maintenance, shore-based environmental programs, and technical and program support for the Navy Seabees.

Finally, in 2004 another organizational restructuring took place. This change focused on consolidation and efficiency, rather than on lines of authority and responsibility. Because of this, NAVFAC was able to champion CNI more effectively and efficiently. As stated in NAVFAC's *Command Annual Operations Report*,

> The most important feature of this transformation was the combining of former engineering field divisions, officer-in-charge of construction organizations, and Public Works Centers (PWC) in to regional Facilities Engineering Commands (FEC) who reported directly to NAVFAC Atlantic or Pacific for their primary duty, and to their respective regional commanders for any additional duties. (NAVFAC, 2008)

This most recent organizational change resulted in a 60% reduction in Echelon III and IV commands. It took two full years for the NAVFAC organization to complete this realignment (see Tables 4 and 5). As written in their command report, NAVFAC's final command disposition is illustrated in Tables 4 and 5.

Table 4. NAVFAC Commands
(NAVFAC, 2008)

Naval Facilities Commands				
Command	Location	Established	Echelon	Consolidated
NAVFAC Atlantic	Norfolk, VA	June 18, 2004	III	N/A
NAVFAC Washington	Washington, District of Columbia	July 23, 2004	IV	- Engineering Field Activity Chesapeake - PWC Washington
NAVFAC Mid-Atlantic	Norfolk, Virginia	July 30, 2004	IV	- PWC Norfolk - Resident Officer in Charge of Construction (ROICC) Hampton Roads
NAVFAC Europe	Naples, Italy	July 8, 2005	IV	- Engineering Field Activity Mediterranean
NAVFAC Midwest	Great Lakes, Illinois	July 8, 2005	IV	- PWC Great Lakes - Engineering Field Activity Midwest
NAVFAC Southwest	San Diego, California	August 2, 2005	IV	- Engineering Field Division Southwest - PWC San Diego
NAVFAC Northwest	Poulsbo, Washington	August 19, 2005	IV	- Engineering Field Activity Northwest
NAVFAC Southeast	Jacksonville, Florida	June 2, 2006	IV	- PWC Jacksonville - Southern Division Naval Facilities Engineering Command
NAVFAC Pacific	Pearl Harbor, Hawaii	June 18, 2004	III	N/A
NAVFAC Far East	Yokosuka, Japan	July 30, 2004	IV	- PWC Yokosuka - Officer-in-Charge of Construction

				Far East
NAVFAC Marianas	Guam	February 25, 2005	IV	- PWC Guam - Officer-in-Charge of Construction Marianas
NAVFAC Hawaii	Pearl Harbor, Hawaii	March 10, 2005	IV	- PWC Hawaii - ROICC Pearl Harbor and Marine Corps Base Hawaii - NAVFAC Pacific's Integrated Product Team, Hawaii

Table 5. NAVFAC Specialty Centers
(NAVFAC, 2008)

Specialty Centers		
Command (Echelon III)	Location	Function
Naval Facilities Engineering Service Center (NAVFAC ESC)	Port Hueneme, California	- Research and development for shore facilities - Energy and environmental issues
Naval Facilities Expeditionary Logistics Center (NAVFAC ELC)	Port Hueneme, California	- Logistical support to Naval Construction Force
Navy Crane Center (NCC)	Norfolk, Virginia	- Manages weight-handling equipment for all naval shore activities - Acquires all cranes for the Navy - Engineering expertise on crane-related issues

D. Current Operations

Today, NAVFAC is operated within the concept of a matrix organization. There are six Business Lines (BL) and four Support Lines (SL) within the NAVFAC organization (see Figure 4) (NAVFAC, 2008). BLs include Expeditionary, Asset Management, Capital Improvements, Public Works, Environmental, and Contingency Engineering, whereas SLs include Financial Management, Command

Information Officer, Counsel, and Acquisition. In this chapter, we will only discuss the Acquisition SL and will not describe any other BL or SL in further detail.

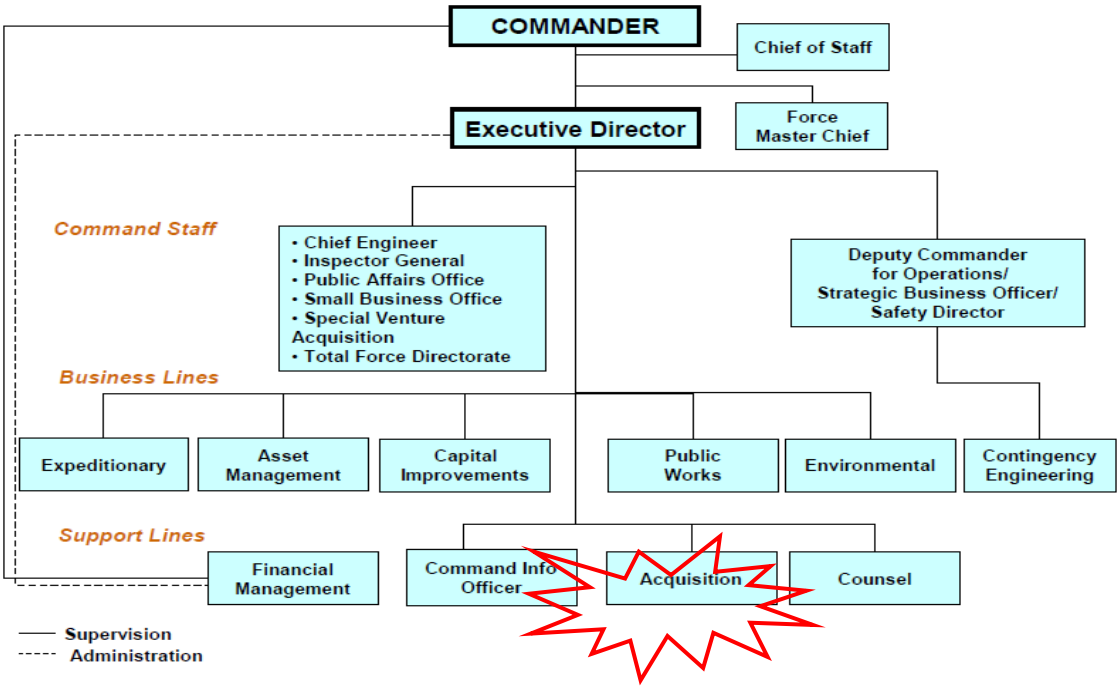

Figure 4. NAVFAC Headquarters Organizational Chart
(NAVFAC, 2008)

NAVFAC Headquarters Acquisition Directorate (ACQ) takes care of all supporting activities and business processes of its Echelon III and IV commands throughout the world. According to its *Operations Report*:

> NAVFAC Acquisition performs a critical role in Military Construction, Environmental Restoration, Base Realignment and Closure, Navy Housing, Contingency Engineering, Seabee Readiness, Base Operations and Support, and Utility Rate Intervention worldwide. During FY 2008, NAVFAC accomplished nearly 40 thousand actions in support of their clients valued at over $9.8 billion. (NAVFAC, 2008)

In fact, there are nearly 1,800 personnel in the NAVFAC acquisition community, to include Active Duty Military, GS1102 (Contract Specialist and Procurement Analyst), GS1105 (Purchasing Agent), GS1106 (Procurement Technician), and GS1130 (Public Utility Specialist) (NAVFAC, 2008). This workforce

is composed of 900 civilians and 853 Active Duty Military, of which 719 and 622, respectively, are certified to their required *Defense Acquisition Workforce Improvement Act (DAWIA)* level (NAVFAC, 2008).

E. NAVFAC Contracts

NAVFAC provides material support for mobile utility support equipment; materials and equipment for defense against chemical, biological, and radiological attacks; railway equipment; construction; subsurface ocean structures; floating cranes; and sealift support systems. In addition, NAVFAC provides technical support to include technical services for economic analysis; support for the Chief of Naval Operations with maintenance and operations programs that directly aide the US Congress; and coordination of site approvals (NAVFAC, 2008). Their contractual requirements also include providing advice and assistance with fire-protection engineering; energy conservation–program formulation; minor construction and repair; numerous services related to the maintenance of shore establishments; operating and maintaining utilities; and various operating services that include grounds, structures, and building maintenance (NAVFAC, 2008).

F. Summary

We provided a necessary in-depth look at the NAVFAC organization, its history, and contracting environment in this chapter. This was necessary in order to enable our readers to have a better fundamental understanding of the NAVFAC operations throughout the world and how it could be possible for these operations to take advantage of what strategic sourcing has to offer. The next chapter provides a description of the model that was developed for the Air Force and how it applies to service-based strategic sourcing. It will also detail the process in which we organized the data provided by NAVFAC.

IV. Service-Based Strategic Sourcing Model

A. Introduction

The research provided by Apte, Rendon, and Salmerón was pivotal to the thesis. The purpose of this chapter is to describe the model that they developed and how it applies to service-based strategic sourcing. This chapter also details the process in which we organized the data provided by NAVFAC in such a way that it could be easily entered to the pricing optimization model (PO).

Apte, Rendon, and Salmerón have recently developed a PO model, which they applied to contract award data provided to them by the United States Air Force. This model was developed to support the Air Force's strategic sourcing initiative (Apte et al., 2009). Their conclusions yielded a significant cost savings through the use of the PO model. We will apply similar contract award data, provided to us by NAVFAC, to this model in support of NAVFAC's own strategic sourcing initiatives.

B. Strategic Purchasing

The Navy realized its recent successes in strategic purchasing by using a method that was developed through the use of a basic contract management process. Apte, Rendon, and Salmerón (2009) identified the same process as critical to the development of the Air Force's model. The process includes six phases (Rendon & Snider, 2008), each of which is discussed below.

Procurement Planning: This phase of contract management involves the critical process of identifying the requirement through the use of Commodity Councils. According to Rendon and Snider (2008), this phase is achieved by defining the requirement, conducting market research, and developing requirements documents such as the Statement of Work (SOW) or the Performance Work Statement (PWS). They determine preliminary cost estimates of the required goods

or services. Contract type should be considered during this phase, along with the potential risks associated with the requirement.

Solicitation Planning: In this phase, documents required to support the solicitation are prepared. Documents completed in this phase include those that detail the program requirements, describe the competition environment, and identify which sources are potentially qualified to satisfy the requirement (Apte et al., 2009).

Solicitation: Solicitation, according to Rendon and Snider (2008), is the process of obtaining proposals from offerors who feel that they can meet the requirement. To accomplish this, the requirement must be advertised and the solicitation must be posted for public access. This advertisement helps to ensure that competition is increased and that industry participation in meeting DoD requirements is broadened (Rendon & Snider, 2008).

Source Selection: This phase first involves the selection of the supplier that best meets the requirements. This is determined through the use of evaluation criteria, which are applied to areas such as cost and the technical and management portions of each offeror's proposal. Second, Rendon and Snider (2008) inform us that negotiating with offerors is an important step during the source selection process. These negotiations are conducted in an attempt to come to an agreement on every aspect of the contract between the government and the offeror.

Contract Administration: This phase includes such activities as monitoring contractor performance, processing payments, and managing any changes that are made to the contract. These activities help to ensure that a contractor is meeting the cost, schedule, and performance requirements of the contract (Apte et al., 2009).

Contract Closeout: This is the final phase of the contract management process. This complicated phase involves not only making the final payment, but also other items such as the acceptance of a final product, disposition of government property, reconciliation of unliquidated damages, and patent-rights reports. The

closeout of a contract is relatively simple, as long as the contract-administration phase was conducted properly. If it was not, then closeout could be hindered by unresolved VE issues, undetermined final indirect-cost rates, unresolved "questionable" costs, or outstanding or unresolved claims.

This basic contract management process sets the foundation for the Navy's strategic sourcing model. Strategic sourcing typically employs a negotiated procurement method, which is usually reserved for source selection approaches that are more complex (Apte et al., 2009). Strategic sourcing also typically uses a trade-off evaluation strategy. In their model, Apte, Rendon, and Salmerón utilize a Performance-price Tradeoff (PPT) strategy. This type of strategy is often used for installation-level services. When it is in the best interest of the government to award, or consider awarding, a contract to an offeror that does not offer the lowest price or is not the highest technically rated offeror, a trade-off strategy may be appropriate (GSA et al., 2005, Part 15.401-1(a)). This type of strategy allows the government to achieve a best-value source selection and, additionally, permits trade-offs to be made "among cost or price and non-cost factors and allows the Government to accept other than the lowest priced proposal" (GSA et al., 2005, Part 15.401-1(c)).

C. Evaluation Criteria

Watt, Kayis, and Willey (2007) identified eight principle categories of non–cost evaluation criteria. They identified these categories through a survey of more than 50 program managers, directors, and general managers, with ranges of experience between 2 and 40 years (Watt et al., 2007). A look at the table indicates that there are many non-cost factors that evaluators should take into consideration. A determination of whether these non-cost factors warrant the government's acceptance of any proposal other than the lowest-priced one would have to be determined on an individual-requirement basis.

Table 6. Principal Evaluation Categories of Criteria
(Watt et al., 2007)

Category	Specific criteria
Organization Experience	Past or Similar Experience, Market Familiarity, Commercial Experience, Understanding of Regulations, Related Experience, Size and Type of Projects Completed, Years in Similar Projects
Workload/Capacity	Current Commitments, Available Manpower, Plant and Equipment Capacity, Current Resource Workload, Equipment Resources, Contractor Capacity, Capacity for Assuming New Projects
Project Management Expertise	Controls Cost, Project Management Ability, Management Competencies, Management Structure, Scope and Risk Control, Project Management Organization and Skills, Project Management Qualifications, Project Management Monitoring and Controls
Past Project Performance	Ability to Deliver, Demonstrated Performance, Track Record, Past Performance, Reliability, Cost Outcomes or Overruns, Past Failures, Performance History, Schedule Performance, Results from Previous Projects
Company Standing (Reputation)	Company Reputation, Organizational Maturity or Stability, References, Responsiveness, Business Ethics, Amount of Past Business, Company Image and Size, Trade Union Record, Litigation Tendency, Reputation
Client–Supplier Relations	Ability to Work as Team, Stakeholder Management, Customer Focus/Relationship, Client/Customer Attitude and Relations, Trust, Commitment to Support, Responsiveness
Technical Expertise	Availability and Experience of Technical Design Experts, Availability of Technical Experts, Key Technical Staff Experience, Experience of Technical Personnel, Technical Competence and Ability
Method/Technical Solution	Compliance with Stated Needs or Requirements, Proposed System Solution, Plant/Equipment Type, Viability of Technical Solution, Technology Base, Proposed Design, Functionality, Lifecycle Requirements, Technological Growth Capability

In their model, Apte, Rendon, and Salmerón (2009) used past-performance information as part of the equation to help determine best value. When using a PPT approach, the offerors' recent and relevant past performance is evaluated. This evaluation is conducted after all of the offerors' technical proposals have been reviewed and determined acceptable and after the price of those proposals has been deemed reasonable. Those acceptable proposals are then ranked based on total evaluated price (Apte et al., 2009). The past-performance evaluation results in the assignment of one of the following performance confidence–assessment ratings (Apte et al., 2009):

1. Substantial Confidence: Based on the offeror's performance record, the government has a high expectation that the offeror will successfully perform the required effort.
2. Satisfactory Confidence: Based on the offeror's performance record, the government has an expectation that the offeror will successfully perform the required effort.
3. Limited Confidence: Based on the offeror's performance record, the government has a low expectation that the offeror will successfully perform the required effort.
4. No Confidence: Based on the offeror's performance record, the government has no expectation that the offeror will be able to successfully perform the required effort.
5. Unknown Confidence: No performance record is identifiable, or the offeror's performance record is so limited that no confidence-assessment rating can be reasonably assigned.

Using the performance-price trade-off approach and the above ratings, if the lowest-priced/technically acceptable offeror also received a past-performance rating of *Substantial Confidence*, that offeror would represent the best value to the government. However, if the lowest-priced/technically acceptable offeror did not acheive a performance rating of *Substantial Confidence*, then the next lowest-priced/technically acceptable offeror with a performance rating of *Substanial Confidence* would be selected for award of the contract (Apte et al., 2009). In addition, as long as the solicitation specifies, the government has the right to award

a contract to the higher-priced offeror if that offeror has a higher confidence rating than the lower-priced offeror. The next section describes the set-covering problem that is the foundation of the PO model, which uses a performance, price trade-off approach.

D. Set-Covering Problem

The set-covering problem (SCP) addresses the use of strategic sourcing for pricing of proposals that are submitted for multiple installations by offerors who meet the technical requirements of a solicitation (Apte et al., 2009).

SCP has many uses. However, it is frequently applied to locations of facilities such as locations of warehouses in a supply chain or the locations of fire stations and hospitals. In addition, the SCP can be applied to the location of schools, libraries (Toregas, Swain, ReVelle & Bergman, 1970), warehouses, and manufacturing plants as described in any supply-chain literature. One such example occurred in 2001 when the Federal Emergency Management Agency (FEMA) identified a requirement for the strategic placement of Disaster Recovery Centers (DRC) in every county in Florida. In response to this requirement, the Aluchua County Emergency Management Division formed a project team, tasked with the identification of the best location(s) for these DRC sites. To determine the ideal locations, the team applied a SCP, and the result was an optimal set of DRCs throughout Alachua County.

In an SCP, a finite set is created and identified as U. In addition, a family of subsets is given and labeled S. The goal of the sub-family of S is that which yields the minimum total cost. This sub-family is identified as a "cover," $C \subset S$, and the union of all of the sets in C is U (Apte et al., 2009). Given that $s \in S$ incurs a fixed cost $c(s)$, the SCP can be formulated as follows:

SCP:

minimize $\sum_{s \in S} c(s) X_s$ (1)

subject to $\sum_{s \in S | u \in s} X_s \geq 1, \ u \in U$ (2)

$X_s \in \{0,1\}, \forall s \in S$ (3)

Equation 1 minimizes the total cost of the cover, while Equation 2 is constructed to assure that every element within the finite set *U* is covered by at least one of the subsets in the cover. Finally, Equation 3 identifies each subset as either in or out of the cover. This is accomplished by assigning a value of 0 or 1 to X_S:

X_s = 0, if the subset **is not** identified as being in the cover.
X_s = 1, if the subset **is** identified as being in the cover (s = 1, 2,…, n).

X_S is referred to as a zero-one integer variable. What that specifies is that values for X_S other than zero or one are not be accepted in the solution to the problem.

The SCP can be used to model the strategic sourcing for pricing proposals that are submitted by technically compliant offerors on multiples installations. The price optimization (PO) model developed by Apte, Rendon and Salmerón (2009) used an adapted version of the SCP.

E. Use of the Model

In the data provided by NAVFAC, the universal set consists of all of the offers that were submitted for base services, including both single- and multiple-contract types. Table 4 illustrates all of the possible proposals for a scenario in which there are two offerors submitting proposals for three installations. In this example, there are 14 possible combinations of proposals. However, in the model, offerors may not submit proposals on all of the possible proposals (due to schedule constraints, limited capabilities, or even constraints that might be imposed on the offerors by the government). One type of constraint imposed by the government might be the

number of installations that an offeror is allowed to include in a single proposal. This particular constraint is an additional constraint in SPC that is included in the PO model (Apte et al., 2009), and this will be used as a parameter in the evaluation of our NAVFAC data.

The main reason for this type of bidding strategy is to maximize price discount by taking advantage of economies of scale or location as validated by Apte, Rendon, and Salmerón. The PO model attempts to prove that the sum of Proposals 1 and 2 for installations 1 and 2 is higher than a single proposal that includes both installations 1 and 2.

Table 7. Possible Bids
(Apte et al., 2009)

Offeror	Bid #	Installation 1	Installation 2	Installation 3
A	1	X		
	2		X	
	3			X
	4	X	X	
	5		X	X
	6	X		X
	7	X	X	X
B	8	X		
	9		X	
	10			X
	11	X	X	
	12		X	X
	13	X		X
	14	X	X	X

In the PO model, the goal is for the authority to select the proposals that best represent the strategy it has established—subject to one of the model's primary constraints—that all of the installations receive the required services (Apte et al., 2009). For example, the strategy might be to select the offeror that represents the highest CPL, regardless of cost. Realistically, however, some type of compromise must be made between the performance and cost objectives (Apte et al., 2009). In other words, it is best if the authority must consider both cost and past performance.

For our evaluation of the NAVFAC data using the PO model, we utilized the same underlying assumptions made by Apte, Rendon, and Salmerón in their problem. We made these assumptions to simplify scenarios. In addition, we will

continue to use five installations as the maximum number of installations that a single offeror can bid on. The remaining assumptions are listed below (Apte et al., 2009):

1. Each offeror bids on numerous bids, but the maximum number of installations, *n*, in a bid is fixed (in this case *n*=*5*).
2. All offerors offer the same percentage of quantity discounts that are based on number of installations included in the bid.
3. All installations have the same preference in CPL of the offerors.

For consistency, we will utilize the same notation used in the Apte, Rendon, and Salmerón (2009) model. This notation is provided below:

I	set of installations, for $i \in I$;
C	set of offerors (contractors), for $c \in C$;
B	set of bids, for $b \in B$;
$B_i \subset B$	subset of bids that contain installation *i*
$I_b \subset I$	subset of installations in bid *b*;
$c_b \in C$	offeror for bid *b*;
p_b	price of bid *b* [$];
v_c	performance rating of offeror *c* [rating] (the lower the rating, the better the performance);
w	penalty weight of performance with respect to cost [$/performance rating];
h_i	penalty factor to reflect importance of having a good performance offeror for installation *i* [multiplicative factor]; and
x_b	binary decision variable: 1 if bid b is selected, and 0 otherwise.

As mentioned previously, the PO model is used to determine optimal offeror and bidding selection through the use of a SCP. We will use Apte, Rendon, and Salmerón's SCP model to evaluate the offeror data provided by NAVFAC. The SCP model is provided below (Apte et al., 2009):

$$\min_{x} \quad \sum_{b} (p_b + wv_{c_b} \sum_{i \in I_b} h_i) x_b \qquad (4)$$

$$\text{s.t.} \quad \sum_{b \in B_i} x_b \geq 1 \qquad \forall i \qquad (5)$$

$$x_b \in \{0,1\} \qquad \forall b \qquad (6)$$

Unlike the data provided to Apte, Rendon, and Salmerón (2009) by the US Air Force, the data provided to us by NAVFAC did not contain combined bids by any offeror. As a result, we will utilize the process proposed by Apte, Rendon, and Salmerón to create those combined bids.

Let:

$I_c \subset I$	subset of installations for which contractor *c* places individual bids;
p_{ci}	price bid by offeror *c* on installation *i*, for $i \in I_c, c \in C$ [$];
n	maximum number of individual bids in a combined bid (pre-specified); and
r_{ck}	discount rate offered by offeror *c* if awarded *k* installations simultaneously.

Process: Generate Cluster Bids

For each offeror, $c \in C$ {

For each $k = 1, 2, ..., \min\{n, |I_c|\}$ {

- For $l = 1, 2, ..., \binom{|I_c|}{k}$ {

  Add a new bid identifier *b* (e.g., a bid counter index) to set *B*;
- Generate the l^{th} (combined) bid *b*, which has exactly *k* installations from I_c;
- Update set B_i for installations in the just-generated bid; and
- Update the cost of the combined bid by using the discount rate:

$$p_b = r_{ck} \sum_{i \in I_b} p_{ci}$$

}}} End process.

F. Implementation

In the analysis, we maintain confidentiality for both installations and offerors. To simplify the specific scenario, we broke down the data into seven regions that align with those established by NAVFAC's organizational structure. After we organized the contract data by region, we determined that the price optimization model could not be applied to four of the seven regions due to the fact that each offeror bid on a single installation. In other words, there were no multiple bids. Tables 8, 9, and 10 illustrate the cost of single bids for each of the three regions to which the model was successfully applied.

Table 8. Single Bids for Location FE

	FE1	FE2	FE3	FE4	FE5	FE6	FE7
J	$535,870						
K		$2,235,272					
L		$2,338,763					
M		$2,388,726					
N			$7,367	$10,499			
O			$17,499				
P			$18,779				
Q			$28,871				
R			$31,321				
S			$38,158				
T			$42,869	$2,874			
U				$20,173			
V					$141,800		
W					$242,500		
X					$285,000		
Y						$309,100	
Z						$398,563	
BK							$5,461,665
BL							$6,702,418
BM							$5,064,448
BN							$6,670,064
BO							$8,005,609

Table 9. Single Bids for Location HA

	HA1	HA2	HA3
AE	$7,984,868		$7,389,581
AF	$8,001,648		
AG	$8,392,087		$7,750,004
AH	$8,649,389		
AI	$8,918,653		$8,757,570
AJ		$14,390,479	
AK		$14,743,500	
AL		$17,140,138	
AM		$17,900,518	
BH			$5,085,266
BI			$6,504,580
BJ			$7,341,446

Table 10. Single Bids for Location SW

	SW1	SW2	SW3	SW4
AU	$808,787			
AW		$8,004,544		
BG			$4,596,021	
BS				$12,500

Table 11 illustrates the discount rates given by offerors based on bids for multiple installations. These discounts are changed based on the particular acquisition strategy chosen by contract managers. In order to implement the development of the mathematical model, we assigned numerical values to CPL, as shown in Table 12 (Apte et al., 2009).

Table 11. Discounts by Offerors
(Apte et al., 2009)

Number of Installations in Bids	Percentage Discount
For single bid	0
For 2	2
For 3	5
For 4	8
For 5	10

Table 12. Numerical Values for CPL
(Apte et al., 2009)

Substantial Confidence	1
Satisfactory Confidence	2
Unknown Confidence	3
Limited Confidence	4
No Confidence	5

Based on the information provided by NAVFAC with regard to offeror past performance, each offeror was assigned a numerical value for CPL, as shown in Table 12. When assigning this CPL, it is important for the reader to remember that

the lower the number, the better the CPL. The numerical values for CPL that we assigned to offerors within each region are illustrated in Tables 13, 14, and 15.

Table 13. Numerical Values of CPL for Region FE

Offeror	CPL
J	4
K	1
L	2
M	4
N	4
O	4
P	4
Q	4
R	4
S	4
T	4
U	4
V	4
W	4
X	4
Y	4
Z	4
BK	4
BL	4
BM	4
BN	4
BO	4

Table 14. Numerical Values of CPL for Region HA

Offeror	CPL
AE	1
AF	1
AG	1
AH	1
AI	1
AJ	1
AK	1
AL	1
AM	3
BH	4
BI	2
BJ	2

Table 15. Numerical Values of CPL for Region SW

Offeror	CPL
AU	2
AW	4
BG	2
BS	4

Two processes can be identified as benchmark processes to compare with the optimal strategy. The first selection process selects the lowest monetary offer, without taking CPL into consideration. In other words, the bidder with the lowest price would be awarded the contract, irrespective of his performance level. The second process takes into consideration both CPL and cost. In this process, the offeror with the best CPL is given preference. In the event of a tie between two or more offerors with the same CPL, the offeror with the lowest cost would be selected for award.

Since the aforementioned processes are not ideal, the PO model uses the "Generate Cluster Bids" process (Apte et al., 2009). This process allows the model not only to take into consideration the single bids in each region, but also to consider combined bids. Region FE, for example, consisted of 22 offerors and seven installations, for a total of 24 single bids. In addition, the "Generate Cluster Bids" process spawned 26 combined bids. Similarly, Region HA contained 16 offerors for three installations, totaling 15 single bids. The number of combined bids created by the same process was 18. Finally, Region SW was made up of four offerors, four installations, and four single bids. The model's cluster bid–generator produced four combined bids.

In the PO objective, a weight (α) was assigned to CPL in order to combine cost as well as CPL. Our analysis used one scenario, α = 1,000,000, which places moderate emphasis on CPL. In an ideal situation in which multiple offerors bid for multiple installations, varying α makes a difference in the solution (Apte et al., 2009). However, in the NAVFAC data, this was not the case, and hence varying α did not make any difference

G. Summary

Because the research provided by Apte, Rendon, and Salmerón was pivotal to our study, this chapter described their model and how it applies to service-based strategic sourcing. This chapter also detailed the process we used to organize the data provided by NAVFAC in such a way that it could be entered into the PO model more easily. The next chapter will provide a comparison of the results of the PO model to the results of both the lowest cost and best Confidence in Performance Level (CPL) selection processes.

V. Results and Analysis

A. Introduction

In this chapter, we will conduct a comparison of the PO model results for the selection processes for both the lowest cost and the best CPL. The selection process for lowest cost will henceforth be referred to as "Selection 1." The selection process for best CPL will hereafter be referred to as "Selection 2."

B. Results

Results from the current selection processes 1 and 2 for each of the NAVFAC regions that we analyzed are shown in Tables 14 through 16. For Region FE, selection 1 yielded a Total Confidence in Performance Level (TCPL) of 25, for a cost of $8,296,730. Selection 2 for Region FE yielded the same TCPL and cost. For Region HA, selection 1 yielded a TCPL of 6, for a cost of $27,460,612. Selection 2 for Region HA yielded a TCPL of 3, for a cost of $29,764,928. Region SW yielded a TCPL of 12, for a cost of $13,421,851 in both selections 1 and 2.

C. Analysis

The results for Regions FE and SW show that there are no savings realized by varying the prioritization of selection between lowest cost and best CPL. Installation FE1 was a single offeror, and, with no competition, they would have been chosen for both selection 1 and 2. Installation FE2 remained unchanged from selection 1 to selection 2 because they were both the lowest bidder and had the best CPL of the two offerors. For Installations FE3 through FE7, all of the offerors had the same CPL, and, therefore, selection process 2 would have yielded to the lowest-priced offeror. Installations SW1 through SW4 were all single-bid contracts. Therefore, selection processes 1 and 2 would have yielded the same results.

Region HA shows that selection process 1 has a TCPL of 6, which is an average CPL of 2 per installation ("Good" confidence level). Selection process 2,

which places emphasis on best CPL, has a TCPL of 3 for an average CPL of 1 per installation ("Excellent" confidence level). However, selection by best CPL results in an additional cost of $2.3 million.

Table 16. Results from Selections 1 (Lowest Cost) & 2 (Best CPL) for Region FE

Selection 1: Results			
Installation	Offeror	CPL	Cost
FE1	J	4	535,870.00
FE2	K	1	2,235,272.00
FE3	N	4	7,366.54
FE4	T	4	2,874.00
FE5	V	4	141,800.00
FE6	Y	4	309,100.00
FE7	BM	4	5,064,448.00
Total		25	8,296,730.54

Selection 2: Results			
Installation	Offeror	CPL	Cost
FE1	J	4	535,870.00
FE2	K	1	2,235,272.00
FE3	N	4	7,366.54
FE4	T	4	2,874.00
FE5	V	4	141,800.00
FE6	Y	4	309,100.00
FE7	BM	4	5,064,448.00
Total		25	8,296,730.54

Table 17. Results from Selections 1 (Lowest Cost) & 2 (Best CPL) for Region HA

Selection 1: Results			
Installation	Offeror	CPL	Cost
HA1	AE	1	7,984,868.18
HA2	AJ	1	14,390,478.65
HA3	BH	4	5,085,265.60
Total		6	27,460,612.43

Selection 2: Results			
Installation	Offeror	CPL	Cost
HA1	AE	1	7,984,868.18
HA2	AJ	1	14,390,478.65
HA3	AE	1	7,389,581.24
Total		3	29,764,928.07

Table 18. Results from Selections 1 (Lowest Cost) & 2 (Best CPL) for Region SW

Selection 1: Results			
Installation	Offeror	CPL	Cost
SW1	AU	2	808,786.65
SW2	AW	4	8,004,543.60
SW3	BG	2	4,596,021.07
SW4	BS	4	12,500.00
Total		12	13,421,851.32

Selection 2: Results			
Installation	Offeror	CPL	Cost
SW1	AU	2	808,786.65
SW2	AW	4	8,004,543.60
SW3	BG	2	4,596,021.07
SW4	BS	4	12,500.00
Total		12	13,421,851.32

The PO model results for Regions FE, HA, and SW using Model Scenario 3 (Apte et al., 2009) are shown in Table 19. Model Scenario 3 adds a weight of 1,000,000 to CPL in order to place emphasis on offeror performance level.

Table 19. Results from Model Scenario

Weight (Model Scenario 3)	Total CPL	Cost
Region FE	25	$ 8,296,731
Region HA	2	$29,457,439
Region SW	12	$13,421,851

TCPL for Regions FE and SW remained unchanged from selection 1 to 2. The PO model results were the same as selections 1 and 2 due to either single-bid contracts or to multiple-bid contracts from offerors with the same CPL. The PO model results for Region HA revealed that we could achieve cost savings by reducing the number of offerors that would perform the same number of contracts. Of the three contracts in Region HA, offeror AE bid on two of them and had the best CPL. Therefore, the PO model selected offeror AE for those two contracts, thereby reducing the TCPL to 2, which resulted in cost savings of $307,489 when compared to selection 2. Figure 5 illustrates the comparison of strategic sourcing and the current process selection for Region HA.

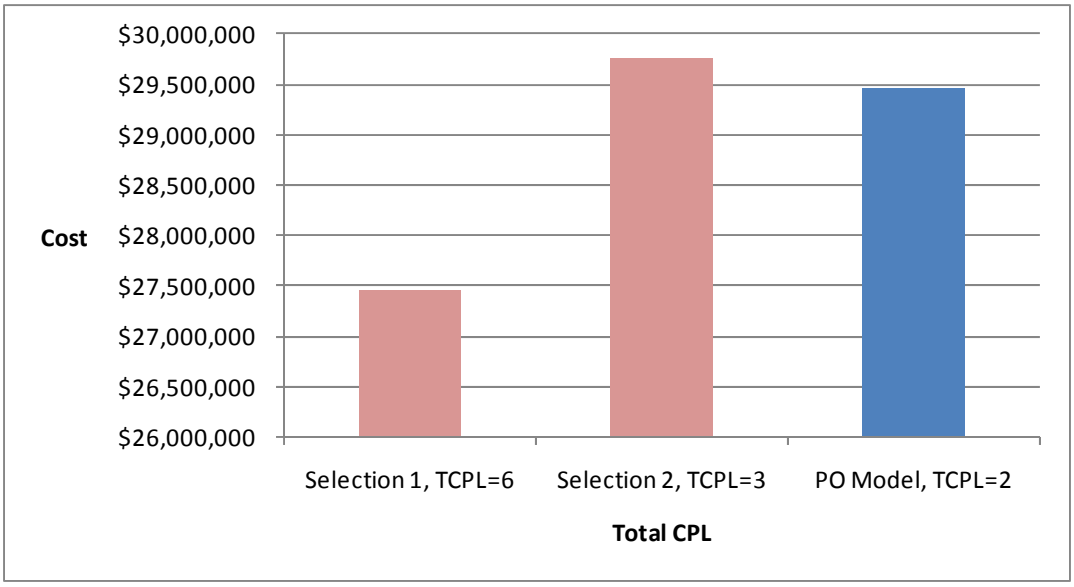

Figure 5. Comparison of Strategic Sourcing and Current Processes of Selection for Region HA

As noted before, it can be observed that the PO model gave a better TCPL at a lesser cost than that given by Selection 2. However, there was a considerable cost increase from Selection 1 due to the decrease in TCPL. This change shows that for every point change in TCPL the overall cost increased by almost $500,000. This is important for contract managers to realize as there is a significant trade-off between best value and best price.

D. Summary

In this chapter, we conducted a comparison of the PO model results to both the selection processes for lowest cost and best CPL. In addition, we conducted a comparison of strategic sourcing selection methods using the PO model to NAVFAC's current processes of selection. In the next chapter, we will provide a summary of our research, conclusions, recommendations, and suggested areas of further research.

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VI. Summary, Conclusions and Areas for Further Research

A. Summary

In this chapter, we provide a summary of our research, conclusions and recommendations based on our results, and suggest areas of further research.

In the first chapter, we presented our research objectives and described the contents of the thesis that followed. Included were the background, purpose, and objectives of our research. We also described the expected benefits of our research and provided a detailed description of the scope and organization of the research as well as the methodology used to conduct the study. In the next chapter, we conducted an in-depth literature review of the origin of strategic sourcing. By describing how strategic sourcing applies to the acquisition of services in the Department of Defense, and specifically in the Navy, we provided an extensive background for the reader.

Additionally, since the research was conducted using data that was provided by NAVFAC, we provided a summary of its organizational structure and how it operates in its respective regions. Building on the model developed by Apte, Rendon, and Salmerón, we described the pricing optimization model and how it applies to service-based strategic sourcing. And, finally, we conducted a comparison of the pricing optimization model results to both the lowest cost and best CPL selection processes and a comparison of strategic sourcing selection methods using the pricing optimization model to NAVFAC's current processes of selection.

B. Conclusions

This project attempted to prove that by applying a pricing optimization model similar to the one applied to an Air Force scenario, the Navy could realize the same or similar cost savings. Although, we were provided with sufficient data from

NAVFAC Headquarters, our pricing optimization model was unable to achieve similar savings by using the assigned parameters in all NAVFAC regions because of sparse data resulting from the limited scope of NAVFAC's current policy. Nonetheless, we were able to show savings in Region HA because of the difference in the past-performance rating of the offerors and because those offerors submitted proposals on multiple installations.

1. Primary research objective:

Identify whether the NAVFAC is currently using strategic sourcing practices for BOSS contracts

NAVFAC is not currently using strategic sourcing practices for their BOSS contracts. By using a past-performance rating system that does not effectively differentiate between offerors, they are not able to use our pricing optimization model. Furthermore, NAVFAC is not writing solicitations in a manner that allows offerors to submit proposals on more than one installation for the same or similar services. By doing this, it effectively eliminates any opportunity to achieve cost savings using this pricing optimization model. Nonetheless, NAVFAC does have an opportunity to realize the potential cost savings that strategic sourcing has to offer if these two counter-forces are remedied.

2. Subsidiary research objectives:

(1) Analyze current data to determine if these strategic sourcing methods are both efficient and effective

NAVFAC's current strategic sourcing methods are ineffective. In the case of Region FE, 20 out of 22 offerors were assigned the same performance rating of 4. Therefore, the pricing optimization model would automatically default to the lowest-priced offeror, if they were to all submit proposals on multiple installations. Furthermore, even if all of the offerors submitted proposals on multiple installations, cost savings that could have been achieved by NAVFAC through the use of this pricing optimization model would not have been realized due to similar past-

performance data. Our recommendation is to either put more emphasis on the numbers assigned for an offeror's past performance or create a more robust past-performance generation system.

(2) Attempt to improve the current methods, if any, by applying actual data to a proven decision model

Based on the current selection process used by NAVFAC, no further savings can be achieved. The data shows that the majority of NAVFAC's offerors are selected based upon a lowest-price, technically acceptable approach. In addition, because there is no disparity between offerors' past-performance information, the pricing optimization model automatically breaks the tie by selecting the offeror that is the lowest price technically acceptable.

(3) Provide recommendations to senior Navy acquisition leaders

NAVFAC should provide offerors with the ability to submit multiple proposals on different combinations of BOSS contracts within the same region. For instance, in Region HA, only three offerors submitted proposals on multiple bases, HA1 and HA3. These same contractors, using a multiple-proposal option, could have submitted proposals in various combinations of the bases included in Table 7. In the previous section, we showed that contractor AE, who submitted proposals on multiple locations, was the optimal offeror when competing for BOSS contracts on multiple facilities. In fact, it would have provided a cost savings of approximately $300,000, with the best TCPL over selection 2, which emphasized best performance over cost. The strategic sourcing policy results in better TCPL for lower cost. This policy costs far more than selection 1 policy, but such cost would eventually result in additional savings from reduced contract-administration costs and volume discounts.

C. Areas of Further Research

Future work could be done to improve NAVFAC's strategic sourcing strategy by implementing a robust past-performance system and by writing solicitations that

will allow offerors to submit proposals on multiple installations. One of the main barriers was the lack of differentiation in CPL among offerors within their respective regions. Continued research could help develop a past-performance rating system that would allow NAVFAC to separate the offerors from each other with regard to past performance.

This project applied strategic sourcing to the NAVFAC contract environment. Similar research could be conducted on Commander, Fleet Industrial Supply Center (COMFISC) contracts for services in various regions and to service contracts across the Navy. In addition, continued research could be applied to services contracted by the Army Contracting Command and DoD service contracts.

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