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MBA PROFESSIONAL PROJECT

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## COMPARATIVE RESEARCH OF LABOR COSTS IN NAVAIR SMALL AND LARGE BUSINESS ENGINEERING SERVICE CONTRACTS

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June 2018

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**COMPARATIVE RESEARCH OF LABOR COSTS IN NAVAIR SMALL AND  
LARGE BUSINESS ENGINEERING SERVICE CONTRACTS**

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Submitted in partial fulfillment of the  
requirements for the degree of

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# **COMPARATIVE RESEARCH OF LABOR COSTS IN NAVAIR SMALL AND LARGE BUSINESS ENGINEERING SERVICE CONTRACTS**

## **ABSTRACT**

Procurement is the main method that the government uses to obtain goods and services. In 2017, the federal government awarded \$508 billion in contracts for the purchase of goods and services. The largest share of government contracts is from the Department of Defense, which constituted 63 percent (\$320 billion). The government contracts can be awarded to both small and large businesses through full and open competition. However, the government is obligated to offer 23 percent of the contracts to small businesses. This study sought to compare and analyze labor rates in small and large businesses, the effect of labor hours and place of performance on labor costs, and whether contracts to small businesses drive up costs to the government. The focus of the study was on small and large businesses classified as North American Industry Classification System (NAICS) code 541330 (Engineering Services). The study found that labor costs in similar NAICS code 541330 contracts awarded to small and large businesses differ. In technical jobs, small businesses' average labor rates are lower than large businesses' average labor rates, both at Headquarters/Program Executive Office (HQ/PEO) and Naval Air Warfare Center, Aircraft Division (NAWC AD). Place of performance affects the labor cost. This study found that, overall, small businesses have lower labor rates compared to large businesses.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ARRA	American Recovery and Reinvestment Act
CCR	Central Contractor Registry
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
COMFRC	Commander, Fleet Readiness Center
DoD	Department of Defense
DoN	Department of the Navy
DUNS	Data Universal Numbering System
ERP	Enterprise Resource Planning
FAR	Federal Acquisition Regulation
FPDS-NG	Federal Procurement Data System - Next Generation
FY	Fiscal Year
GPE	Government Point of Entry
GPO	Government Publishing Office
GSA	General Services Administration
HQ/PEO	Headquarters/Program Executive Office
LPTA	Lowest Price Technically Acceptable
NAICS	North American Industry Classification System
NAWC AD	Naval Air Warfare Center, Aircraft Division
NAWC WD	Naval Air Warfare Center, Weapons Division
NAVAIR	Naval Air Systems Command
ORCA	Online Representations and Certifications Application
OSBP	Office of the Small Business Programs
PWS	Performance Work Statement
R&D	Research and Development
RFP	Request for Proposal
SAP	Simplified Acquisitions Procedures
SAT	Simplified Acquisition Threshold
SBA	Small Business Administration
SBIR	Small Business Innovation Research

SBR	Small Business Reservation
SLA	Service Legal Agreement
SOO	Statement of Objectives
SOW	Statement of Work

## I. INTRODUCTION

Procurement is the manner by which the federal government obtains goods and services. In fiscal year (FY) 2017, the U.S. federal government obligated \$508 billion in contracts for the acquisition of goods, services, and research and development (USA Spending, 2018b), and the Department of Defense (DoD) is one of the biggest spenders. That fiscal year, DoD obligated \$320 billion on federal contracts, 63% of the total government obligations, more than all other federal government agencies combined. USA Spending (2018b) data shows there has been an increasing trend in DoD spending as seen in Figure 1.

### Spending Over Time (Fiscal Year 2015 - 2017)

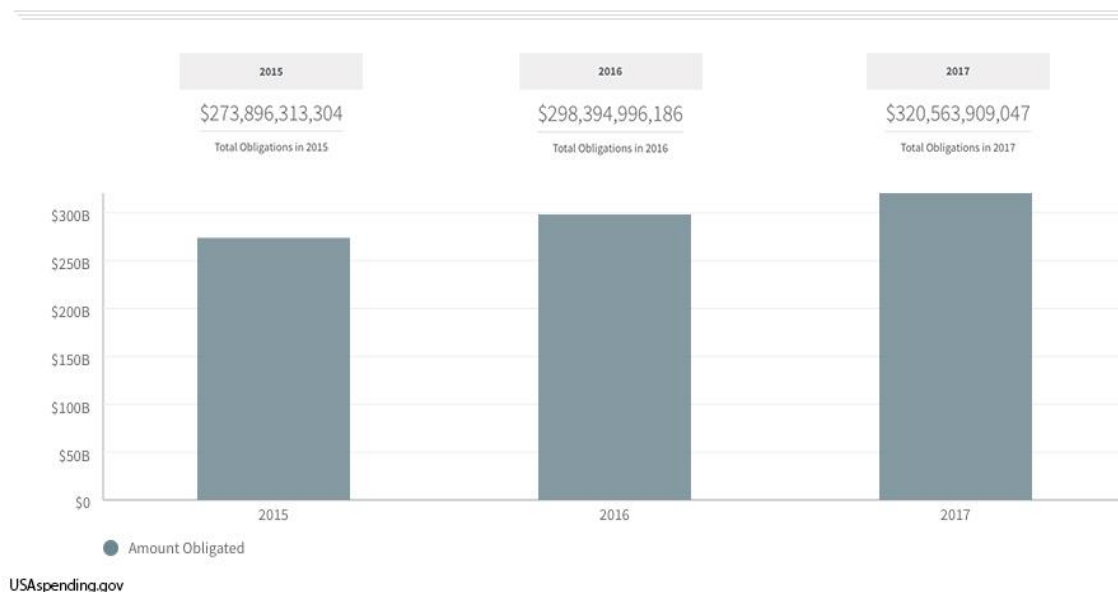


Figure 1. DoD Spending FY15 to FY17. Adapted from USA Spending (2018).

The DoD has continuously depended on contractors in the delivery of extensive array of goods and services to the U.S. military. To procure goods and services, government agencies use the Federal Acquisition Regulation (FAR), the policy that

pertains to all government purchases with the funds appropriated by Congress. The government awards contracts to both large and small businesses. For a contractor seeking to enter the federal market, they need to locate different opportunities and awards that are transparent and open for procurement. These opportunities have to be published in the Government Point of Entry (GPE) as stated in FAR Part 5 (Federal Acquisition Regulation [FAR], 2018a). Christopher Yukins noted that the accessibility of the federal procurement market can be computed through vectors such as trade agreements that opened the market, system transparency, and barriers that made it harder for firms to join in this federal competition (Yukins, 2017). One of the barriers existing in the federal procurement market include the provision of 23% of the procurements to be awarded to small businesses, as required by the Small Business Act, so that they can contribute to the country's economy (Small Business Act, 2016). Additionally, the federal government prefers full and open competition based on their requirements. 10 U.S. Code 2304 states the competition requirements regarding contract awarding:

(a)(1) Except as provided in subsections (b), (c), and (g) and except in the case of procurement procedures otherwise expressly authorized by statute, the head of an agency in conducting a procurement for property or services (A) Shall obtain full and open competition through the use of competitive procedures in accordance with the requirements of this chapter and the Federal Acquisition Regulation; and (B) Shall use the competitive procedure or combination of competitive procedures that is best suited under the circumstances of the procurement. (Office of the Law Revision Counsel, 2018)

FAR Part 6, Competition Requirements, similarly directs contracting officials on different procedures and policies, which can enhance full and open competition in the process of awarding contracts. The FAR Subpart 6.0 explains the scope:

This part prescribes policies and procedures to promote full and open competition in the acquisition process and to provide for full and open competition, full and open competition after exclusion of sources, other than full and open competition, and advocates for competition. This part does not deal with the results of competition (e.g., adequate price competition), that are addressed in other parts (e.g., Part 15). (FAR, 2018b)

FAR Subpart 19.5 (FAR, 2018c), also involves Set-Asides for exclusively for Small Businesses. In this context, a set-aside for small business is a reserved acquisition awarded

to small businesses and it could be opened for every small business, either total or partial set aside.

Small businesses are often considered the backbone of the American economy. Although limited in their magnitude of influence individually, small businesses collectively represent the kind of entrepreneurship and fiscal risk that drives innovation and competition. Regardless of whether the government awards a contract to small business or large business, the contracting officer must first determine if the price is fair and reasonable (FAR, 2018b) by conducting cost and price analysis. A question is therefore raised if small business price proposals are less expensive or more expensive compared to large businesses.

#### **A. BACKGROUND OF THE STUDY**

The purpose of this research is to assess if there is a difference in labor cost between large and small businesses in a specific North American Industry Classification System (NAICS) code. NAICS Code 541330, Engineering Services, is defined by the U.S. Census Bureau as:

This industry comprises establishments primarily engaged in applying physical laws and principles of engineering in the design, development, and utilization of machines, materials, instruments, structures, processes, and systems. (U.S. Census Bureau, 2017)

Engineering Services that are efficacious often receive government contracts to extend service use and reach, and augment or complete projects of import. Because engineering services can effectively and efficiently provide necessary infrastructure and product services for the government, many government agencies are looking for Engineering support services. The Department of the Navy (DoN) contracted a total of over \$36 billion from FY15 to FY17 for Engineering Services as seen in Figure 2 (USA Spending, 2018a). In addition, the Department of the Navy Office of the Small Business Programs (OSBP) reported that in FY 2015, Engineering Services is the number one NAICS code in Small Businesses with \$2.7B in contracts as seen in Figure 3 (Department of the Navy Office of the Small Business Programs [OSBP], 2018).

## Spending Over Time (Fiscal Year 2015 - 2017)

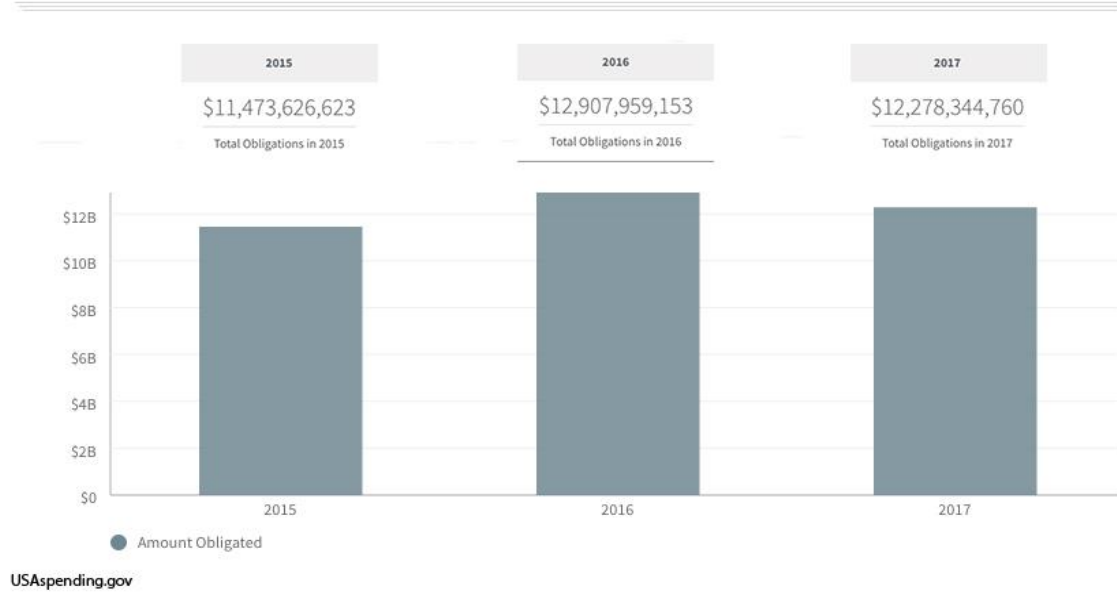


Figure 2. DoN, Engineering Services, FY15 to FY17. Adapted from USA Spending, (2018)

### Top Small Business NAICS FY15

541830	Engineering Services	\$2.7 B
236220	Commercial & Institutional Building Construction	\$1.3 B
541712	Research and Development in the Physical, Engineering & Life Sciences (Except Biotechnology)	\$836 M
336611	Ship Building & Repairing	\$756 M
561210	Facilities Support Services	\$508 M
483111	Deep Sea Freight Transportation	\$374 M
541519	Other Computer Related Services	\$251 M
622110	Gen Medical & Surgical Hospitals	\$236 M
334220	Radio & TV Broadcasting & Wireless Comms Equipment Manufacturing	\$224 M
334111	Electronic Computer Manufacturing	\$159 M

Figure 3. DoN, Small Business Accessible Market FY15. Source: OSBP (2018)

One of the systems command in the Navy is Naval Air Systems Command (NAVAIR). Their mission is to:

Provide full life-cycle support of naval aviation aircraft, weapons and systems operated by Sailors and Marines. This support includes research, design, development and systems engineering; acquisition; test and evaluation; training facilities and equipment; repair and modification; and in-service engineering and logistics support. (Naval Air Systems Command [NAVAIR], 2018)

NAVAIR Office of Small Business Programs (OSBP) is effective because they offer numerous opportunities for private sector engagement and contractual agreements. For small businesses especially, NAVAIR OSBP prioritizes the entrepreneurial skills of small businesses by nurturing and sustaining creative talents in defense of the nation.

In procuring DoD products and services through NAVAIR, small businesses will vary from large businesses in a number of critical ways. Firstly, small businesses must determine where they exist within the size standard parameters. According to the Small Business Administration:

A size standard is the largest that a concern can be and still qualify as a small business for Federal Government programs. For the most part, size standards are the average annual receipts or the average employment of a firm. (Small Business Administration [SBA], 2016)

For small businesses existing within the Engineering Services 541330 NAICS code, \$15 million is the standard (SBA, 2016). In other words, said businesses must not exceed this value to potentially obtain contracts with NAVAIR, the DoD and other governmental agencies as a designated small business. Contracting with the DoD is often a painstaking process that requires patience and due diligence. In fact, it may take 18 months of planning to become competitive, identify certain opportunities, market to potential clients, develop proposals, execute and perform their first DoD contract and comply with necessary rules and regulation (DoD OSBP, 2018). Not only does it take time to ascertain the necessary documentation and accreditation to be receptive to DoD contracts, but the process also demands a stellar track record of performance. The awarding of contracts by the DoD through NAVAIR is highly dependent upon these and many other associated factors. One of those mediating factors is the salience of differential costs.

## **B. STATEMENT OF THE PROBLEM**

While the government awards contracts to both large businesses and small businesses, the government Contracting Officer must ensure that there is a fair and reasonable price at award of any contract. 48 CFR 215.371-3, Fair and Reasonable Price, states:

If there was “reasonable expectation ... that ... two or more offerors, competing independently, would submit priced offers” but only one offer is received, this circumstance does not constitute adequate price competition unless an official at a level above the contracting officer approves the determination that the price is reasonable (see FAR 15.403-1(c)(1)(ii)). (GPO, 2018)

Differential costs are important because they affect the way government entities and non-government entities transact mutually beneficial contracts. Due to considerations that small businesses are “non-competitive,” new statutory and regulatory environments require further analysis. There is currently a lack of data-driven research on the differences between large and small business contracts with the government. The following questions, therefore, are raised. How do we know if we are paying more for small businesses than large businesses? Does awarding contracts with small businesses drive up costs to the government? If so, by how much? Is it okay if we pay more for small business? Assessing these differences in labor costs will enable a more comprehensive understanding of the methodologies and mechanisms necessary for awarding a contract. By assessing an important area of industry, Engineering Services, this comparative study will address the cost differential associated with labor costs, labor categories, labor rates and labor hours, all critical variables in the contract management process. Chapter III details the research methodology.

## **C. RESEARCH OBJECTIVES**

A comparative analysis of labor costs in small and large business Engineering Services contracts awarded on a specific NAICS code 541330, Engineering Services, in different labor categories will be done. This is achieved by developing a construct for assessing primarily the internal secondary data. The study will use contract files and data related to NAICS code 541330 to conduct an analysis of labor cost differences to NAVAIR.

The differences will be delineated across labor categories associated with small and large businesses. Based on this evaluation, the following research objectives are used:

1. To compare and analyze labor costs in similar NAICS code of awarded contracts to small and large business Engineering Services.
2. To determine if labor hours and place of performance affect the labor cost.
3. To determine if awarding contracts with small businesses drive up costs to the government.

#### **D. RESEARCH QUESTIONS**

Labor costs in small and large business Engineering Service contracts is a critical factor in comparison of large and small business services awarded contracts on specific North American Industry Classification System (NAICS) code 541330 (Engineering Services) in different labor categories. As mentioned earlier, the research will objectively be comparing labor rates, labor categories, labor hours and place of performance. The methodology of the research will be further explained in Chapter III of this research. The questions developed for the investigation are as follows:

1. What are the labor costs in similar NAICS code of awarded contracts to small and large business engineering services?
2. Does labor hours and place of performance affect the labor cost?
3. Does awarding contracts with small business drive up costs to the government, and if so, by how much?

#### **E. SUMMARY**

This chapter introduced the extent of federal spending particularly in the Department of Defense. The government award contracts to both small and large businesses and prefer a full and open competition in awarding them. This research was initiated to assess if there is a difference of labor cost between small and large businesses. Engineering Services was selected for comparison because it is the top NAICS Code for

small businesses. This chapter discussed the background of the study, statement of the problem, research objectives and questions that are used for the research. In the next chapter, the Literature Review is discussed.

## **II. LITERATURE REVIEW**

### **A. INTRODUCTION**

Risks arise while doing business; as a result, DoD needs contract management throughout the contracting process. Gregory Garrett notes that organizations need to use their resources (labor, money, and capital) efficiently because, in this age, strategic decisions determine how to get the best goods and services (Garrett, 2007). Outsourcing is an important aspect of business management because many organizations utilize contracts to lessen their operational costs, improve quality, capitalize on its expenses, and, in turn, increase profits. For DoD, acquiring goods and services from other institutions has proved more practical than in-house manufacturing. Therefore, the whole concept of business outsourcing some essential goods and services necessitates contract management to ensure that the business gets quality goods and services (Garrett, 2007). Contract management has three phases, which have six steps for the buyer. The government similarly uses this process during their contracting processes. This chapter discusses the overview of federal procurement, government contracting process, small business contracts with the DoD, and the North American Industry Classification System.

### **B. OVERVIEW OF FEDERAL PROCUREMENT**

The federal procurement process starts with acquisition personnel determining the requirements of their agency. Once personnel have posted a solicitation in the Federal Business Opportunities (FedBizOpps.gov) website, for example, interested business entities can develop offers applicable to the solicitation. For federal contracting eligibility, entities with a Data Universal Numbering System (DUNS) number register with the Central Contractor Registry (CCR), then they complete an Online Representations and Certifications Application (ORCA). Numerous agencies, like the General Services Administration (GSA), offer help and service to both potential and existing government contractors. Therefore, the procurement process requires the identification of goods and services needed, identifying the best way to acquire these items as well as conducting the acquisition (Halchin, 2012).

With economic decline and the implementation of the American Recovery and Reinvestment Act of 2009 (ARRA), various commercial and private contractors are increasingly looking for federal contracting opportunities. The increase has resulted in proposals from entities that have no experience in government contracting (Laurence, Justine, & Julie, 2010). However, entities must fulfill certain processes before bidding for federal government contracts. The entity must first get the DUNS number from Dun & Bradstreet, then register with the Central Contractor Registration System and determine which North American Industry Clarification System (NAICS) code describes the service it hopes to provide. Only after completing these steps can the contractor examine different sources to find government contracts (Laurence et al., 2010).

The government should award contracts with a preference for full and open competition. For small businesses, there are exceptions that can give them an advantage. For instance, the “rule of two,” which is under the FAR 19.502-2, states that, if there are two or more small businesses that can perform the work, it should be awarded to the small business (FAR, 2018c). Additionally, when the government is considering offers, it should award the contract to the lowest priced responsive qualified bidder through the prequalification program (Laurence et al., 2010) or can also award the contract applying the best value selection or the tradeoff process. The federal procurement is conducted using specific steps of the government contracting process which will be discussed next.

### **C. GOVERNMENT CONTRACTING PROCESS**

The government contracting process is divided into three phases: Pre-award, Award and Post-award. Within these three phases, there are six steps. The Pre-award includes procurement planning, solicitation planning, and solicitation. The Award includes source selection, and Post-award includes contract administration and contract close-out. These six steps will be discussed as follows.

#### **1. Procurement Planning**

This step involves the government’s decision process of ascertaining their need and procurement time. During this step, the government decides on the goods and services they will produce internally and, therefore, determine what they will outsource. The decision as

to whether to manufacture or outsource requires contemplation and consideration, especially regarding the strategically important aspects. The choice to procure will result in implementation of a project in collaboration with an outside organization, which is out of the buyer's regulation or mandate (Garrett, 2007). Consequently, the buyer engages in a process with risk and uncertainty. During procurement planning, the contracting officer determines the scope of the contract, and, at this phase, the contracting officer determines, through market research, if small businesses are available to perform the contract. If available small businesses are limited, it can be an opportunity for a sole source to a small business. If there are enough small businesses, it can be a set-aside competition among small businesses. If there are not enough small businesses, it will be a full and open competition.

## **2. Solicitation Planning**

During the solicitation planning step, the government needs to specify its deliverables, to determine possible sources, and to evaluate the origin of risk and uncertainty, which will, as a result, create the contract's Terms and Conditions. Additionally, the government will need to select the strategy for formulation of the Request for Proposal (RFP) as well as the formulation of the source selection which will include evaluation of proposal, negotiation and contract formation. Last, the government needs an effective arrangement for administering the contract. The solicitation planning step also involves the creation of documents such as Statement of Work (SOW), Performance Work Statement (PWS), or Statement of Objectives (SOO), as well as product specification (Garrett, 2007). These documents include the solicitation document, and the solicitation planning step is deemed complex because the government needs to understand its requirements as well as communicate these requirements. Based on procurement planning, the contracting officer develops the RFP, structured either for a sole source, small business set-aside, or full and open competition procurement strategy.

## **3. Solicitation**

In the third step, the government asks for quotations, bids, proposal, or tenders through solicitations. Solicitations are procurement documents, which can take different

forms such as request for tenders, request for proposals, invitation to bid, invitation for negotiation, and request for quotations. Importantly, solicitation documents communicate the government needs, and the quality of solicitation documents, therefore, determine the success of the government (Garrett, 2007). Consequently, a high-quality solicitation results in better quotes, proposal, tenders, or bids from sellers whereas a poor-quality solicitation can cause confusion, delays, low-quality responses, and fewer bids or proposals. For acquisitions of goods and services, contracting officers must communicate the notice of proposed contract actions through the Government Point of Entry (GPE), which is the Federal Business Opportunities website accessed through <http://www.fedbizopps.gov>, as required by the Small Business Act (FAR, 2018a). This notice is posted to increase competition and expand small business access in contracting opportunities.

#### **4. Source Selection**

The source selection step includes receiving proposals, evaluating proposals, conducting negotiations if required, and awarding the contract. Contractor selection is one of the most critical decisions the government makes because contract success mainly depends on the selected contractor. Therefore, procurement planners have to pinpoint the prospective sources with available products and services, develop criteria for assessing every contractor, and, in the end, select one source for the contract that corresponds to the best value to the government. Each procurement is unique, and each procurement has its own evaluation strategy. Some evaluation strategies are based on award on the lowest priced offer or on a tradeoff award.

#### **5. Contract Administration**

Contract administration encompasses all processes from compliance based on the terms and conditions laid out in the contract, including contract performance, to contract closeout or termination. Subsequently, both buyer and the seller need to conduct their operations within the agreed terms and conditions. Some best practices involved in contract administration encompass ensuring that all organizational participants read the contract, understand their roles and responsibilities, and providing the contract to every participating and affected entity whether in paper or electronic form or both (Garrett, 2007).

## **6. Contract Closeout/Termination**

The last step entails all the necessary activities at the end of the contract. The majority of issued contracts are completed through the successful completion and closeout criteria, but there are rare instances where the government is compelled to terminate a contract early because of violation of the set terms and conditions, failure of the seller to meet their end of the deal, or other extenuating reasons. The contracting officer plays a crucial role in this process as they are the ones who oversee contract performance (Garrett, 2007). Additionally, the contracting officer can advise termination as well as better alternatives based on the situation. Contract termination can negatively affect the seller, ruining their reputation.

As discussed in the previous section, the government may award contracts to small businesses. The next section will discuss small business contracts with the DoD.

### **D. SMALL BUSINESS CONTRACTS WITH THE DEPARTMENT OF DEFENSE**

Small businesses receive specialized opportunities within the federal contracting process. For government contracting purposes, a small business is defined as an independent business that has less than 500 employees (SBA, 2017). Over the past years, the federal government has consistently improved laws and contract terms to support small businesses. For instance, the federal government established a statutory objective of having 23% of goods and services contracted to small business contractors. Other small businesses competing for federal government contracts include women-owned as well as disadvantaged businesses considerations under the SBA. Within the federal government, most purchases go to DoD; as a result, contracting has been the center of attention for most pro-small business advocates. Additionally, both congress and presidential administrations have provided efforts in support of small businesses. However, the DoD has also undergone some challenges in meeting the 23% threshold in different categories, like those involving industry consolidation between large firms, and, as a result, DoD acquires goods and services from large businesses due to the economies of scale (Grammich et al., 2011).

DoD spends about two thirds of the federal government's purchases, and, as a result, has a direct impact on the prosperity of federal legislation that seeks to enhance small businesses (Moore et al., 2008). Therefore, due to their significant influence on DoD purchases, Congress seeks to compel the DoD Office of Small Business Programs to evaluate hindrances of small businesses across both sub-contracting and contracting. For instance, the FAR requires other-than-small businesses to develop sub-contracting plans, such as in Research and Development (R&D) and professional services, which are subcontracted to small businesses. Consequently, sub-contracting has increased the chances of small businesses in R&D programs through the Small Business Innovation Research (SBIR) program. Additionally, another way of enhancing the involvement of small business is through the Mentor-Protégé Program whereby large contractors (mentors) help small businesses (protégés) to improve their abilities as federal contract suppliers (Moore et al., 2008).

The Department of the Navy (DoN) has an immense acquisition workforce that includes the 1102 Contract Specialist series and 1105 Purchasing Agent series focused on increasing small businesses' contract awards based on the DoD and DoN initiative like the Better Buying Power, government policies such as Small Business Act, and the Federal Acquisition Regulation (FAR). A good example, which resulted in increased DoN opportunities, was the FAR Part 13 Simplified Acquisitions Procedures (SAP), developed into an effective component capable of surpassing barriers that hindered the small business contractors (Kidalov, 2013). Congress also compelled DoN, through the Small Business Reservation (SBR), to assign set-aside contracts below the Simplified Acquisition Threshold (SAT) to small businesses. Additionally, the Small Business Jobs Act of 2010 approved voluntary set-asides on delivery and task orders under FAR Subparts 8.4 and 16.5. Therefore, the DoN contracting mechanism is meant to enhance small business involvement by targeting open market purchases as well as other goods and services (Kidalov, 2013). As previously stated, the purpose of this research is to compare large and small businesses for a specific North American Industry Classification System (NAICS) code, 541330, Engineering Services. The next section discusses NAICS.

## **E. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM**

The federal government categorizes all types of supplies and services into codes and this code system is the North American Industry Classification System (NAICS). The U.S. Census Bureau FAQs describes the NAICS as:

The standard for use by federal statistical agencies in classifying business establishments for the collection, tabulation, presentation, and analysis of statistical data describing the U.S. economy. Use of the standard provides uniformity and comparability in the presentation of these statistical data. NAICS is based on a production-oriented concept, meaning that it groups establishments into industries according to similarity in the processes used to produce goods or services. (U.S. Census Bureau, 2018)

The U.S Census Bureau created this framework that categorizes every type of supplies and services procured by the federal government. These different supplies and services are designated a code and these codes are used in procurement planning. For example, Ship Building and Repairing is NAICS code 336611 or Engineering Services is NAICS code 541330. The NAICS is an important factor in federal contracting especially considering small businesses because the contracting officer is responsible for selecting the most credible NAICS code for every federal procurement. Therefore, selection of an unsuitable code can hinder small businesses bidding for the federal contracts due to the unique requirements in every code. The NAICS code groups business entities for the sake of evaluation, collection, and publication of statistical data based on the economy of the country (Miller, 2016). Therefore, for a North American institution to work with the federal government, they need to determine their NAICS code, which is also used by the contracting officer to select a source based on their evaluation of the industry as well as the requirements. Therefore, the contracting officer is the only entity that can authorize the federal government's commitment to a contract. As a result, the contracting officer can award, administer, and terminate a contract as the federal government's representative (Miller, 2016). On that note, the contracting officer is supposed to choose the NAICS code most suitable for a particular contract during solicitation. Moreover, to get the contract for small businesses, the contractor must fulfill the size standard of the industry correlated with the chosen NAICS code.

The NAICS groups businesses based on their production process. Consequently, every level of both the federal government and private business can apply the NAICS during publication and collection of facts associated with North American Industries based on the NAICS selection. Through their contracting officers, entities impact how small businesses can take part in government contracting. Luis Miranda noted that contracting officers can be assisted by small business professionals, resulting in a broad selection range during the NAICS consideration process (Miranda, 2014). Therefore, NAICS code choice can influence small businesses both positively and negatively. However, contracting officers are federally required to give the maximum number of chances to small businesses, and errors can violate the FAR 19.201 (2012) (Miranda, 2014).

## **F. SUMMARY**

The chapter discussed federal procurement and government contracting processes as well as the types of businesses involved (large and small business). However, since large business can monopolize federal contacts, the government has created legislation and application processes such that small businesses have the best opportunity to win government contracts. Significantly, this small business support honors the U.S. manifesto of equal distribution of the national budget. However, challenges exist when it comes to contracting, but federal contracting processes and laws continue to evolve based on what best serves both the government and the contractors. Hopefully, we continue to create solutions for existing challenges in contracting.

As previously discussed, the purpose of this research is to assess if there is a difference in labor cost between large and small businesses in a specific NAICS code, 541330 (Engineering Services). The methodology used in this research will now be discussed in the next chapter.

### **III. METHODOLOGY**

#### **A. INTRODUCTION**

This chapter describes the research design for this analysis of contract labor costs. It also presents the data collection procedures and the analytical methods used to compare large and small labor costs. The chapter ends with a brief concluding summary.

#### **B. RESEARCH DESIGN**

This analysis adopts an exploratory research design because there are few prior studies comparing labor costs between small and large businesses. The scope of the empirical analysis is to uncover new viewpoints and to develop a suitable groundwork for conducting more comprehensive research in the future. Exploratory research design is not used in studies where preexisting theory would predict a given outcome, therefore the study outcomes will be used for a following inquiry to attain definite results for a specific problem (Sreejesh, Mohapatra & Anusree, 2014). In this case, it is unknown whether large or small businesses will have different labor cost rates or whether there would be a consistent pattern of cost differential.

One drawback to this approach is that it may be less useful in decision making at the managerial level. Additionally, the small sample size may limit capacity to externalize the results to a broader population. The purpose of this study is to help identify future questions relating to the cost differential between large and small business contracts.

The scope of the analysis is narrowed to a single class of industrial activity, as identified under the North American Industry Classification System (NAICS). This helps to ensure that the type of activities performed by individual labor classes are sufficiently similar for the purposes of comparison. The NAICS code used for this analysis is Engineering Services (NAICS code 541330). The analysis is conducted by drawing a sample of contracts from this NAICS code and then comparing the labor cost rates across similar large and small contracts.

The analysis uses secondary data acquired from the NAVAIR Business Objects system. The data is classified as an internal source since the secondary data is readily accessible in the organization. According to NAVAIR Office of Small Business Programs, Business Objects specializes in business intelligence. The data are used internally for performance management, planning, reporting, query and analysis. Secondary data is time and again the initial material for data gathering in as much as it is the primary category of records to be collected (Lancaster, 2005).

### **C. DATA COLLECTION**

A quantitative analysis was conducted to compare the labor costs in both small and large business contracts for a single class of Engineering Services (NAICS code 541330). This quantitative approach was adopted in order to compare and analyze labor costs in similar NAICS codes, to identify the impact of labor hours and place of performance on the labor rates as well as in identifying whether awarding contracts with small business push costs to the government. The research sample was drawn from the Business Objects system which warehouses different data combined from Federal Procurement Data System - Next Generation (FPDS-NG), Navy Enterprise Resource Planning (ERP) and other databases of all contracts awarded. The specific fields queried from the system were Labor Category, Business Size Selected (Small Business or Other than Small Business/Large Business), Labor Rate, Total Labor Hours and the Business Activity (Place of Performance) of contracts awarded in FY15 and FY16. The Business Activities were:

1. NAVAIR Headquarters (HQ/PEO) - Patuxent River, MD
2. Commander, Fleet Readiness Center (COMFRC) - Patuxent River, MD
3. Naval Air Warfare Center, Aircraft Division (NAWC AD) - Lakehurst, NJ
4. Naval Air Warfare Center, Weapons Division (NAWC WD) – China Lake, CA

The report contained over 200 distinct labor categories. A labor category refers to a specific type of labor performed under the contract. Only a subset of labor categories was

used with sufficient frequency to make comparison feasible. The researcher selected the labor categories listed in Table 1 from Management and Technical functional groups on the basis of data availability.

Table 1. Labor Categories for Engineering Services. Adapted from NAVAIR Business Objects (2018)

<b>Management Functions</b>	<b>Technical Functions</b>
Administrative Assistant	Engineer/Scientist Level 1
Analyst	Engineer/Scientist Level 5
Logistics Analyst	
Program Analyst	
Program Manager	

#### **D. DATA ANALYSIS**

This section will describe the model used to evaluate labor costs. The steps of the data analysis used in the research is illustrated in Figure 4.

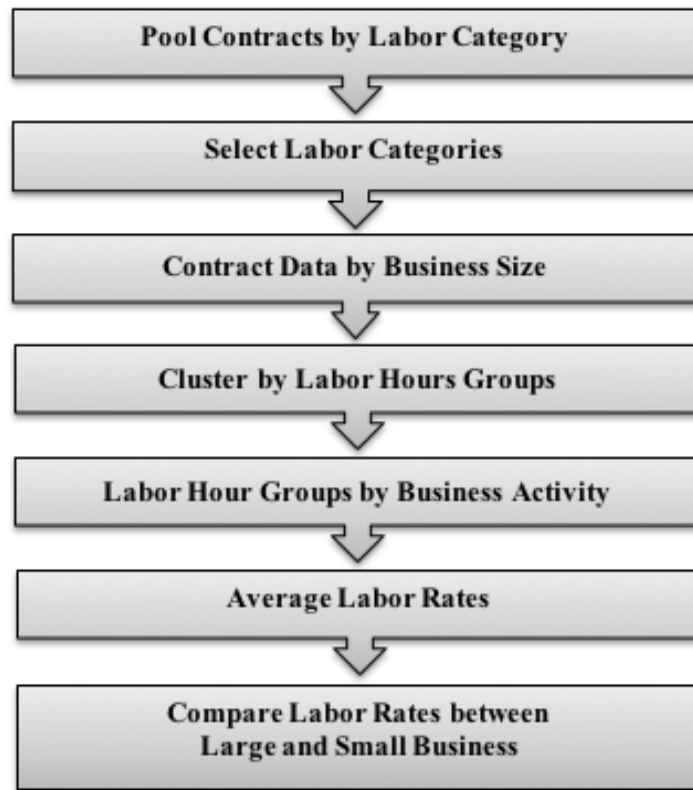


Figure 4. Data Analysis Steps

First, the required data from NAICS code 541330 were queried in the Business Objects database then pooled all the contracts from FY15 and FY16 by Labor Category. Not all labor categories in the data collected had contracts awarded to both small and large businesses. Only labor categories that had sufficient observations in both categories were included in the sample. The contract data of each Labor Category were divided into small business and large business. There was a wide range of Labor Hours awarded for each Labor Category, so it was clustered into groups of labor hours (Table 2).

The sample size in this research was selected based on Cluster Analysis, whose key objective is to associate observations into clusters such that each respective cluster formed is identical or comparable to each other (Sreejesh, et al., 2014). Clustering was an effective tool that ensured that the data collected was adequate and of quality to support the goals of the study.

Table 2. Labor Hours Group. Adapted from NAVAIR Business Objects (2018)

<b>LABOR HOURS GROUP</b>
> 5,000
4,000 - 4,999
3,000 - 3,999
2,000 - 2,999
1,000 - 1,999
500 - 999
100 - 499
0 - 99

The researcher then separated each cluster of Labor Hour Groups by Business Activity. The appropriate Labor Hour Group and Business Activity, with a suitable number of contracts, was selected to be used for comparison. The Labor Rates were then averaged for each Business Activity and Labor Hour Group. The analysis was done by comparing the Labor Rates of the same Labor Category in the same Activity between small and large business and comparing Labor Rates of same Labor Category in a different Activity between Small and Large Business. Engineering activities are separated into two functional groups: Management and Technical. Table 3 summarizes the labor hour categories and hours charged by business activity for the management functional group. Table 4 does the same for the Technical functional group.

Table 3. Number of Contracts for Engineering Services (Management Functional Group). Adapted from NAVAIR Business Objects (2018)

LABOR CATEGORY (MANAGEMENT FUNCTIONAL GROUP)	BUSINESS SIZE BUSINESS ACTIVITY	LARGE				SMALL			
		HQ/PEO	COMFRC	NAWC AD	NAWC WD	HQ/PEO	COMFRC	NAWC AD	NAWC WD
ADMINISTRATIVE ASSISTANT	LABOR HOURS GROUP								
	>5,000	1	0	6	0	3	1	7	1
	4,000 - 4,999	0	0	0	0	2	0	0	0
	3,000 - 3,999	0	0	3	0	12	1	1	1
	2,000 - 2,999	5	0	7	0	13	0	1	1
	1,000 - 1,999	6	0	15	5	29	2	6	2
	500 - 999	5	0	11	3	22	2	4	1
	100 - 499	5	0	10	4	23	4	4	2
	0 - 99	4	0	3	5	13	4	2	1
	NUMBER OF CONTRACTS	26	0	55	17	117	14	25	9
ANALYST	LABOR HOURS GROUP								
	>5,000	7	0	6	0	5	0	11	1
	4,000 - 4,999	7	0	0	0	2	0	0	0
	3,000 - 3,999	1	5	3	1	1	1	0	1
	2,000 - 2,999	18	0	2	0	13	2	10	0
	1,000 - 1,999	26	0	9	1	22	7	19	1
	500 - 999	19	0	13	0	18	7	6	0
	100 - 499	24	1	10	1	23	14	10	2
	0 - 99	11	0	6	0	2	10	8	6
	NUMBER OF CONTRACTS	113	6	49	3	86	41	64	11
LOGISTICS ANALYST	LABOR HOURS GROUP								
	>5,000	13	1	3	0	2	17	11	1
	4,000 - 4,999	0	0	2	0	0	3	5	0
	3,000 - 3,999	3	0	2	0	2	9	3	0
	2,000 - 2,999	5	2	3	0	4	16	14	1
	1,000 - 1,999	14	1	22	0	7	36	59	1
	500 - 999	9	2	14	0	8	9	38	2
	100 - 499	9	1	18	0	6	24	48	0
	0 - 99	2	0	7	0	1	6	11	0
	NUMBER OF CONTRACTS	55	7	71	0	30	120	189	5
PROGRAM ANALYST	LABOR HOURS GROUP								
	>5,000	17	0	10	0	38	0	10	0
	4,000 - 4,999	2	0	4	1	15	0	2	0
	3,000 - 3,999	4	0	1	1	35	0	10	1
	2,000 - 2,999	8	2	10	0	53	1	11	0
	1,000 - 1,999	21	1	33	1	185	0	39	4
	500 - 999	69	1	27	3	92	2	18	1
	100 - 499	19	0	29	0	96	0	10	0
	0 - 99	8	0	22	0	42	1	25	1
	NUMBER OF CONTRACTS	148	4	136	6	556	4	125	7
PROGRAM MANAGER	LABOR HOURS GROUP								
	>5,000	2	0	1	1	0	0	2	1
	4,000 - 4,999	0	0	2	0	0	0	1	0
	3,000 - 3,999	1	0	0	1	0	0	2	1
	2,000 - 2,999	2	0	1	1	2	0	3	0
	1,000 - 1,999	12	1	11	2	12	0	25	3
	500 - 999	5	1	9	2	6	5	10	1
	100 - 499	17	2	14	12	15	12	23	10
	0 - 99	8	1	8	9	5	17	2	4
	NUMBER OF CONTRACTS	47	5	46	28	40	34	68	20

Table 4. Number of Contracts for Engineering Services (Technical Functional Group). Adapted from NAVAIR Business Objects (2018)

LABOR CATEGORY (TECHNICAL FUNCTIONAL GROUP)	BUSINESS SIZE	LARGE				SMALL			
	BUSINESS ACTIVITY	HQ/PEO	COMFRC	NAWC AD	NAWC WD	HQ/PEO	COMFRC	NAWC AD	NAWC WD
ENGINEER/SCIENTIST I	LABOR HOURS GROUP								
	>5,000	7	0	21	0	0	1	11	3
	4,000 - 4,999	1	0	2	1	0	0	5	0
	3,000 - 3,999	0	0	4	0	1	0	6	1
	2,000 - 2,999	8	0	20	4	8	2	13	1
	1,000 - 1,999	5	7	41	3	18	2	51	0
	500 - 999	6	1	41	3	7	4	24	3
	100 - 499	6	1	27	6	9	2	37	3
	0 - 99	3	0	7	4	5	1	6	0
	NUMBER OF CONTRACTS	<b>36</b>	<b>9</b>	<b>163</b>	<b>21</b>	<b>48</b>	<b>12</b>	<b>153</b>	<b>11</b>
ENGINEER/SCIENTIST V	LABOR HOURS GROUP								
	>5,000	6	0	12	1	1	0	5	3
	4,000 - 4,999	1	0	2	0	0	1	1	1
	3,000 - 3,999	1	0	4	2	0	1	1	0
	2,000 - 2,999	5	0	15	3	7	0	14	4
	1,000 - 1,999	8	1	31	9	12	4	26	3
	500 - 999	6	2	28	5	10	3	24	1
	100 - 499	3	0	35	14	9	2	19	2
	0 - 99	8	0	10	8	4	0	3	1
	NUMBER OF CONTRACTS	<b>38</b>	<b>3</b>	<b>137</b>	<b>42</b>	<b>43</b>	<b>11</b>	<b>93</b>	<b>15</b>

The appropriate Labor Hour Group and Business Activity, with a suitable number of awarded contracts, was selected to be used for comparison as shown in Table 5. Labor Hour Groups that are not fitted for comparisons between small and large business were dropped.

Table 5. Labor Hour Group and Business Activity for Engineering Services.  
Adapted from NAVAIR Business Objects (2018)

LABOR CATEGORY (MANAGEMENT FUNCTIONAL GROUP)	BUSINESS SIZE	LARGE		SMALL	
	BUSINESS ACTIVITY	HQ/PEO	NAWC AD	HQ/PEO	NAWC AD
ADMINISTRATIVE ASSISTANT	LABOR HOURS GROUP				
	1,000 - 1,999	6	15	29	6
	500 - 999	5	11	22	4
	100 - 499	5	10	23	4
	NUMBER OF CONTRACTS	16	36	74	14
ANALYST	LABOR HOURS GROUP				
	1,000 - 1,999	26	9	22	19
	500 - 999	19	13	18	6
	100 - 499	24	10	23	10
	NUMBER OF CONTRACTS	69	32	63	35
LOGISTICS ANALYST	LABOR HOURS GROUP				
	1,000 - 1,999	14	22	7	59
	500 - 999	9	14	8	38
	100 - 499	9	18	6	48
	NUMBER OF CONTRACTS	55	71	30	189
PROGRAM ANALYST	LABOR HOURS GROUP				
	1,000 - 1,999	21	33	185	39
	500 - 999	69	27	92	18
	100 - 499	19	29	96	10
	NUMBER OF CONTRACTS	109	89	373	67
PROGRAM MANAGER	LABOR HOURS GROUP				
	1,000 - 1,999	12	11	12	25
	500 - 999	5	9	6	10
	100 - 499	17	14	15	23
	NUMBER OF CONTRACTS	34	34	33	58
LABOR CATEGORY (TECHNICAL FUNCTIONAL GROUP)	BUSINESS SIZE	LARGE		SMALL	
	BUSINESS ACTIVITY	HQ/PEO	NAWC AD	HQ/PEO	NAWC AD
ENGINEER/SCIENTIST I	LABOR HOURS GROUP				
	2,000 - 2,999	8	20	8	13
	1,000 - 1,999	5	41	18	51
	500 - 999	6	41	7	24
	100 - 499	6	27	9	37
NUMBER OF CONTRACTS	25	129	42	125	
ENGINEER/SCIENTIST V	LABOR HOURS GROUP				
	2,000 - 2,999	5	15	7	14
	1,000 - 1,999	8	31	12	26
	500 - 999	6	28	10	24
	100 - 499	3	35	9	19
NUMBER OF CONTRACTS	22	109	38	83	

The Labor Rates were then averaged for each Business Activity and Labor Hour Group. The analysis was done by comparing the Labor Rates of the same Labor Category between large and small business.

#### **E. SUMMARY**

This chapter explained the method adopted in the study. The research design adopted in this study was an exploratory research design which is normally used in instances where there is limited data and studies used for referencing purposes. In addition, the researcher adopted an exploratory research design since the studies in the scope are limited and the data available when referencing as a comparison is made between the large and small businesses. In this study, the research sample was drawn from the Business Objects system. A cluster analysis was used in selecting the sample size and observations were combined into groups based on their similarities. Data analysis was conducted in seven steps and they included collecting data from the system, pooling contracts from FY15 and FY16 based on labor categories, selecting suitable labor categories, contract data based on the size of businesses (small and large), cluster by labor hour groups, selecting labor hour groups based on business activity, averaging labor rates, making a comparison of labor rates in the same business and in different business activities. The next chapter will focus on a discussion of the results obtained.

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## IV. FINDINGS AND DISCUSSION

### A. INTRODUCTION

Chapter IV discusses the results from comparing and analyzing labor costs in small and large business contracted by the federal government for engineering services. Table 6 presents study results according to labor categories, business activity, and place of performance. The study uses the t-test to compare the two independent samples, assuming the two samples have unequal variance. The chapter details the findings for each of the seven labor categories.

Table 6. Difference-in-Means 2 tailed t-Test Comparing Large and Small Business Labor Rates. Adapted from NAVAIR Business Objects (2018).

LABOR CATEGORY (MANAGEMENT FUNCTIONAL GROUP)	BUSINESS ACTIVITY	HQ/PEO			NAWC AD		
	t- TEST	MEAN	VARIANCE	P VALUE	MEAN	VARIANCE	P VALUE
ADMINISTRATIVE ASSISTANT	BUSINESS SIZE						
	LARGE	\$ 42.89	122.82	0.375	\$ 44.41	144.71	0.513
	SMALL	\$ 40.19	104.05		\$ 42.21	104.69	
ANALYST	BUSINESS SIZE						
	LARGE	\$ 84.29	568.43	0.001 ***	\$ 74.02	432.99	0.926
	SMALL	\$ 70.12	594.95		\$ 74.62	960.29	
LOGISTICS ANALYST	BUSINESS SIZE						
	LARGE	\$ 65.51	537.40	0.054 *	\$ 76.21	347.90	0.022 **
	SMALL	\$ 73.32	183.88		\$ 70.40	250.47	
PROGRAM ANALYST	BUSINESS SIZE						
	LARGE	\$ 78.97	715.28	0.000 ***	\$ 86.71	720.39	0.001 ***
	SMALL	\$ 66.31	517.71		\$ 76.52	431.51	
PROGRAM MANAGER	BUSINESS SIZE						
	LARGE	\$ 119.20	2766.53	0.091 *	\$ 120.26	1309.03	0.000 ***
	SMALL	\$ 104.21	707.86		\$ 93.92	695.62	
LABOR CATEGORY (TECHNICAL FUNCTIONAL GROUP)	BUSINESS ACTIVITY	HQ/PEO			NAWC AD		
	t- TEST	MEAN	VARIANCE	P VALUE	MEAN	VARIANCE	P VALUE
ENGINEER/SCIENTIST I	BUSINESS SIZE						
	LARGE	\$ 99.90	1938.99	0.032 **	\$ 98.80	774.77	0.002 ***
	SMALL	\$ 81.76	659.56		\$ 89.46	602.42	
ENGINEER/SCIENTIST V	BUSINESS SIZE						
	LARGE	\$ 129.32	2253.16	0.002 ***	\$ 121.39	360.14	0.000 ***
	SMALL	\$ 100.79	750.70		\$ 110.39	492.76	

Legend: \* p < .1. \*\* p < .05. \*\*\* p < .01

## **B. MANAGEMENT FUNCTIONAL GROUP**

The management labor category is divided into five sub-categories that include administrative assistant, analyst, logistics analyst, program analyst, and program manager. The difference in the mean labor rates across large and small businesses varies widely across labor categories. In the Administrative Assistant Sub-category, the average labor rate for large businesses working at the NAVAIR Headquarters (HQ/PEO) is \$42.89 while for small businesses the average is only \$40.19. A t-test to assess this difference, however, shows that it is not statistically significant. Similarly, in the Naval Air Warfare Center, Aircraft Division (NAWC AD), large businesses pay administrative assistants \$44.41 per hour while small businesses pay an hourly rate of only \$42.21. A t-test also finds this difference not statistically significant. The similar labor rate for small and large business at NAWC AD and at HQ/PEO indicates that both business contracts may not be very different, and the roles played by administrative assistants at different-sized firms are similar.

The average labor rates for an analyst working in a large business operating at HQ/PEO is \$84.29. For an analyst working in a small business operating at HQ/PEO, the average labor rate is \$70.12 with a standard deviation of \$24.39. A comparison of the mean using t-test gives a p-value of 0.000, which is less than 5%. Therefore, the average labor rate for analysts is less in a small business compared to a large business at the HQ/PEO. This may indicate that analysts in large businesses have higher work requirements compared to analysts in small businesses and, therefore, have higher labor rates. Small businesses may also pay less compared to large businesses if they face additional costs in contract performance as these costs would likely increase operation costs.

For the NAWC AD, large businesses pay an average labor rate of \$74.02 for an analyst while small businesses, on average, pay \$74.62. The p-value of the t-test is 0.925, more than 5%. The statistic shows that the average labor rate in small and large business operating at NAWC AD are not statistically different. The equal labor rate may be due to an equal level of work requirement for analysts in small and large businesses that operate at NAWC AD. In HQ/PEO, large businesses pay more for analysts, but at NAWC AD, large and small pay essentially the same labor rate.

Logistics analysts working in large businesses that operate at HQ/PEO have an average labor rate of \$65.51 while small businesses pay an average of \$73.32. The t-test has a p-value of 0.053, which is almost equal to 5% meaning the test result is marginally significant at the 10% level. Therefore, the logistics analysts' average labor rate is high for small business compared to large business. The different average labor rate suggests that small and large business may face different costs in contract performance at HQ/PEO, and the logistic analysts may have different level of work requirement. At NAWC AD, large businesses pay an average labor rate of \$76.21 for a logistic analyst while small businesses pay an average of \$70.40. The t-statistic has a p-value of 0.021, which is less than 5%. The result indicates that the average labor rate for a logistic analyst is lower in small businesses than in large businesses that operate at NAWC AD. The different labor rates may indicate different work requirement of workers or costs in contract performance. Furthermore, logistics analysts working in large businesses have a higher average labor rate at NAWC AD than at HQ/PEO. However, logistic analysts' average labor rate in small businesses is higher at HQ/PEO than at NAWC AD. So, at HQ/PEO, the smaller businesses pay more, in NAWC AD the larger businesses pay significantly more.

Program analysts have an average labor rate of \$78.97 for large businesses operating at HQ/PEO while small businesses pay \$66.31. The t-test gives a p-value of 0.000, which is less than 5%. Therefore, the average labor rate for program analysts is less for small businesses than for large businesses. Furthermore, the average labor rate of program analysts in a large business operating at NAWC AD is \$86.71 while small businesses pay \$76.52. The t-test gives a p-value of 0.000, which is less than 5%. Therefore, small businesses have a lower average labor rate compared to large businesses. The lower labor rate suggests that small businesses are effective both at place of performance and service delivery. A comparison between the two location indicates that average labor rates are higher at NAWC AD for program analysts, both for small and large businesses.

Program managers working in large businesses operating at HQ/PEO have an average labor rate of \$119.20 while small businesses' average labor rate at the same location is \$104.21. The t-test gives a p-value of 0.091, which is more than 5%. Therefore,

the difference in means is only marginally statistically significant. At NAWC AD, large businesses pay an average labor rate for program managers of \$120.26 while small businesses pay \$93.92. We do see a difference in program manager compensation that is much higher in large businesses. The difference is almost \$30 per hour and it is statistically significant. The comparison of the mean gives a p-value of 0.000, which is less than 5%. Therefore, average labor rate for program managers working in small businesses operating at NAWC AD is less than that of large businesses. The differences may be due to differences in contract performance costs and work requirement of program managers. Furthermore, large businesses at NAWC AD have a higher average labor rate than at HQ/PEO. For small businesses, the average labor rate is higher at HQ/PEO than at NAWC AD.

### **C. TECHNICAL FUNCTIONAL GROUP**

The technical labor category has two sub-categories: Engineer/Scientist I and Engineer/Scientist V. An Engineer/Scientist I at large businesses operating at HQ/PEO receives an average labor rate of \$99.90 while the small businesses pay an average labor rate of \$81.76. The comparison of the means has a p-value of 0.031, which is less than 5%. Therefore, a person working as an Engineer/Scientist I in a small business operating at HQ/PEO receives a lower average labor rate as compared a person who serves in the same capacity for a large business. At NAWC AD, Engineer/Scientist I in large businesses have an average labor rate of \$98.80 while, in small businesses, scientists working in the same category have an average labor rate of \$89.46. A comparison of the means using t-test has a p-value of 0.001, which is less than 5%. Therefore, small businesses operating at NAWC AD have a lower average labor rate compared to large businesses. The difference in labor rate may be due to different costs of contract performance and scientist work requirement. Furthermore, a person serving as an Engineer/Scientist I for a large business receives a higher average labor rate at HQ/PEO than in NAWC AD. The small business average labor rate for Engineer/Scientist I is higher at NAWC AD than HQ/PEO.

For Engineer/Scientist V, large businesses have an average labor rate of \$129.32 in HQ/PEO while small businesses have an average labor rate of \$100.79. A comparison of the means using t-test gives a p-value of 0.001, which is less than 5%. Therefore, small

businesses have lower average labor rates than large businesses operating at HQ/PEO. At NAWC AD, an Engineer/Scientist V in a large business has an average labor rate of \$121.39 while small businesses pay an average labor rate of \$110.39. A comparison of the mean using t-test gives a p-value of 0.000, which is less than 5%. Therefore, small businesses have lower average labor rate than large businesses. Furthermore, large businesses have a higher average labor rate at HQ/PEO than at NAWC AD. For small businesses, the average labor rate is higher at NAWC AD than at HQ/PEO. The cost contract performance and work requirements may be the major driver of the differences in average labor rate.

#### **D. SUMMARY**

The analysis found that, generally, for businesses with contracts at HQ/PEO, small businesses pay lower average labor rates than large businesses, except in the case of logistic analysts. The analysis also found that, for businesses operating at NAWC AD, small businesses pay a lower average labor rate compared to large businesses, except for Administrative Assistant and Analyst sub-categories. Furthermore, average labor rates differ widely at HQ/PEO and NAWC AD, both for small and large business.

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## **V. SUMMARY, CONCLUSIONS, AND AREAS FOR FURTHER RESEARCH**

### **A. SUMMARY**

The Department of the Navy spends billions of dollars in Engineering Services contracts. These contracts are awarded to both small and large businesses. Small and large businesses propose different prices for each labor categories. Regardless of how the contracts are awarded, the government contracting officers must still ensure that there is a full and open competition and that there is a fair and reasonable price for the award of any DoD contract. The purpose of the research was to assess whether there are cost differentials between large and small business contracts under a specific NAICS code, 541330, Engineering Services. This specific code is the number one NAICS code for small businesses.

The specific study objectives were: first, to compare and analyze labor costs for contracts with similar NAICS codes awarded to small and large businesses that provide engineering services; second, to determine if labor hours and place of performance affect labor cost; third, to determine if awarding contracts with small businesses drives up costs to the government. The study focused on cost differentials among DoD contracts with NAICS code 541330 awarded to small and large business. Using a quantitative approach, specifically summary statistics and t-test statistics, the study analyzed data to determine the impact of labor hours and place of performance on labor rates and whether making contracts with small businesses push up costs to the government. Essentially, the study found that small businesses have lower labor rates than large businesses.

### **B. CONCLUSIONS**

To answer the research questions, the study collected and analyzed data on small and large businesses, labor rates, labor categories, labor hours and place of performance. The results lead to the following conclusions.

1. What are the labor costs in similar NAICS code of awarded contracts to small and large business engineering services?

The study found that labor costs for contracts awarded to small and large businesses under NAICS code 541330, Engineering Services, differ. The labor rates of small businesses are generally less compared to those of large businesses at both locations. NAVAIR may be paying a premium by awarding contracts to large businesses for both managerial and technical job categories, and NAVAIR may get more value by awarding these contracts to small businesses.

2. Does labor hours and place of performance affect the labor cost?

The study found that places of performance do affect labor cost. Small and large businesses have different average labor rates at HQ/PEO and NAWC AD. Managerial jobs have a generally higher labor rate in NAWC AD compared to HQ/PEO for both small and large businesses. Technical jobs in large businesses have a higher labor rate in HQ/PEO compared to NAWC AD but is the opposite in small businesses. Technical jobs in small businesses have a higher labor rate in NAWC AD compared to HQ/PEO.

3. Does awarding contracts with small business drive up costs to the government, and if so, by how much?

The study found that, generally, small businesses have lower average labor rates than large businesses. These findings indicate that small firms tend to offer lower labor rates compared to larger firms. Large businesses may employ better educated and skilled workers compared to small businesses, which can be the case with technical workers like engineers where larger businesses are able to attract the most qualified engineers. Second, larger businesses sometimes have higher work requirements compared to smaller businesses. Third, large businesses have more market power and hence can attain higher labor rates. Fourth, since it may be harder to monitor employees in large businesses, they often pay higher labor rates to deter workers from shirking. Essentially, awarding contracts to small businesses does not drive up the costs of government contracts.

### **C. AREAS FOR FUTURE RESEARCH**

Considering limitations from scope, data, and methodology, the study recommends that future researchers could consider the following questions:

- (1) How do labor rates affect small businesses' performance?
- (2) Do federal government contracts improve overall small business performance?
- (3) Do work requirement differentials and level of competition explain the differences between small and large businesses' different labor rates?

The study recommends that future researchers also collect Contract Line Item Number (CLIN) level data. They could use that data to investigate how work requirement differentials affect labor rates. Differentials in costs due to work requirement levels at firm levels may be driving costs. While small businesses operate in competitive markets, market structure may be the main driver of cost differentials. Therefore, future researchers could determine how market structure affects labor rates. Moreover, future researchers could use a methodology that controls for other factors that affect labor rates and find additional results.

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