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JOINT APPLIED PROJECT REPORT

ELEMENTS THAT LEAD TO GOVERNMENT BID PROTEST AND WHETHER UNCERTAINTY IN THE PROCUREMENT ENVIRONMENT IS A CONTRIBUTING FACTOR

June 2020

**By: Jeffrey A. Brescini
Nick J. Giacalone**

**Advisor: Janie L. Maddox
Co-Advisor: James Paris,
NAVSUP Fleet Logistics Center**

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**ELEMENTS THAT LEAD TO GOVERNMENT BID PROTEST AND WHETHER
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CONTRIBUTING FACTOR**

Jeffrey A. Brescini, Civilian, Department of the Navy
Nick J. Giacalone, Civilian, Department of the Navy

Submitted in partial fulfillment of the
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from the

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Approved by: Janie L. Maddox
Advisor

James Paris
Co-Advisor

Brett M. Schwartz
Academic Associate, Graduate School of Defense Management

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

COFC	United States Court of Federal Claims
DOD	Department of Defense
FAR	Federal Acquisition Regulation
FEDBIZOPPS	Federal Business Opportunities
FPDS-NG	Federal Procurement Data Base System Next Generation
GAO	Government Accountability Office
HCA	Head of the Contracting Activity
HQMC, I&L	Installations and Logistics, Headquarters Marine Corps
LPTA	Lowest Price Technically Acceptable
NAVFACENCOM	Naval Facilities Engineering Command
NAVSUPSYSCOM	Naval Supply Systems Command
MAS	Multiple Award Schedule
MSC	Military Sealift Command
PALT	Procurement Actions Lead Time
SAP	Simplified Acquisition Procedures
SPSS	IBM SPSS Software Version 26
U.S.C.	United States Code

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I. INTRODUCTION

The Navy faces an ever-changing procurement environment with ongoing focus on speed to produce. As the procurement process speeds up, the time to define requirements and set acquisition plans in motion decreases. Over the last few years, procurement rule changes now focus on a more subjective approach to source selection. The Navy now procures more services than supplies, which require less definite requirements. All of this injects uncertainty into the acquisition environment, which industry may not fully grasp, and may make Navy acquisitions more susceptible to protest.

This study examines factors that affect uncertainty and other elements that drive industry to protest Navy acquisitions. This research compares those subjective type procurement elements to the odds of a General Accountability Office (GAO) protest on Navy acquisitions. Past research shows the results of contracting officers' prepotency to avoid protests (Hawkins et al., 2016); this study, however, focuses on industry's prepotency to protest. Additionally, the team found a broader study similar to the methodology used herein conducted on the whole of the Department of Defense (DOD; Maser & Thompson, 2010).

A. PURPOSE AND RESEARCH QUESTION

This project focuses on the Navy's contracting and the protest process. The protest process allows interested parties to challenge either the pre-award process or the award decision. Many factors come into the decision making process for interested parties to protest the Navy's award decision. This project provides insight into those factors within an acquisition, potentially encouraging interested parties to protest either from an economic standpoint or from a pure desire for oversight.

Two perspectives exist within government contracting protests, that from within government walls and that from private industry. Private industry's point of view tends to focus on what, when, how, and why firms should file bid protests. On the other hand, the government's perspective focuses on decision making in the acquisition cycle to avoid bid protests.

The ultimate goal of this study should identify procurement variables through a logistic regression model, as explained in Chapter III, to predict protest probability from industry on a given Navy contract action. The variables focus on elements tied to uncertainty in the acquisition environment. The team established variables and utilized logistical regression analysis to determine statistical significance in relation to GAO protests received. This analysis shall allow contracting officers to determine the probability acquisition elements lead to protests. This research project intends to answer two questions: which elements of acquisition translate into a protests from industry? Secondly, do elements of uncertainty contribute to protest probability?

This research hopes to provide an important tool to acquisition teams to understand which elements lead to protest to assist in planning and execution of contract actions. The content will identify specific procurement elements that correlate, positively or negatively, to bid protests and provide the Navy recommendations to identify the risks of certain procurement elements contributing bid protests.

Protests add a significant delay to the award cycle. GAO requires 100 days to render a decision. Contracting officers, under normal circumstances, must stay contract performance until GAO renders a decision (FAR 33.1, 2020). Further, in the event GAO sustains the protest, this may require the Navy to resolicit the requirement and pay the protestor legal costs. A new competition of a significant magnitude takes many months to complete and in some instances years (GAO, 2018b, p. 12).

For mission critical services, a protest may translate to awarding a sole source, non-competitive contract to an incumbent for the sole purpose of continuing services until a new contract is awarded (GAO, 2015, p. 26). These sole source actions, commonly referred to as bridge contracts, put the Navy in a position of low leverage with an incumbent contractor to negotiate and avoid excess of costs (GAO, 2015, p. 1). Additionally, a command may lack the budget to fund this unforeseen action.

A desire to avoid protests within the Navy exists not just on purely economic grounds but from a mission support need. As the Navy turns away from government support staff to contractor support, any protest may result in a lapse to contractor provided

critical support services, which potentially affect the agency's mission. The source selection process must account for elements, while not necessary outside the rules or regulatory framework, but may increase the probability of industry protests delaying a contract award.

B. SCOPE AND LIMITATIONS

This study utilizes data from the most recent completed fiscal year. The team utilized sets from various government databases, which include the GAO docket and Federal Procurement Data Base System Next generation (FPDS-NG). The team cross-referenced data from FPDS-NG to locate solicitations posted publicly on the government's point of entry, Federal Business Opportunities (FEDBIZOPPS), for posting contract actions during fiscal year 2019.

The team limited this study to those actions made publicly available on the government's point of entry. The team held no ability to access restrictive websites or actions made entirely on in house contract writing systems. The study limited the data set to actions over \$25M as the Federal Acquisition Regulations (FAR) limits private industry's ability to protest certain contract actions below this dollar amount (FAR 16.505, 2020).

The analytic approach includes: (1) A discussion of each variable; (2) Preliminary data analysis of key predictors; (3) A logistic regression to identify predictors, which lead to GAO protests within the Navy; and (4) Results of the study.

C. ORGANIZATION

The team divided this joint applied project into separate chapters, to provide a logical flow of information. The project starts with an introduction, background and a brief overview in Chapter I. The literature section, Chapter II, details other studies, applicable laws and other relevant information necessary to understand this project's intent. Chapter III discusses the methodology, which includes the team's data collecting technique and identifying the predictors and generalizing a model. Chapter IV presents the results of the

model and tests associated with strength and goodness of fit for a logistic regression.
Chapter V summarizes the outcome of the study, limitations and possible extensions.

II. LITERATURE REVIEW

This chapter provides a general overview of the procurement process, bid protest process, and identification of solicitation elements commonly surrounding bid protests. Additionally, it also outlines elements of changes within Navy source selection procedures pushing the appearance of flawed selections to industry tied to uncertainty, additional limitations on private industry's ability to protest, and potential for increased protest volume. This chapter documents a thorough and comprehensive review of statutes, regulations, scholarly journals, and research theses to gain an understanding of the bid protest process and solicitation elements commonly surrounding bid protests.

Our research identifies sources in this chapter that highlight the regulatory framework of the bid protest process. The chapter identifies specific solicitation elements private industry and the government identify as possible driving factors leading to bid protests. This literature review helps identify those elements necessary for inclusion in a statistical model.

We organized the research documents and other literature into primary themes: Navy Contracting Framework, Bid Protest Process, Changes to the Acquisition Environment Which May Drive More Protests, and Other Studies on Protests. Organizing our research into themes allows us to provide a baseline of the laws, regulations, and processes of bid protests and identify common solicitation elements to use as variable elements in our statistical model.

A. NAVY CONTRACTING FRAMEWORK

1. Navy Contracting Structure

The Navy mission requires the utilization of contractors as the military and government civilian personnel lack the ability to meet the overall reach of the Navy. Therefore, in accordance with FAR 1.601 the Navy utilizes its authority as an Agency Head to enter into contracts. The Navy delegates this authority to its Head of the Contracting Activities (HCAs). The 11 Navy HCAs include:

- Deputy Assistant Secretary of the Navy (Acquisition and Procurement) (DASN(AP))
- Installations and Logistics, Headquarters Marine Corps (HQMC, I&L)
- Marine Corps Systems Command (MARCORSYSCOM)
- Military Sealift Command (MSC)
- Naval Air Systems Command (NAVAIRSYSCOM)
- Naval Facilities Engineering Command (NAVFACENGCOM)
- Naval Sea Systems Command (NAVSEASYSCOM)
- Naval Supply Systems Command (NAVSUPSYSCOM)
- Office of Naval Research (ONR)
- Space and Naval Warfare Systems Command (SPAWARSYSCOM)
- Strategic Systems Programs (SSP)

These HCAs delegate authorities to the contracting officers within the Navy and limit authority within defined mission sets. To understand the procurement environment of the Navy includes understanding the unique disposition of each of these HCAs.

Some of these HCA titles may infer which commands buy unique systems, which expand the capability of the Navy. Others specialize in unique services such as NAVFAC providing construction or MSC providing maritime support to non-military vessels. Of the 11 commands HQMC, I&L and NAVSUP focus strictly on sustainment, tactical and other mission related support. While HQMC I&L focus strictly on the Marine Corps, NAVSUP provides contracting support to all commands within the Navy lacking contracting authority.

All HCAs receive flow down authority granted from the President of The United States through the Secretary of the Navy. In the end, these separate HCAs support the Navy

warfighter. All receive similar driving outside forces influencing contract decisions including customer base, congressional mandates, regulation changes, taxpayers, budget constraints, industry and the layers of policy. Figure 1 captures these influences and contract authority flow down:

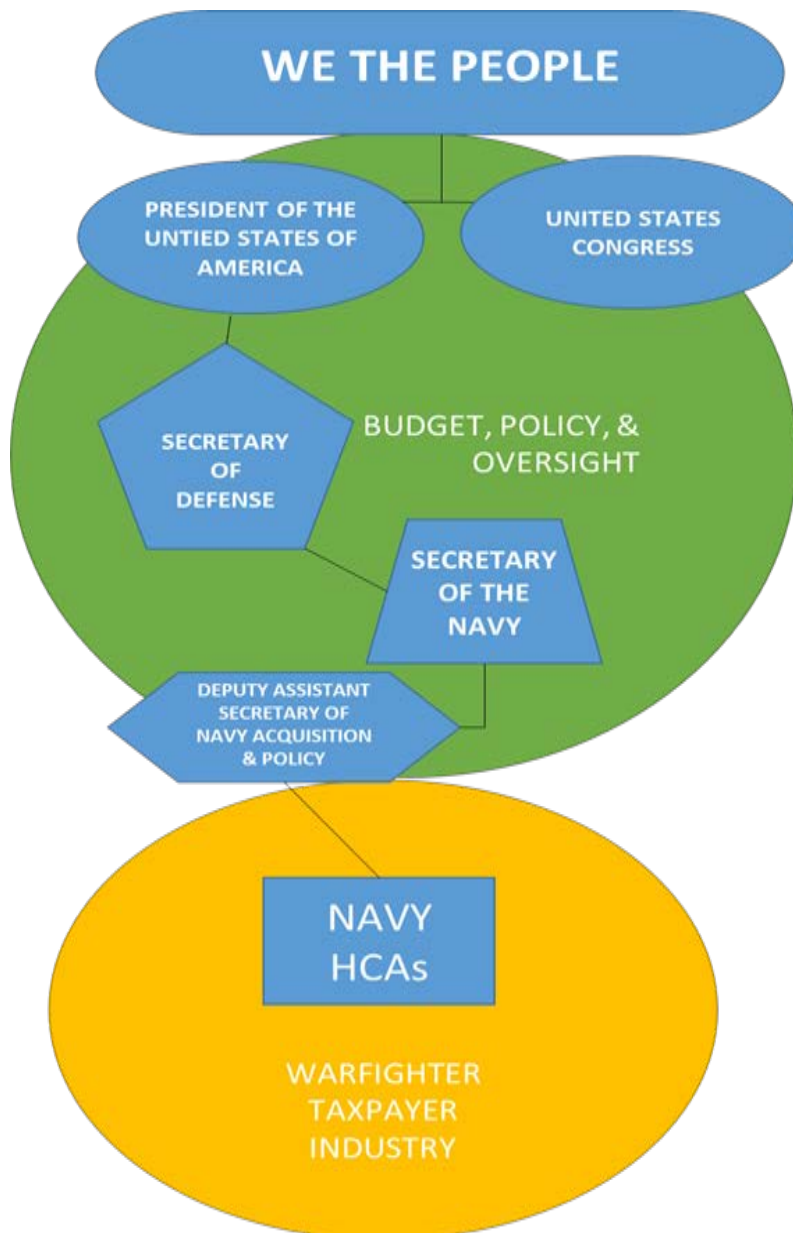


Figure 1. Contract Flow-Down and Influence

2. Navy Contracting Process Overview

The Navy acquisition team faces a complex framework of laws, regulation and policy, which it must navigate through in order to acquire the goods and services to support mission requirements. The Navy contracting officer holds the responsibility to follow and adhere to this prior to entering into any contract.

These rules and regulations include the Federal Acquisition Regulation, Defense Federal Acquisition Regulation Supplement, The Navy Marine Corps Acquisition Regulation Supplement, Head of Contracting Activity Policy, and local policy. All of these regulations attempt to meet public policy objectives while maintaining the mission needs of the Navy. A contracting officer must follow all levels of regulation and policy put on his or her Agency when executing contract actions.

The contracting officer works with the entire acquisition team to develop a strategy to procure goods and services. The contract process starts when the requiring activity identifies a need and defines the unique specifications to meet the need. The requiring activity submits their needs and specifications to the contracting officer to solidify a strategy to solicit, evaluate, award, and administer a contract. Garrett describes this process as the “The Buying and Selling Life Cycle” and details six phases as follows (Garrett, 2011, p. 20):

1. Phase 1: Requirements Determination
2. Phase 2: Solicitation planning and preparation
3. Phase 3: Opportunity and Risk Assessment
4. Phase 4: Proposal Development and Evaluation
5. Phase 5: Negotiations and Contract Formation
6. Phase 6: Contract Administration and Close Out

3. Methods of Navy Contracting

Although several methods exist, the two primary methods of contracting within the Navy are sealed bidding and contracting through negotiation (FAR 6.401, 2020). The

framework the contracting officer must follow differs between these two methods. Sealed bidding represents the statutory preferred method for soliciting and making contract awards while contracting through negotiation offers the most flexibility.

The sealed bidding method limits the ability of the contracting officer to adjust posted requirements, clarifying communications with industry, and only allows for firm fixed price awards. Under sealed bidding the contracting officer awards to only the low price responsive respondent. Contracting through negotiation allows the contracting officer to adjust the solicitation based on communications with industry, negotiations to take place, and awards to other than the lowest priced offeror.

Beyond sealed bidding and contracting by negotiation the other three types of common contracting methods, include simplified acquisition procedures (SAP), multiple award schedules (MAS), and ordering under indefinite delivery contracts.

Under SAP the contracting officer only seeks as much competition as practicable. It provides maximum flexibility through very few regulations on how to pursue this competition. It also provides the micro-purchase procedures and use of the Government Commercial Purchase Card. The Government Commercial Purchase Card allows for expedited payment that is simple for both the government and the contractor. In SAP, the government receives a quote that allows it to withdraw, amend or cancel purchase orders issued.

Under MAS procurements, the contracting officer orders off already established terms and prices. The General Services Administration awards these MAS for commercial supplies and services at discount terms. When a contracting officer locates requiring activity needs on one of these schedules he or she follows a fair opportunity process. This process only provides fair opportunity among MAS holders and the contracting officer may limit evaluation under these procedures to lowest price or award to other than the lowest price.

Under indefinite delivery contracts the contractor and government agree to pricing upfront and the Government can place orders (up to the agreed upon ceiling) during the agreed upon ordering period without formal competition procedures. These vehicles allow

the government to fill requirements on an as needed basis. Like the MAS process, the contracting officer follows a fair opportunity process, which allows for either award to the lowest price or other than the lowest price offeror.

4. Lowest Price Technically Acceptable versus Tradeoff Source Selection

The “Best Value Continuum” includes processes for both the tradeoff and lowest price technically acceptable (LPTA); (FAR 15.101, 2020). Tradeoff under the Best Value Continuum considers multiple factors with a stated order of precedence. “The hallmark of the system is that it permits the determination of best value to be after the receipt and evaluation of proposals” (Cibinic et al., 1996, p. 227). It allows a tradeoff of price for non-cost factors. The process includes evaluating non-cost factors on an equal or more important weight as price. In addition, it allows award to other than the lowest price proposal. Therefore, the government takes into account proposed enhancements, which offer a true value. The government signals to industry a willingness to pay a premium in a solicitation specifying tradeoff procedures.

The LPTA process only allows the Government to evaluate proposals against an established minimum level of acceptability defined in the solicitation. Therefore, the process includes only objective evaluation against clear solicitation requirements. The government makes award to the offer that meets these objective standards at the lowest proposed price in comparison to others received, which also meet this bar.

B. BID PROTEST PROCESS

1. FAR Part 33

FAR Part 33 provides the procedures for conducting preaward and postaward protests.

a. Preaward Challenges

Early exchanges may identify issues with the solicitation that the contracting officer failed to recognize. These communications may in turn cause the contracting officer to issue amendments to the solicitation to address the offeror’s concerns. Most contracting

officers want to make the necessary changes to a solicitation to avoid any preaward protests. The FAR allows “open and frank discussions” to resolve issues prior to a protest (FAR 33.103, 2020). The protest process takes an abundant amount of time and cost, which both parties may want to avoid.

If the contracting officer fails to clarify or issue an amendment to the solicitation that satisfies the offeror’s concerns, the offeror may protest the solicitation. The offeror must protest any solicitation prior to the closing date for receipt of proposals or bid opening date for timely consideration (FAR 33.103, 2020). The offeror may file a protest with one of the following agencies or courts (FAR 33.102, 2020):

- The Agency
- GAO
- U.S. Court of Federal Claims

When faced with a protest the contracting officer may take corrective action to the solicitation, make the changes the offeror sought, and/or request the reviewing protest agency or judge to dismiss the protest. However, if the contracting officer fails to take corrective action the requisite agency or court shall hear the protest.

Potential offerors may request the agency level protest review at least one level above the contracting officer (FAR 33.103, 2020). In the event the offeror disagrees with the adverse information, it may subsequently file a protest with GAO. Although, “any subsequent protest to the GAO must be filed within 10 days of knowledge of initial adverse agency action” (FAR 33.103, 2020).

No policy exists for the protestor to go through the agency first prior to the other avenues. If the potential offeror decides to protests directly to GAO or decides after the agency responds, it must wait for GAO to issue a decision normally within 100 days (FAR 33.104, 2020).

GAO decides to either sustain the protest (partially or in full) or deny the protest. In a sustained decision, the contracting officer takes corrective action to incorporate the

changes or resolicit completely with a new format. If denied, the contracting officer proceeds with the award process.

Both GAO and agency level protests put a stay on a contract's award until a decision is rendered. However, protests filed with U.S. Court of Federal Claim (COFC) cause no stay of performance. COFC general procedures state no timeliness factor to file a protest to the COFC, but case law exists that sets precedents for filing to take place on solicitation protests before bid opening or request for proposal closing (*Allied Tech. Group, Inc. v. United States*, 1997). The COFC also allows an appeals process. Therefore, if the offeror still decides that the solicitation fails to allow it to compete, it can file a protest with the COFC prior to bid opening or solicitation closing.

b. Post-award Challenges

An unhappy interested party that failed to receive an award should go through the post award protest process. To succeed the protestor must demonstrate itself as an interested party, that agency acted without a rational basis, violated law and, that the protestor was prejudiced.

The offeror must submit a protest within 10 days of knowledge of the adverse action for both agency level and GAO actions (FAR 33.103, 2020). If the protest is filed within 10 days of knowledge of the adverse action or within five days of the debrief, the contracting officer must stay performance for GAO and for agency level protests (FAR 33.103, 2020).

Upon request, the protestor may request at least one level review above the contracting officer. If the agency sustains the protest, the contracting officer must resolicit the procurement. In the event the agency denies the protest, the procurement process continues and performance continues. The protestor may subsequently file a protest to GAO within ten days of agency dismissal.

As discussed above the agency, upon receipt of the protest, shall suspend award. For GAO award protests, as with solicitation protests, the agency shall draft an agency report and detail all the applicant documents that support its decision. The protestor shall

receive a chance to review this report and documents and file subsequent protest within 10 days of discovery. If GAO sustains the protest, the agency must take corrective action, which may include resoliciting and paying contractor bid cost and attorney fees.

If the interested party decides to protests directly to GAO or decides after the agency responds it must wait for GAO to issue a decision normally within 100 days. The protestor can appeal the decisions or go directly to the COFC and follow the procedures at (FAR 33.105, 2020). No policy exists that prevents the protestor to go directly to GAO or the Agency before going to the court. This comprises of a much costlier process that includes a formal documentation trail, discovery, and witness testimony.

2. U.S.C. 21 Bid Protest Regulations

Title 4, Chapter 21 of the United States Code (U.S.C.), titled Bid Protest Regulations, provides the roles, responsibilities, and procedures for filing a bid protest with the GAO. These regulations define periods and information protestors must comply with and provide in order for GAO to review, hear, and deliver a decision. Additionally, these regulations provide the required actions of the protested agency as well as the actions and considerations of the GAO.

Of particular relevance to our research, 4 U.S.C. 21.5 defines protest issues not for GAO's consideration. Thus, providing a list of solicitation elements not to consider as variable elements in the statistical analysis. GAO will dismiss bid protests filed under the following bases:

- Contract Administration
- Small Business Administration (SBA) issues including Small business size standards and North American Industry Classification System (NAICS) standards, Small Business Certificate of Competency Program, Procurements under section 8(a) of the Small Business Act
- Affirmative determination of responsibility by the contracting officer
- Procurement Integrity
- Protests not filed with the GAO or the agency with required time limits at 4 U.S.C. 21.2
- Protests lacking a detailed statement of the legal and factual grounds of protest required by 4 U.S.C. 21.1(c)(4), or that fail to clearly state the legally sufficient grounds of the protest required by 4 U.S.C. 21.1(f)

- Procurements by agencies other than Federal agencies as defined by sec. 3 of the Federal Property and Administrative Services Act of 1949, 40 U.S.C. 102—e.g., the U.S. Postal Service (USPS) and the Federal Deposit Insurance Corporation (FDIC).
- Subcontract Protests
- Suspensions and debarments
- Competitive range
- Decision whether or not to file a protest on behalf of Federal employees
- Protest of orders issued under task or delivery order contracts
- Protest of awards, or solicitations for awards, of agreements other than procurement contracts. (Bid Protest Regulations, 1996)

3. “Understanding the Bid Protest Process”

The article “Understanding The Bid Protest Process” (Fausti & Malamud, 2007) describes in detail the three arenas to file a bid protest: The Court of Federal Claims, the procuring agency, and the GAO. Fausti and Malamud briefly explain different expectations when choosing which arena to file a protest:

Although the choice depends on the facts of your case, it is possible to make certain generalizations that will assist in making this decision. If the protest is filed in the Court of Federal Claims, be prepared to endure a lengthy and costly process. If the protest is filed directly with the procuring agency, although far less costly and less time-consuming, do not expect a detailed explanation of the agency’s procurement decision or that the agency will provide copies of all the documents on which the procurement decision was made. If you elect to file with GAO, you will receive copies of the documents on which the agency based its procurement decision, as well as the agency’s narrative report signed by the contracting officer that explains its procurement rationale and a memorandum of law. GAO may provide the protester a hearing if requested, at which time the protester, the agency, and any intervenors will appear before a GAO hearing officer, who will obtain information relevant to deciding the protest. The protester’s cost of filing a GAO protest is significantly less than filing in the Court of Federal Claims and the time in which a decision is rendered is far shorter than if the protest is filed with the Court. (p. 31)

This article provides a clear, step-by-step understanding of the bid protest process and the different requirements, expectations, and outcomes each protest arena presents. The detailed explanation of the steps within the protest process allowed the research team to not only better understand the respective protest processes of all three arenas, but also gain a perspective of the time consumption put on the government. This perspective

provides insight as to why the government seeks to implement procedures to reduce, or eliminate, the possibility of a protest.

The article also helped provide a perspective of why private industry may choose to protest in one arena over the other. Each arena's respective process affects the time, cost, and information provided to a protester, which forces a protester to make a conscious decision of which arena to file a protest to obtain the results they desire. A protester may choose to file an agency protest if saving time and money are of the most importance. A protester wishing to obtain a stay on contract performance and an independent analysis of their perceived discrimination may find the most value in filing a GAO protest. If the protester desires a formal judicial process to hear the parties and examine the government's actions across the entirety of the procurement, they may elect to file a COFC protest.

C. CHANGES TO THE ACQUISITION ENVIRONMENT THAT MAY DRIVE MORE PROTESTS

1. Section 813 of the National Defense Authorization Act

Section 813 of the National Defense Authorization Act requires the Department of Defense (DOD) to utilize "Tradeoff" almost exclusively and limits LPTA source selection procedures (National Defense Authorization Act, 2017). The law presents an issue for acquisition professionals as DOD acquisition professionals now must limit one of most common source selection methods. The law limits the availability to use LPTA on even the simplest of service contracts. This new rule causes acquisition teams across the DOD to face more difficulty as tradeoff source selection requires additional skill to properly execute. The DOD incorporated the language into the Defense Federal Acquisition Regulation Supplement in fourth quarter of fiscal year 2019. The increase in tradeoff source selections may translate into longer procurement and more protests.

The government as a whole, including its largest buying arm: the DOD, always seeks ways to reduce costs, which in turn causes procurement officials to normally seek the lowest cost approach to executing source selections for services. Most acquisition personnel would agree the LPTA source selection provides the quickest path to a bottom-line price. However, the approach fails to account for enhancements of any kind or to spark

innovative proposals. In a LPTA model, offerors seek to provide the bare minimum at reduce prices.

Over the last few decades the budget reductions, sequestration, and furloughs pushed the need for even more costs savings. This created an environment in which LPTA flourished as normal source selection procedures on all types of services acquisitions. Private industry took notice to the large stream of LPTA procurements over the last two decades and pushed congress to enact legislation. “Industry contends, overusing LPTA in the long haul will erode the DOD technological edge through low-cost/low-performance solutions; cause performance innovators to depart the market and reduce the quality of goods and services provided” (Calisti, 2015, p. 1).

Private industry dislikes the LPTA source selection methodology. “In the 2014 Washington Technology Insider Report on LPTA procurements, 89 percent of industry and government responded that they were opposed to the use of LPTA for services procurements” (Lohfeld, 2014, para. 3). LPTA fails to provide a platform for contractors to provide innovation and in turn allows contractors to undercut costs, provide inferior service and allow for “buying in.”

The tradeoff process requires more time on the contractor’s part to propose unique solutions. The tradeoff process between technical enhancements and cost requires the government to support the technical cost tradeoff in detail. The government must document its decision to forgo costs savings to capture an enhancement that presents real value. These determinations become more open to interpretation thus, making contracting officers more susceptible to protest.

The government awards LPTA source selections to the lowest price offeror. This push to create tradeoff source selections in turn adds complexity to source selections within the DOD. The GAO states:

The complex nature of the best value tradeoff process, including decisions on whether to pay a price differential, requires much greater business judgment when compared to other acquisition approaches. DOD officials stated that making tradeoff decisions, particularly when to pay a price differential, is among the most difficult aspects of the tradeoff process,

which will become more challenging with less experienced staff coming into the acquisition workforce. (GAO, 2010, p. 18)

These tradeoff source selections routinely become out-briefed to industry under FAR 15, which hold the ability to challenge the slightest mistake in the decision making process. In a sample GAO pulled, it found that 15 of the 88 contracts awarded on a best value tradeoff process received a protest to GAO (GAO, 2010, p. 1). Almost every offeror responding to a tradeoff procurement may make a claim as an interested party, which allows potential protests against the subjective government evaluation of proposal elements.

The GAO's 2018 report on protest showed "the most prevalent reasons for sustaining protests during the 2018 fiscal year were: (1) unreasonable technical evaluation; (2) unreasonable cost or price evaluation; (3) flawed selection decisions." Moving away from the objective nature and easily defensible source selection decision of LPTA opens the DOD to more sustainable protests. Major gaps exist in acquisition teams' ability to execute tradeoff source selection. The over the top LPTA usage left many junior personnel to never touch a tradeoff source selection. Executing a technical tradeoff source selection properly requires years of experience and hands on training.

Additionally, most junior personnel normally receive assignments of simple requirements normally procured under LPTA procedures at low dollar amounts. "For contracts with obligations over \$1 million and under \$25 million, DOD used LPTA process an estimated 45 percent of the time" (GAO, 2018a, p. 9). Therefore, junior personnel hold limited exposure to the tradeoff process. A properly executed technical/cost tradeoff stands up against the greatest of scrutiny including that of GAO.

In fiscal year 2018 source selection decisions and technical evaluation flaws made up two thirds of sustainable protests. Some of the decisions referenced in GAO's 2018 report on protests represent procurements in hundreds of millions dollars, normally executed through some of the most senior contracting officers in the government (GAO, 2018c). If senior contacting personnel struggle to present source selections capable to withstand protest sustainment, junior personnel should struggle as well.

2. “The Revolution in Federal Procurement, 1980–Present”

In “The Revolution in Federal Procurement,” Taylor (2019) claims growth in technology throughout society (internet, instant communication, information technology, etc.) resulted in the government’s mission becoming more complex and reliant on services from contractors. The government now extensively contracts for services more than supplies. These services include (but are not limited to) engineering support, cybersecurity, and technical expertise required to support public agencies and programs. In the past, the government spent the vast majority of dollars on tangible items or supplies such as hardware, vehicles, weapons systems, and other supplies. Currently, the government spends the vast majority of dollars on service contracts.

Service contracts are inherently less defined than supply contracts and therefore adds uncertainty to the source selection process. “Services are more abstract than products (Thomas, 1978, Para. 10).” Supply contracts provide tangible goods with stated life spans, capable of tests and specific use. In contrast, many highly technical service contracts require ongoing analytical support to deliver a level of effort vs stated tangible objects. “Increasingly, the actions between buyers and sellers required to build winning services contracts have become more complex” (Garrett, 2011, p. 21). This research intends to determine if complexity in service contracts add to the odds of protest in Navy contracts.

3. “The Requirements of Requirements: Saying What You Mean Means Getting What You Need”

Dr. Carol Barton’s (2015a, 2015b) articles discusses private industry’s challenges with ambiguous language in solicitations and contracts and highlights many linguistic issues that bring ambiguity in to defining requirements. Identifying the offeror that provides the best value to the government is the contracting officer’s primary goal during source selection process. However, the contracting officer must conduct that process through a fair and transparent evaluation. Essentially, the contracting officer must not only justify its award decision but also produce evidence proving losing bidders did not comply with the terms of the solicitation or did not represent the best value to the government. Ambiguous language in solicitations may result in bidders and the government having

different interpretations or expectations of the requirements. Thus, providing unsuccessful bidders an argument in which to file a protest.

The article discusses the use of imperative terms such as “shall” and “will” instead of “may.” Terms with imperative force helps ensure contractors understand exactly what the government requires. The article also identifies the use of subjective adjectives. Words such as “satisfactory” can mean different things to different people. Subjective adjectives restrict a bidder’s ability to determine how to meet the requirement and restricts the government’s ability to claim the contractor did not propose to the requirements of the solicitation (Barton, 2015b, p. 47).

Dr. Barton also identifies using proper punctuation, grammar, and spelling. Additionally, she discusses the use of simple, understandable language. She uses the example of the sentence “Woman without her man is nothing” (2015b, p. 48). The meaning of this sentence can change drastically if different punctuation is used. For example, “Woman, without her man, is nothing” versus “woman: without her, man is nothing” (2015b, p. 48). All three of those sentences contain the same exact words however, the placement of a comma or the addition of a colon changes the meaning of each sentence. Therefore, when developing requirements it is necessary the drafter uses proper punctuation, grammar, and spelling to ensure the solicitation clearly explains the requirement and is completely understood by both the requiring activity and potential bidders.

The article also discusses the legal rule of *contra proferentum*. As stated:

“*contra proferentum*” (“against the offeror”) is a legal rule that, in the case of any omission, uncertainty, or inconsistency in contractual documents, puts “the risk of ambiguity, lack of clarity, and absence of warning on the drafting party”—i.e., the person offering the document—“such that, if the contract interpretation rules resolve the ambiguity, then the ambiguity will be construed against the drafter”—i.e., the government. (Barton, 2015a, p. 15)

In other words, if a solicitation’s terms are not clear, it is the drafter’s fault- not the Offeror’s fault for misinterpretation. However, Dr. Barton identifies a paradox between the government and private industry: “Generally, a federal contractor who fails to ask for

clarification of a glaring error or inconsistency before award will not prevail, so it is critically important to resolve any such issues prior to submittal of a proposal. This of course puts the onus on the contracting community to “fix” the government’s faulty technical documents, whether the competitors have the time, budget, expertise, or inclination to do so or not- a catch-22 that no ethical requiring activity should condone” (Barton, 2015a, p. 15).

Service contracts require written performance standards as compared to supply contracts that provide concrete, detailed specifications. The use of written performance standards opens the door for ambiguous language to cloud a party’s interpretation of a solicitation, which may lead to a protest.

D. OTHER STUDIES ON PROTESTS

1. “Federal Bid Protests: Is the Tail Wagging the Dog?”

Hawkins et al.’s (2016) study focuses on quantifying the magnitude the fear of protests places upon agency’s acquisition strategies and how the fear and consequences of protests drive procurement professional’s decision making. This research study details the following negative effects protests place on contracting agencies: increased costs via thorough documentation and substantiation of proposal evaluations, increased legal and administrative costs of defending a protest, increased procurement actions lead time (PALT), the burden of making corrective actions, or re-work. Other examples of bid protest consequences are suspension of performance, proposal re-evaluation, reimbursing successful protestors proposal preparation and legal costs, and a complete re-solicitation. The study suggests that the potential negative costs of a protest sometimes leads agencies to make acquisition strategy decisions in order to mitigate the risk of protest. Such decisions include using LPTA source selection procedures rather than a full tradeoff method and using multiple award contracts rather than single award contracts.

The study also identifies instances where losing bidders are likely to file a protest. These instances include efforts to gain understanding why they lost the competition, incumbents trying to delay a switch in contractors simply to gain additional revenue via continued performance, and efforts to show their level of commitment to stakeholders

rather than easily accepting defeat. The study also cites common errors in solicitations likely leading to bid protests. These errors include poorly written or vague descriptions of the requirement, the agency incorrectly following processes identified in the solicitation, and a lack of adequately documenting agency findings/determinations.

The study concluded sufficient PALT and the contracting officer's level of source selection experience mitigates protest fear. Additionally, the researchers discovered effects the fear of protest plays on acquisitions. These effects include compromised evaluations, additional PALT, increased transactions costs, decreased contracting officer authority, and the use of inappropriate source selection methodologies.

2. Protests of Acquisition Contracts

A research report entitled *Understanding and Mitigating Protests of Department of Defense Acquisition Contracts* (Maser & Thompson, 2010) focuses on data driving protests in the DOD at the GAO and COFC level. The study utilized a Stepwise Logistical Regression to analyze data from 2001 through 2009. The study focuses on both the sustainment rates and the likely hood of receiving a protests. The study provided one of the only statistical analysis of protests found and methodology for analyzing future data sets and setting independent variables.

The study utilized logistical regression analysis utilizing several predictor variables to predict protests within the DOD. The logistical regression in this study utilized Foreign Winner, Size of Contract Winner, Contract Pricing, Service vs. Product and Agency. It utilized these variables to predict the odds of receiving a protest and the sustainment rates.

The study found more complex contract action increase the odds of receiving a protest. The results of the regression analysis determined cost type and service contracts lead to greater odds of a protest. Based on limitations in dealing with FEDBIZOPPS the study limited variables to these as it is readily available. Additionally, the study goes on to utilize a stepwise logistical regression to determine the effects of variables in the acquisition process leading to sustainment rates.

Our team utilized this study as guide to conduct a Navy specific analysis through similar regression techniques. Our study utilized similar methodology but set similar data points such as Cost and Service variables. Tailoring the study to just the Navy limits the data set, which allows for reviewing individual solicitations and specific other public data bases and establish more specific variables tied to uncertainty.

E. SUMMARY

In relation to our research efforts, this literature review identified and provided further understanding of the bid protest process, the costs and negative effects protests place upon agencies, and how those effects, in turn, drive acquisitions strategies and the development and execution of solicitations. Additionally, the research provides elements of solicitations commonly protested and common motives involved in a bidder's decision to protest. Thus, providing us with a better understanding of the view industry may, or may not, consider when making the decision to file a bid protest. The next chapter describes the methodology used to develop the data set and the analytical process used to develop the binary logistic regression model.

III. RESEARCH METHODOLOGY

This chapter describes the methodology used for this research. The first section of the chapter explains the procedures used for selecting the contract sample set as well as defining and selecting the dependent and independent variables. The chapter concludes with a description of the analytical process used to develop the binary logistic regression model and statistical tests.

A. DATA DESCRIPTION

1. Description of the Contract Sample

The team utilized publicly available data accessed through Federal Procurement Data Base System Next generation (FPDS-NG). “FPDS-NG is designed to capture and summarize a variety of information on pre-award decisions and actions after the fact” (FPDS-NG, 2017, p. 1). Contracting officers must complete a Contract Action Report in FPDS-NG after awarding a contract valued greater than the micro-purchase threshold (FAR 4.603, 2020). The Contract Action Report collects an assortment of procurement data directly relevant to each contract award and subsequent modifications.

FPDS-NG contains the most publicly available comprehensive award information available for quantitative analysis. The report generation tool on the website allows filters to select specific dollar amounts and years. This research utilized FPDS-NG to create a list of contract actions based on specific parameters. The original report generated 94 specific data elements available for review per contract action.

The team utilized fiscal year 2019, the most recent completed fiscal year, October 1, 2018, through September 30, 2019, to capture data. The team cross-referenced data from FPDS-NG to locate solicitations posted publicly on the governments point of entry for posting contract actions during fiscal year 2019, Federal Business Opportunities. The team limited the actions to fiscal year 2019 as the GAO docket only allows public searches for 18 months and Federal Business Opportunities archives data.

An initial search within FPDS-NG revealed thousands of contract actions executed through Navy HCAs during fiscal year 2019. Therefore, the team limited the final data report to actions capable of protest through regulation and those the team knowingly could find the solicitation data publicly available. The team limited the final data pull to scrub out contract modifications as this study focuses on initial awards.

Further, the team limited the data pull to actions specifically effected through source selection such as contract type and variables tied to uncertainty. The team also removed non-competitive actions as that fall outside the scope of this study. Since FAR 16.505 (10) (i) (2) restricts some protests to GAO within the DOD to only those actions over \$25M, the team utilized this as administrative cutoff for the data pull. Setting these standards allows for a final data pull of 69 observations.

The team cross-referenced these 69 contract actions on the FEDBIZOPPS to find the posted advertisements. The team updated the data set to reflect various source selection factors left undefined within FPDS-NG. These factors include those tied to uncertainty such as tradeoff source selection, the number of amendments issued and cost reimbursement pricing structure. The team physically reviewed each solicitation to evaluate these factors. www.sam.gov replaced FEDBIZOPS as the government point of entry in December 2019. However, the team conducted this cross reference prior to this transition throughout fiscal year 2019. Figure 2 displays the two major categories of variables used in this study.

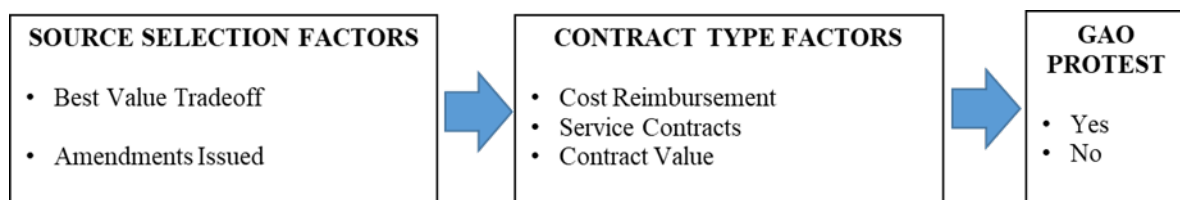


Figure 2. The Flow of Predictors and Their Categories

2. Definition of Dependent Variable

The team set GAO protests received as a binary dependent variable. This variable only accounts if industry filed a protest with GAO on either the contract number or solicitation. Therefore, the team set yes to “1” in the event GAO received a protest on a Navy action, and “0” if not.

3. Description of Independent Variables

The team grouped independent variables data into two categories: those tied to source selection and, those tied to contract type. The team set six independent variables representing different levels of uncertainty. These variables also capture contract value as an economic incentive for industry to protest.

a. Source Selection Variables

(1) Best Value Tradeoff (BESTV)

The team set best value tradeoff as the first variable. As discussed in length within the Literature Section the best value tradeoff brings a level of uncertainty to the acquisition in comparison to LPTA. “LPTA is the appropriate source selection process to apply only when there are well-defined requirements.” (Kendall, 2015, p. 1). The subjective nature of this element and complexity should drive the probability of protests. The team defines this binary variable as Tradeoff Source Selection as “1” and LPTA as “0” in the data set.

(2) Number of Amendments Issued (AMENDS)

Contracting officers issue amendments to clarify issues or make corrections to already issued solicitations. These amendments help to address industry concerns, remove clerical errors and fix erroneous information. A large number of amendments indicates a higher degree of uncertainty within a solicitation. This factor should drive up the probability of protests.

b. Contract Variables

(1) Cost Reimbursement (COST)

This binary independent variable receives a “1” for cost reimbursement actions and a “0” for the inverse within the data set. This variable represent those contracts not firm fixed priced, which represents uncertainty through its very utilization. As stated in FAR 16.3:

(a) The contracting officer shall use cost-reimbursement contracts only when-

(1) Circumstances do not allow the agency to define its requirements sufficiently to allow for a fixed-price type contract (see 7.105); or

(2) Uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract. (FAR 16.301-2)

(2) Service Contracts (SERVICE)

As discussed in the Literature Section services contracts through their very nature hold less defined characteristics for outcome than procurements for supplies. Service contracts drive uncertainty in terms of scope in comparison to supplies. Therefore, the team believes this element increases the likeness of protest. Therefore, the team set Service Contracts to “1” and Non Service Contracts as “0” in the data set.

(3) Cumulative Contract Value (CUMVALUE)

A protestor’s pursuit of a new competition or award of the contract, incentivizes a protestor to challenge a Navy contract action to GAO. This figure represents the total potential award accounting for potential contract growth. A higher dollar value contract action should incentivize a protestor more than a lower dollar value as it could translate into a potential higher payout. Therefore, the team anticipates the dollar amount of a procurement drives the probability of protest.

(4) Current Contract Value (CURVALUE)

A protestor's pursuit of a new competition or award of the contract, incentivizes a protestor to challenge a Navy contract action to GAO. This figure represents the contract work guaranteed in a sense and the initial effort amount. Unlike CUMVALUE this figure represents awarded dollars at the start of an effort. A higher dollar current contract action should incentivize a protestor more than a lower dollar amount as it could translate into a higher secured payout. Therefore, the team anticipates the dollar amount of a procurement drives the probability of protest.

Table 1 provides a matrix of the variables, their descriptions, and assigned codes.

Table 1. Variable Descriptions

VARIABLE	DESCRIPTION	CODE
PROTEST VARIABLES		
GAO PROTEST RECEIVED (PROTEST)	YES/NO DETERMINED THROUGH GAO DOCKET INPUT OF THE SOLICITATION NUMBER OR CONTRACT NUMBER. IF RECEIVED DATA SET TO Y IF NOT SET 0.	1= RECEIVED "YES" 0= NOT RECEIVED "NO"
SOURCE SELECTION VARIABLES		
BEST VALUE TRADEOFF (BESTV)	YES/NO DETERMINED THROUGH SOURCE SELECTION METHOD ASSIGNED ON HE SOLICITATION SET TO YES IF NOT SET TO N.	1= TRADEOFF "YES" 0= LPTA "NO"
NUMBER AMENDMENTS ISSUED (AMENDS)	0 THROUGH 100 ASSIGNED BASED ON THE NUMBER OF AMENDMENTS ISSUED ON A GIVEN SOLICITATION AND POSTED TO THE GOVERNMENT POINT OF ENTRY	0-100 BASED ON THE TOTAL NUMBER OF AMENDMENTS ISSUED.
CONTRACT VARIABLES		
COST REIMBURSEMENT (COST)	YES/NO DETERMINED THROUGH CONTRACT TYPE IN FPDSNG IF COST REIMBURSEMENT USED SET TO YES IF NOT SET TO NO.	1= COST REIMBURSEMENT "YES" 0= FIRM FIXED PRICE "NO"
SERVICE CONTRACTS (SERVICE)	YES/NO DETERMINED THROUGH CONTRACT TYPE IN FPDSNG IF SERVICE CODES SET TO YES IF NOT SET TO NO.	1= SERVICE "YES" 0= SUPPLY "NO"
CONTRACT VALUE (CUMVALUE)	ASSIGNED BASED ON THE DOLLAR AMOUNT LABLED IN FPDSNG ON A CONTRACT ACTION	BASED ON THE TOTAL DOLLAR AMOUNT OF AWARD
CURRENT CONTRACT VALUE (CURVALUE)	ASSIGNED BASED ON THE DOLLAR AMOUNT LABLED IN FPDSNG ON A CONTRACT ACTION	BASED ON THE TOTAL DOLLAR AMOUNT OF AWARD

B. ANALYTICAL APPROACH

The study utilizes a binary logistic regression to predict the protest outcome each source selection or contract element causes. Based on the binary nature of the dependent variable the study could not utilize a typical linear regression for forecasting. A binary logistic regression allows prediction of a non-continuous dependent variable (Yes/No Protest) such as in this case study. A logistic regression allows for binary and discrete mix of independent variables. The logistics model ensures the predicted value lies between 0 and 1.

A normal linear regression technique utilizes standard probabilities of the independent variables, while the logistics regression transforms the independent variables through a logarithm procedure to allow an equation to produce a binomial dependent variable in real terms. This method provides the “maximum likelihood, with the goal to find the best linear combination of predictors to maximize the likelihood of obtaining the observed outcome frequencies” (Tabachnick & Fidell, 2001, p. 518).

This study utilizes the IBM SPSS Software Version 26 (SPSS) to run all logistic regression analysis. This software allows an automated approach to running complex equations. Additionally, it allows researches without a sophisticated math background to perform their own data analysis. The software utilizes researcher’s input and provides a series of tests to verify the assumptions made in regards to the research questions presented herein. This includes a series of goodness of fit tests to ensure the model provides the best predictive narrative possible.

The logistics regression model takes on the following form:

$$\text{Ln } [P/1-P] = \alpha + u.$$

In this equation, “the linear regression (u) is the natural log (Ln) of the probability of being in one group” divided by the probability of being in the other group (Tabachnick & Fidell, 2007, p. 518). The u represents a typical linear equation $u = X_1\beta_1 + X_2\beta_2 \dots + X_K\beta_K$. Therefore, the coefficients (β_k) also represent the natural logs of this odds ratio. As the units (XK), increase or decrease it in turn increases or decreases the odds of the dependent

variable falling into one category or the other (Protest/No Protest). Solving for P in the logistics model provides the probability of the binary (Protest/No Protest) outcome as express in the following equation:

$$P=1/1+e^{-(\alpha + \beta_1X_1+ \beta_2X_2 \dots + \beta_KX_K)}.$$

As the independent variables ($\beta_1X_1+ \beta_2X_2 \dots + \beta_KX_K$) approach positive infinity, the dependent variable P approaches one (Protest). Alternatively, as the independent variables ($\beta_1X_1+ \beta_2X_2 \dots + \beta_KX_K$) approach negative infinity the dependent variable approaches zero (No protest) (Ramanathan, 1998, p. 607). This creates an equation where the range never falls outside of the range one to zero or in the case of this study protest or no protest.

The model requires general testing to ensure goodness of fit and strength of association. In order to achieve this the SPSS software shall produce a direct R² and Chi-square figure (χ^2). Taking the output figures and comparing these to standard statistics tables utilizing the degrees of freedom shall verify the significance of each at 95% confidence interval.

The study shall calculate a R² figure in order to test the strength of association of the model. Since the logistics regression for this study produces a two-category output, a bivariate regression within SPSS produces a direct R² figure to allow evaluation for strength of association in the model (Tabachnick & Fidell, 2001, p. 545). The SPSS bivariate correlation run between the predicted probabilities and the outcome provides a figure, which squared provides R². This R² provides a figure most researchers without an extensive math background recognized as a strength of association figure, similar to the figure utilized in far more common standard linear regression models. The other SPSS output tests provide more obscure strength of relationship figure as opposed to this more widely recognized test.

Another statistically familiar test, the log likelihood-ratio chi-squared, provides a test for goodness of fit for a logistic regression, which χ^2 represents. SPSS compares the χ^2 , against the constant only model (includes no independent variables just the intercept) and the full model (includes all independent variables). Comparing the χ^2 allows inference

on the reliability between the one with no predicted variables and those of a full model (Tabachnick & Fidell, 2001, p. 562).

SPSS provides the significance for each of the independent variables. After verifying the overall strength of association and fit, the research includes determining the significance of each independent variable. The research utilizes the universally recognized 95% confidence level and shall verify each independent variable meets this level of significance ($p < .05$). Finally, the research covers the odds ratio for each of the independent variables and magnitude each holds on the overall model with or without its inclusion.

C. SUMMARY

In summary, this chapter provides the general methodology of this research project along with the data set. The chapter provided the background for each independent variable the analysis for its inclusion into the hypothetical model. The chapter also presented the necessary theory on the planned logistical regression model and the tests necessary for determining the strength of model. The next chapter provides the SPSS output utilizing the data and the statistical test results.

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IV. ANALYSIS AND RESULTS

The chapter starts with a preliminary data analysis through descriptive statistics. The remainder of this chapter provides the SPSS output results of the logical regression model with the theorized independent variables. The chapter breaks out the descriptive statics section between the nominal and binary independent variables. The chapter presents the outcome of those variables theorized as providing ambiguity to the procurement process and if they result in stronger odds in producing a protest.

A. PRELIMINARY DATA ANALYSIS

The research starts with descriptive statistics of the nominal independent variables, which includes calculations for the mean, standard deviation, coefficient variation, min and maximum figures. In addition, the research includes analyzing the distributive properties of the binary independent variables. The final portion of the descriptive statics section provides a SPSS matrix of correlation coefficients.

1. Characteristics of Nominal Independent Predictor Variables

Table 2 provides the descriptive statics of the nominal variables, which demonstrate variation among the groups. In the event the model demonstrates a poor goodness a review for outliers shall take place.

Table 2. Descriptive Statistics of Nominal Independent Variables by Group
(N = 69)

	Mean	Stand Deviation	Coefficient of Variance	Min	Max	Grouping Variable
CURVALUE (In Millions)	\$43.53	\$44.75	0.74	\$6.86	\$254.57	TRADEOFF (YES)
	\$62.03	\$57.65	0.72	\$6.14	\$298.21	TRADEOFF (NO)
	\$30.02	\$29.35	0.98	\$6.86	\$115.74	COST (YES)
	\$57.74	\$54.64	0.70	\$6.14	\$298.21	COST(NO)
	\$34.13	\$29.13	0.85	\$7.58	\$118.62	SERVICE (YES)
	\$56.29	\$54.88	0.73	\$6.14	\$298.21	SERVICE (NO)
	\$64.62	\$86.09	0.66	\$8.95	\$254.57	PROTEST (YES)
	\$50.70	\$47.10	0.76	\$6.14	\$298.21	PROTEST (NO)
	Mean	Stand Deviation	Coefficient of Variance	Min	Max	Grouping Variable
AMENDS	4.84	4.41	0.91	0	23.00	TRADEOFF (YES)
	6.09	3.90	0.64	0	15.00	TRADEOFF (NO)
	3.36	1.82	0.54	0	7.00	COST (YES)
	5.95	4.47	0.75	0	23.00	COST(NO)
	2.77	2.09	0.75	0	7.00	SERVICE (YES)
	6.04	4.34	0.72	0	23.00	SERVICE (NO)
	4.14	2.27	0.55	0	7.00	PROTEST (YES)
	5.56	4.35	0.78	0	23.00	PROTEST (NO)
	Mean	Stand Deviation	Coefficient of Variance	Min	Max	Grouping Variable
CUMVALUE (In Millions)	\$135.19	\$151.07	1.1174962	\$25.17	\$637.58	TRADEOFF (YES)
	\$76.04	\$69.49	0.91385371	\$28.43	\$315.47	TRADEOFF (NO)
	\$185.07	\$192.17	1.03840919	\$25.17	\$637.58	COST (YES)
	\$88.08	\$90.91	1.03210562	\$28.43	\$529.90	COST(NO)
	\$150.09	\$153.02	1.0194861	\$25.17	\$557.67	SERVICE (YES)
	\$97.93	\$114.55	1.16967391	\$28.43	\$637.58	SERVICE (NO)
	\$245.29	\$258.92	1.05559875	\$25.17	\$637.58	PROTEST (YES)
	\$92.23	\$88.87	0.96352778	\$28.43	\$529.90	PROTEST (NO)

Data sources: FPDS-NG database, FEDBIZOPPS, retrieved January 2020.

2. Characteristics of Binary Independent Predictor Variables

Table 3 provides the distribution of the observations as it relates to the independent binary variables. Table 4 provides the breakout between the binary variables and expected outcome as it relates to protest. The data set includes seven observations in total for the outcome protest received. Distributive properties exceed 10% and a potential to provide significant variables within the logistical regression.

Table 3. Descriptive Statistics of Binomial Independent Variables (N=69)

Variable	Number	Percentage
BEST VALUE TRADEOFF		
TRADEOFF (YES)	37	54%
TRADEOFF (NO)	32	46%
SERVICE		
SERVICE (YES)	13	19%
SERVICE(NO)	56	81%
COST REIMBURSEMENT		
COST (YES)	14	20%
COST(NO)	55	80%
PROTEST		
PROTEST (YES)	7	10%
PROTEST (NO)	62	90%

Data Sources: FPDS-NG, FEDBIZOPPS, GAO, retrieved January 2020.

Table 4. Descriptive Statistics of Binomial Independent Variables Protest and Non-protest Groups (N = 69)

Variable	PROTEST (YES)		PROTEST(NO)	
	Number	Percentage	Number	Percentage
BEST VALUE TRADEOFF				
TRADEOFF (YES)	1	17%	30	48%
TRADEOFF (NO)	6	83%	32	52%
SERVICE				
SERVICE (YES)	2	29%	11	18%
SERVICE(NO)	5	71%	51	82%
COST REIMBURSEMENT				
COST (YES)	5	71%	9	15%
COST(NO)	2	29%	53	85%

Data sources: FPDS-NG database, FEDBIZOPPS, retrieved January 2020.

3. Matrix Correlation Coefficients

SPSS generates a correlation matrix, which utilizes the Pearson method, and flags significant relationships between variable pairs at 99% and 95% confidence levels. This method provides correlation coefficients for every pair of variables in the hypothesized model. The SPSS output for this study, expressed in Table 5, flagged significant correlations (>5%) between AMENDS, CURVALUE, and COST Variables. It flagged TRADEOFF and CUMVALUE variables as significantly correlated. Finally, it flagged AMENDS and COST as correlated.

The rules of procurement lead to expected multicollinearity among these variables. Therefore, in the event the other goodness of fit and strength tests show a bad model it may become necessary to run multiple logical regressions with these multicollinearity variables

separately to identify the best model possible. In the event the overall model fails to meet significance or goodness of fit tests it may require separate runs to remove these correlated independent variables to find the best model possible.

Table 5. Matrix Correlation Coefficients of Study Variables

Correlation Matrix								
		SERVICE	COST	TRADEOFF	PROTEST	CURVALUE	CUMVALUE	AMENDS
SERVICE	Pearson Correlation	1	.310**	.374**	0.084	-0.169	0.167	-.306*
	Sig. (2-tailed)		0.010	0.002	0.495	0.165	0.171	0.010
	N	69	69	69	69	69	69	69
COST	Pearson Correlation	.310**	1	.397**	.427**	-0.218	.319**	-.250*
	Sig. (2-tailed)	0.010		0.001	0.000	0.072	0.008	0.039
	N	69	69	69	69	69	69	69
TRADEOFF	Pearson Correlation	.374**	.397**	1	.312**	-0.180	.241*	-0.150
	Sig. (2-tailed)	0.002	0.001		0.009	0.139	0.046	0.218
	N	69	69	69	69	69	69	69
PROTEST	Pearson Correlation	0.084	.427**	.312**	1	0.082	.378**	-0.103
	Sig. (2-tailed)	0.495	0.000	0.009		0.503	0.001	0.400
	N	69	69	69	69	69	69	69
CURVALUE	Pearson Correlation	-0.169	-0.218	-0.180	0.082	1	.333**	.261*
	Sig. (2-tailed)	0.165	0.072	0.139	0.503		0.005	0.030
	N	69	69	69	69	69	69	69
CUMVALUE	Pearson Correlation	0.167	.319**	.241*	.378**	.333**	1	-0.067
	Sig. (2-tailed)	0.171	0.008	0.046	0.001	0.005		0.586
	N	69	69	69	69	69	69	69
AMENDS	Pearson Correlation	-.306*	-.250*	-0.150	-0.103	.261*	-0.067	1
	Sig. (2-tailed)	0.010	0.039	0.218	0.400	0.030	0.586	
	N	69	69	69	69	69	69	69

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Data source: SPSS, retrieved April 2020.

B. LOGISTICAL REGRESSION ANALYSIS

This study utilized SPSS to run a binary logistical regression to test the general model that independent variables (predictors) lead to greater odds of a protest. The regression as focuses of the hypothesis of a two category outcome, specifically whether an interested party filled a GAO protest yes or no. The section below shows the SPSS results of the binary logistical regression based on the data set and information on the parameters used to determine those either successful or unsuccessful predicators of the expected outcome.

1. Major Analysis of Total Binary Logistical Regression Predictor of Protest Model

Table 6 demonstrates the initial predictive success rate of the model. The figures in downward diagonal from left to right in the table indicate the number of successes the model accurately predicates either as a protest or no-protest. The model accurately predicates 61 out of the 62 non-protest actions as correct and three out of the seven protest actions correctly. Overall the model provides an overall classification accuracy of 92.8 % and a strong model for prediction.

Table 6. Classification Table

Classification Table ^a					
Observed			Predicted		Percentage Correct
			PROTEST		
			0	1	
Step 1	PROTEST	0	61	1	98.4
		1	4	3	42.9
		Overall Percentage			92.8
a. The cut value is .500					

Data source: SPSS, retrieved April 2020.

SPSS outputs the Chi-Square (χ^2) for the model and it is the first test provided as Table 7. The test run against a constant only model (one with no predicted variables) indicates the model as statistically reliable as $\chi^2 (6) = 19.1792, p = .004$. This statistically significant χ^2 represents the model reliably predicts between an action in or outside the protest group compared to one with no predictors at all.

Table 7. Chi-Square Test of Model

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Model	19.179	6	0.004

Data source: SPSS, retrieved April 2020.

In addition, SPSS provides a Gosmer-Lemeeshow Statistic for the model at a significance level of 0.94 (Table 8). Gosmer-Lemeeshow statistic provides the most reliable test for SPSS binary logic regression (IBM, n.d.). Any statistical significance value below .05 indicates a poor fit (IBM, n.d.). Therefore, since the statistic for this model exceeds this figure the model adequately fits the data.

Table 8. Gosmer-Lemeeshow Statistic

Hosmer and Lemeshow Test			
	Chi-square	df	Sig.
	2.844	8	0.944

Data source: SPSS, retrieved April 2020.

Table 9 provides the SPSS predicted probabilities for the model, per observation against inclusion in the protest group, which provides a correlation value of .587. When squared, this correlation provides an R² figure of .344. R² accounts for “the proportion of variance in the variables” (Tabachnick & Fidell, 2001, p. 716). The GAO Docket only indicates 187 fiscal year 2019 Navy protests in comparison to over 167,000 Navy contract actions executed in fiscal year 2019, per FPDS-NG. GAO protests only make up .11% of all actions available for analysis, a small group in relation to overall actions, which may drive a low strength predictor value for the model. Therefore, R²=.344 provides a solid figure in relationship and understandable strength of relationship.

Table 9. Predicted Probability Coefficient

Correlations			
		PROTEST	Predicted probability
PROTEST	Pearson Correlation	1	.587**
	Sig. (2-tailed)		0.000
	N	69	69
Predicted probability	Pearson Correlation	.587**	1
	Sig. (2-tailed)	0.000	
	N	69	69
**. Correlation is significant at the 0.01 level (2-tailed).			

Data source: SPSS, retrieved April 2020.

2. Analysis of the Individual Predictors of Logistical Regression Protest Model

SPSS provides the meaningful statistical elements per variable as part of the model run. Table 10 summarizes these elements and includes: regression coefficients, with corresponding standard errors, Wald statistics, and the Odds Ratio for each predictor included in the model. A review of the table indicates only the COST variable as significant with a p value $> .05$ at .048. Accordingly, only the COST variable reliably predicts PROTEST. The odds ratio for the COST predictor indicates interested parties are 11.369 more likely to protest a cost contract action than a firm fixed price contract action.

Running the model with the COST predictor omitted lowers the predictive power of the model as the Chi-square figure drops from $\chi^2(6) = 19.1792$, $p = .004$ to $\chi^2(5) = 14.182$, $p = .014$. This demonstrates the full model reliably different from the partial model with COST remove and confirms it as the only reliable predictor.

Table 10. Direct Logistic Regression Analysis for Predictors of Protest

Variables in the Equation									
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for	
								Lower	Upper
Step 1 ^a	SERVICE	-0.395	1.097	0.130	1	0.719	0.674	0.078	5.790
	TRADEOFF	19.503	6415.258	0.000	1	0.998	295071285.053	0.000	
	COST	2.431	1.229	3.910	1	0.048	11.369	1.022	126.518
	CURVALUE	0.000	0.000	1.941	1	0.164	1.000	1.000	1.000
	CUMVALUE	0.000	0.000	1.038	1	0.308	1.000	1.000	1.000
	AMENDS	-0.007	0.168	0.002	1	0.968	0.993	0.715	1.380
	Constant	-23.235	6415.258	0.000	1	0.997	0.000		

a. Variable(s) entered on step 1: SERVICE, TRADEOFF, COST, CURVALUE, CUMVALUE, AMENDS.

Data source: SPSS, retrieved April 2020.

C. RESULTS

The research project established a model set with a sound rationale to established elements normally associated with uncertainty in the Navy procurement process. The elements include those traditionally seen as ambiguous and recognized through practitioners. In the end, the model utilized these predictor elements to test the hypotheses if uncertainty and other elements increase the odds of a protest. The model provides an overall classification accuracy of 92.8 % and a strong model for prediction.

The research established a model with reliable good fit to the data and acceptance strength. The study only established a single variable, COST, as a predictor element with significance. The study failed to confirm SERVICE as significant variable such as other studies confirmed for the whole of DOD (Maser & Thompson, 2010, p. 50). However, the COST predictor element demonstrates a strong reliability in predicting protest based on the data set. Table 11 summarizes the final odds ratios per element included in the model per type based on either contract type factors or source selection factors.

Table 11. Final Odds Ratios of Model

SOURCE SELECTION FACTORS	
Varibale	Odds Ratio
TRADEOFF	295071285.053
AMENDS	0.993
CONTRCAT TYPE FACTORS	
Varibale	Odds Ratio
SERVICE	0.674
COST	11.369
CURVALUE	1.000
CUMVALUE	1.000

Data source: SPSS, retrieved April 2020.

While only the Cost factor plays a statistically significant role in increasing the odds of industry filling a GAO protest on a Navy acquisitions, the other elements provide insight. The tradeoff element (TRADEOFF) provides the only other element then COST with odds ratio beyond one, which increases the chance of receiving a protest at a highly likely rate. The ratios dealing with contract value play no impact as both indicate an odds ratio of one. These elements neither decrease nor increase the odds of a protest. The service (SERVICE) and amendments issued (AMENDS) indicate values below one, which indicate they reduce the odds of a protest.

The finding of a positive odds ratio for both TRADEOFF and COST indicate these elements, which contain uncertainty through their very nature, increase the odds of receiving a protest. However, the COST predictor proved as the only variable with statistical reliability in the model. A run removing tradeoff element reduces the overall fit of the model as the Chi-square figure drops from $\chi^2(6) = 19.1792, p = .004$ to $\chi^2(5) = 14.204, p = 0.007$. This demonstrates the model benefits from its inclusion and may increase in significance utilizing a different data set or an expanded one.

These findings highlight the importance of removing uncertainty in the procurement process to demonstrate to industry the complete intent. This research presents an important tool in pushing the Navy acquisition community to further themselves from cost type efforts as it increases the odds of receiving a protest at 11.369 times. This

reaffirms the larger DOD acquisition study (Maser & Thompson, 2010, p. 50) in today's Navy procurement environment. However, our study fails to identify further statistically significant elements.

D. SUMMARY

This chapter presented the descriptive statistics of the data set and the binary logistics regression results. The regression analysis provided the impact of the odds increasing of receiving a protest based on certain source selection elements. This chapter identified those variables as predictors which may lead to protest. The model results indicate only the cost type source selection element as a predictor of protest. The last chapter provides a summary, conclusion, and recommendations for future research.

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V. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

A. SUMMARY

This research project examined elements of uncertainty within the Navy procurement process and if these elements or others increase the odds of industry filing a GAO protest. The project examined various source selection and contract elements. It identified those elements normally associated with ambiguity and set those as variables within a model. The project focused on fiscal year 2019, the most recent completed fiscal year of contract awards.

Chapter I provided an overview of this study and background information about service contracts, bid protests, previous similar research, and the limitations of available data used to establish the basis of this research. Chapter II identified and discussed relevant research, articles, laws, regulations, and publications reviewed by the research team to explain the Navy's contracting framework, an understanding the bid protest process, and identify areas of ambiguity within service contracts. Chapter III provided the general methodology of this research project and defined each variable of the data set. The chapter also presented the necessary theory on the planned logistical regression model and the tests necessary for determining the strength of model. Chapter IV presented the descriptive statistics of the data set and the binary logistics regression results. This chapter provides a conclusion of the research, limitations, and recommendations for future research.

B. CONCLUSION

This research attempted to answer which elements of acquisition translate into a protests from industry? Secondly, do elements of uncertainty contribute to protest probability? The research team's binary regression model resulted in an overall classification accuracy of 92.8 % and proved as a strong model for prediction. The results of the analysis identified two elements that correlate to receiving protests from industry: the use of tradeoff source selection procedures (TRADEOFF) and, cost type contracts (COST). Though the model identified both elements as increasing the odds of receiving a protest, only the team found only the COST element statistically significant with an odds

ratio of 11.369. Therefore, the research team concludes that use of a cost type contract increases the odds of receiving a protest at 11.369 times.

Though the model didn't identify any other elements as increasing the probability of bid protests, it did identify that both elements tied to contract value (current value (CURVALUE) and cumulative value (CUMVALUE)) have no impact on receiving bid protests as both received an odds ratio of one. Furthermore, the model identified both service contracts (SERVICE) and the number of amendments issued (AMENDS) with odds ratios of less than one and, therefore, reduce the odds of receiving a protest.

This research reaffirms Maser and Thompson's 2010 research on DoD-wide contracts that found cost as a significant variable for receiving a protest. The team failed to recreate the conclusion of service contracts as a significant variable given limited data. This research also highlights the importance of the Navy contracting community removing uncertainty in the procurement process and provides an important tool to further themselves from using cost type contracts.

C. LIMITATIONS AND RECOMMENDATIONS

The study maintained its limitations, with gathering the necessary data as the biggest challenge. The data pull only included those contract actions found in the public domain. This included manually reviewing posted solicitations for those actions contracting officers must make available. However, many more contract actions exist which received protests this team held no access.

Further, many of the websites self-archive data, which limited the data pull for this study to a single fiscal year. Many publically available repositories lack the necessary procurement elements to build a quality data set. We recommend conducting a study with a larger data set across multiple years, which could change the statistical significance of some of the predictors. In addition, Section 806 of the National Defense Authorization Act for fiscal year 2020 implemented a requirement for DOD contracting personnel to report source selection process data elements (LPTA, tradeoff, or other) on all Contract Action Reports submitted through FPDS-NG (U.S. Congress, 2019).

In order to expand, the study would require the direct input from the various Navy HCAs to provide the necessary information to allow for expansion. This includes expanding to agency level protests and gathering data on those actions in which publicly available databases lack. This would allow an expansion of the data set and help to confirm the significance of the findings. Additionally, it might help to identify other predictors or confirm those of this study as statistically reliable.

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