NPS-CM-26-223

# ACQUISITION RESEARCH PROGRAM SPONSORED REPORT SERIES

# The Cost of Delay Process Analysis of Navy Husbanding Service Provider Contracting

June 2026

**LCDR Nathan L. Courter, USN**

**LCDR Dustin D. Nollkamper, USN**

**LCDR Christopher B. Abel, USN**

Thesis Advisors: Brett M. Schwartz, Lecturer
Dr. Robert F. Mortlock, Professor

Department of Acquisition, Finance and Manpower

**Naval Postgraduate School**



Prepared for the Naval Postgraduate School, Monterey, CA 93943

The research presented in this report was supported by the Acquisition Research Program of the Department of Acquisition, Finance and Manpower at the Naval Postgraduate School.

# ABSTRACT

Since implementation of Off-Ship Bill Pay and the Multiple Award Contract strategy in 2016, the Navy husbanding services process has operated under increased oversight and auditability requirements intended to improve transparency and fiscal control. While these reforms improved process control following the Glenn Defense Marine Asia scandal, questions remain regarding their effect on contracting efficiency and cost outcomes. This capstone research examines which contracting process intervals within the Husbanding Service Provider pre-port visit process most influence daily port visit cost from fiscal year (FY)16 through FY26. Using quantitative analysis of over 6,700 overseas Navy port visits extracted from HSPortal, the researchers evaluated five major contracting process intervals and their relationship to daily average port visit cost through descriptive statistics and multivariate regression modeling. The analysis found that longer durations during early requirement validation and task order award increased daily port visit costs in Fifth and Seventh Fleets, while Sixth Fleet showed that compressed contracting timelines were associated with higher cost. The contract award phase was the most consistently significant process interval across all fleets. The researchers conclude that targeted improvements in early coordination, proposal evaluation, and planning time may reduce costs while maintaining audit readiness and operational responsiveness.

THIS PAGE INTENTIONALLY LEFT BLANK

# ABOUT THE AUTHORS

**LCDR Nathan Courter** graduated from Indiana University in 2014 with a Bachelor of Arts Degree in Political Science. After completing Officer Candidate School and the Supply Corps Basic Qualification Course, he served as Disbursing and Sales Officer onboard PCU PORTLAND (LPD 27). The ship was commissioned as USS PORTLAND (LPD 27) in April 2018, where he continued as Disbursing and Sales Officer and later Food Service Officer. Ashore, he has worked for United States Forces Korea J4, NAVSUP FLC Norfolk, Naval District Washington, and COVID-19 Countermeasures Acceleration Group. He attended Supply Officer Department Head Course and reported to USS SHOUP (DDG 86) as the SUPPO in San Diego, California in July 2022. The ship homeport shifted to Yokosuka, Japan in November 2022, where he continued to serve until October 2024. After graduating from Naval Postgraduate School with a degree in Defense Contract Management, he will be reporting to Defense Contract Management Agency Northeast, Garden City, New York, as a Contract Administrator.

**LCDR Dustin Nollkamper** graduated from the University of New Mexico in 2017 with a Bachelor of Arts Degree in Economics and Minor in Naval Science. After graduation his first at-sea assignment was onboard the USS HUE CITY (CG 66) in Mayport, FL, serving as the Main Propulsion Officer and Electrical Officer from June 2017 until August 2019. He then reported to the Basic Qualifications Course at Naval Supply Corps School in Newport, RI in March 2020.

After graduation, he served onboard the USS THOMAS HUDNER (DDG 116) from April of 2020 until March 2022 as the Assistant Supply Officer. He then attended SODHC and reported to PCU JACK H LUCAS (DDG 125) in Pascagoula, Mississippi as the PRECOM SUPPO in April 2022, where he then commissioned the ship in September 2023. He served as the SUPPO of USS JACK H LUCAS (DDG 125) from the sail-around to San Diego, California until December 2024. After graduating from Naval Postgraduate School he will be reporting to Naval Sea Systems Command as a Contracting Specialist.

**LCDR Christopher Abel** graduated from the University of Arkansas in Fayetteville, AR, in 2009 with a degree in Biological Sciences. He enlisted in the Navy in 2013 and earned his commission in the Supply Corps in 2015 through the Officer Candidate School program. His operational tours include serving as Disbursing and Sales Officer onboard USS OSCAR AUSTIN (DDG 79) from October 2016 to January 2019, and as Supply Officer onboard USS DELBERT D. BLACK (DDG 119) from November 2023 to November 2025. His shore tours include US Aegis Ashore Romania, where he worked as the onsite Logistics Officer, and Aviation Supply Detachment Guam as the ASD Officer-In-Charge. After graduation from Naval Postgraduate School, he will be reporting to Naval Mobile Construction Battalion One in Gulfport, MS as the Supply Officer.

## ACKNOWLEDGMENTS

We would like to thank our thesis advisors, Prof. Brett Schwartz and Dr. Robert Mortlock for their guidance and mentorship throughout this research project. As well, we would like to thank Larissa Hill at NAVSUP for help with HSPortal, gathering data, husbanding process guidance, and answering questions along the way.

We would also like to thank our sponsors, NAVSUP FLC Sigonella and the Acquisition Research Program (ARP) for their guidance and support throughout the research project.

THIS PAGE INTENTIONALLY LEFT BLANK

NPS-CM-26-223

# ACQUISITION RESEARCH PROGRAM SPONSORED REPORT SERIES

## The Cost of Delay Process Analysis of Navy Husbanding Service Provider Contracting

June 2026

**LCDR Nathan L. Courter, USN**

**LCDR Dustin D. Nollkamper, USN**

**LCDR Christopher B. Abel, USN**

Thesis Advisors: Brett M. Schwartz, Lecturer
Dr. Robert F. Mortlock, Professor

Department of Acquisition, Finance and Manpower

**Naval Postgraduate School**



Prepared for the Naval Postgraduate School, Monterey, CA 93943

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

# LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

# LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AOR | area of responsibility |
| BSC | Business Support Center |
| BSF | brief stop for fuel |
| BSP | brief stop for personnel |
| COR | Contracting Officer's Representative |
| DAU | Defense Acquisition University |
| DFARS | Defense Federal Acquisition Regulation Supplement |
| DFAS | Defense Financial Accounting Service |
| DoD | Department of Defense |
| DON | Department of the Navy |
| ELIN | exhibit line-item number |
| FAR | Federal Acquisition Regulation |
| FIAR | Financial Improvement and Audit Readiness |
| FISC | Fleet Industrial Supply Center |
| FLC | Fleet Logistics Center |
| FP | force protection |
| FY | fiscal year |
| GAO | Government Accountability Office |
| GDMA | Glenn Defense Marine Asia |
| GFE | government furnished equipment |
| GMAC | Global Multiple Award Contract |
| HSP | husbanding service provider |
| IDIQ | indefinite delivery indefinite quantity |
| KO | Contracting Officer |
| LOGREQ | logistics requirement |
| LOGSSR | Logistics Services Repository |
| MAC | multiple award contract |
| MLS | Multinational Logistics Services |
| MSC | Military Sealift Command |
| NATO | North Atlantic Treaty Organization |

| | |
|---|---|
| NAVSUP | Naval Supply Systems Command |
| OPNAV | Office of the Chief of Naval Operations |
| OSBP | off-ship bill pay |
| PVST | port visit |
| PWS | performance work statement |
| QASP | quality assurance surveillance plan |
| RTOP | request for task order proposal |
| SAC | single award contract |
| SECNAV | Secretary of the Navy |
| SLR | standardized logistics requirement |
| TYCOM | Type Commander |
| WAWF | Wide Area Workflow |

# EXECUTIVE SUMMARY

The Navy's husbanding services process is a critical component of overseas naval operations, providing the logistics and port support services necessary to sustain operational readiness during foreign port visits. Following the Glenn Defense Marine Asia (GDMA) scandal, the Navy implemented a series of reforms to strengthen oversight, improve auditability, and reduce opportunities for fraud within the husbanding services process. While these reforms improved transparency and internal controls, they also introduced additional procedural requirements that increased the complexity of the contracting process.

This thesis examines how procedural delays within the Husbanding Service Provider (HSP) contracting process influence daily port visit cost across Fifth Fleet, Sixth Fleet, and Seventh Fleet operations from fiscal year (FY) 2016 through FY2026. Specifically, the research evaluates which phases of the pre-port visit workflow have the greatest effect on cost outcomes and whether delays in contracting timelines consistently increase pricing across operational environments. The research also assesses where the greatest opportunities exist for process improvement while preserving audit readiness and operational responsiveness.

The study relied on quantitative analysis of data extracted from HSPortal, the Navy's centralized repository for husbanding services documentation and port visit records. Following extensive data cleaning and removal of incomplete, cancelled, and non-standard port visits, the final analytical sample consisted of 6,752 completed port visits across Fifth, Sixth, and Seventh Fleets. The researchers analyzed five primary contracting process intervals within the HSP workflow: logistics requirement (LOGREQ) submission to Contracting Officer's Representative (COR) assignment, COR assignment to task order solicitation issuance, solicitation issuance to proposal due date, proposal due date to task order award, and task order award to ship arrival. Descriptive statistical analysis and multivariate regression modeling were used to determine the relationship between process-step duration and daily average port visit cost while controlling for ship type and days in port.

The analysis identified several significant findings across all three fleets. Most notably, the time period between contractor proposal receipt and final task order award (TO DUE → TO AWARD) emerged as the most consistently influential contracting interval affecting daily port visit cost across all operational environments. In both Fifth Fleet and Seventh Fleet, delays during this process step were strongly associated with increased daily average cost. These findings suggest that prolonged proposal evaluation, coordination, and award timelines may create pricing pressure by reducing contractor planning certainty and compressing execution timelines prior to ship arrival. Seventh Fleet demonstrated the strongest relationship between contracting process duration and pricing outcomes, with the regression model explaining approximately 63 percent of the variation in daily port visit cost. This finding indicates that contracting process timing was more consistently associated with pricing outcomes in Seventh Fleet than in the other fleets examined.

The analysis also demonstrated that delays occurring during early requirement validation and solicitation preparation phases contributed significantly to higher costs in both Fifth Fleet and Seventh Fleet. Specifically, delays between LOGREQ submission and COR assignment, as well as delays between COR assignment and solicitation issuance, were positively associated with increased daily average port visit costs. These findings indicate that inefficiencies during the earliest stages of the contracting process create downstream schedule compression and increase contractor pricing pressure. In contrast, Sixth Fleet demonstrated an inverse relationship between contracting timeline duration and daily average cost. Longer planning and coordination timelines in Sixth Fleet were generally associated with reduced daily costs, suggesting that additional planning time may improve requirement definition, reduce urgency-driven pricing, and improve contractor preparation.

One of the most consistent findings across all three fleets was that the solicitation response period provided to vendors (TO ISSUE → TO DUE) did not demonstrate a statistically significant relationship with daily average cost. This suggests that extending or compressing vendor bid submission windows alone does not substantially influence pricing outcomes. Instead, the analysis indicates that internal government coordination, requirement validation, and contract award timelines are the primary drivers affecting cost variability within the HSP process.

The findings further demonstrated that operational context significantly influences how contracting timelines affect pricing outcomes. In Fifth Fleet and Seventh Fleet, compressed timelines and delayed coordination were associated with higher costs, likely reflecting operational urgency and reduced contractor preparation time. Conversely, Sixth Fleet results suggest that deliberate planning and extended coordination timelines may reduce pricing pressure in more stable operational environments. These differences indicate that a single standardized approach to process timing may not be appropriate across all fleet areas of responsibility.

Based on the results of this study, several process improvement opportunities were identified. First, Navy leadership should prioritize reducing delays during early LOGREQ validation and proposal evaluation phases, as these steps demonstrated the strongest relationship with increased costs. Second, Naval Supply Systems Command should consider implementing enterprise-wide target-date reporting and schedule variance tracking for key contracting milestones. Tracking planned versus actual completion dates would improve visibility into recurring delays, contracting performance, and cross-fleet process trends while maintaining regional flexibility. Importantly, the findings suggest that improving the predictability and visibility of contracting timelines may provide greater benefit than simply accelerating process execution. Finally, contracting offices and operational commands should preserve adequate planning and coordination time whenever operational conditions permit, particularly in fleets where extended planning horizons reduce pricing pressure.

Overall, this research demonstrates that contracting process timelines significantly influence overseas port visit costs under the current HSP framework. While post-GDMA reforms successfully improved oversight and accountability, the findings indicate that procedural inefficiencies and schedule compression continue to affect pricing outcomes across operational environments. By focusing process improvement efforts on early coordination, proposal evaluation, and contract award timelines, Navy leadership can improve cost control while maintaining the transparency, auditability, and operational responsiveness required to support global naval operations.

# I. INTRODUCTION

U.S. Navy ships operating overseas rely on commercial husbanding services to support port visits that enable mission execution, maintenance, and logistics replenishment, and enhance crew welfare. These services include a wide range of port-related support such as force protection coordination, transportation, waste removal, water and fuel services, and other logistics functions required for safe and efficient port operations. Because port visits occur under varying operational, diplomatic, and scheduling conditions, the effectiveness of husbanding services plays a critical role in sustaining operational readiness and supporting fleet objectives.

In recent years, the Navy has implemented significant changes to how husbanding services are contracted, managed, and paid. These changes were intended to improve financial transparency, strengthen internal controls, and enhance oversight of port-visit expenditure. While these reforms did improve accountability, they also increased the procedural requirements associated with husbanding services execution, introducing additional coordination, validation, and approval steps prior to contract award and performance.

As a result, questions have emerged regarding how these procedural requirements influence execution time lines, cost outcomes, and service quality. Despite the operational importance of husbanding services, there remains limited analytical understanding of how process execution affects these outcomes across overseas port visits. Addressing this gap is necessary to support informed decision-making and ensure that husbanding services continue to meet operational needs efficiently. Accordingly, a clearer understanding of how the reformed husbanding services process performs in practice, particularly with respect to execution time lines, cost outcomes, and service quality, is required.

## A. PROBLEM STATEMENT

Since the implementation of major reforms to the Navy's husbanding service provider (HSP) program in 2016, including the off-ship bill pay (OSBP) process and the multiple award contract (MAC) strategy, husbanding services have been executed under increased procedural and oversight requirements intended to strengthen fiscal transparency and accountability (Office of the Chief of Naval Operations, 2020). While these reforms improved governance, concerns remain regarding their impact on execution timelines, cost outcomes, and service quality (Hauser et al., 2022; Naval Audit Service, 2019).

Although global HSP data are captured through the Naval Supply Systems Command (NAVSUP) HSP Portal, the system remains optimized for transactional oversight rather than analytical assessment. While it consolidates port-visit records from multiple contracting offices, inconsistent data entry, limited integration with financial systems, and constrained access for cross-regional comparison reduce its value for evaluation (Naval Audit Service, 2014; Naval Audit Service, 2019). As a result, Navy leadership lacks a standardized, data-driven picture of how process flow, approval delays, and regional practices affect total port-visit cost and service outcomes.

This limitation restricts the Navy's ability to identify where the greatest procedural friction occurs, such as late logistics requirement (LOGREQ) submissions, delayed contracting officer's representative (COR) validations, or contract award, and how those points drive higher prices or degraded performance. Without a coherent analytic framework to interpret the data already collected, opportunities to streamline processes, forecast costs more accurately, and strengthen fiscal discipline remain largely unrealized.

## B. PURPOSE & OBJECTIVES

This study examines how procedural delays and administrative inefficiencies within the HSP process affect cost and service outcomes under the OSBP and MAC frameworks. Using quantitative data extracted from the HSP Portal and supporting contract records, it looks to expose the relationship between cycle time, pricing trends, and service performance. The analysis informs targeted recommendations for process improvement considerations while ensuring compliance with Financial Improvement and Audit Readiness (FIAR) requirements.

To achieve this purpose, the objectives of this thesis are to

- conduct a quantitative analysis of HSP data from ship port visits in non–U.S.-based areas of responsibility (AORs), covering the period from the implementation of OSBP (October 2016) to December 2025,
- assimilate the quantitative findings from the analysis to determine if there is a relationship between the timeliness of LOGREQ submission and contract award to total contract costs, and what factors most impact the quality and cost of port services, and
- make specific and implementable HSP process recommendations to appropriately streamline HSP execution and incentivize cost savings while maintaining service quality.

## C. RESEARCH QUESTIONS

This thesis is guided by the following research questions:

**Primary Research Question:**

1. What contracting process intervals within the Husbanding Service Provider (HSP) pre-port visit workflow have the greatest influence on daily port visit cost across Fifth, Sixth, and Seventh Fleets under the Off-Ship Bill Pay (OSBP) framework from FY2016 through FY2026?

**Secondary Research Questions:**

2. Where do the most significant time delays occur between LOGREQ submission and ship arrival, and how consistently are these delays associated with increased daily port visit cost across fleets?
3. Which stages of the HSP contracting process present the greatest opportunity for process improvement, cost reduction, and strengthened audit readiness without reducing operational responsiveness?

## D. SCOPE & LIMITATIONS

This study is limited in scope to overseas Navy port visits conducted under the current husbanding services framework. The analysis focuses on Navy-wide trends rather than individual geographic regions or contracting offices. The timeframe examined corresponds to the period following the implementation of OSBP and the MAC strategy.

The scope of this research includes procedural timelines, cost outcomes, and available measures of service quality associated with port visits. This study does not evaluate contractor-specific performance beyond aggregated outcomes, nor does it assess broader strategic or geopolitical factors that may influence port visit execution. Additionally, this thesis does not seek to evaluate alternative contracting models outside the current husbanding framework. Results are subject to data completeness and consistency limitations inherent in administrative contracting systems.

## E. SIGNIFICANCE

Husbanding services are essential enablers of overseas naval operations, with direct implications for operational readiness, fiscal stewardship, and institutional accountability. Post-2016 reforms strengthened oversight and internal controls, but also increased procedural requirements across ships, contracting offices, and supporting commands. Understanding how these requirements affect execution in practice is necessary to ensure that accountability improvements do not unintentionally degrade efficiency or service outcomes.

Prior reviews identified weaknesses in receipt and acceptance procedures, invoice validation, and oversight responsibilities, prompting the implementation of standardized policy, OSBP, and enhanced documentation requirements (Naval Audit Service, 2014; Office of the Chief of Naval Operations, 2020). These measures align with broader FIAR objectives and have generated extensive process and cost data intended to support transparency and control.

However, compliance alone does not ensure effective execution. Federal Acquisition Regulation (FAR) 16.5 (2026) emphasizes competition through multiple-award contracting to achieve best value, yet the extent to which procedural timelines and administrative friction influence cost and service quality under this framework remains insufficiently understood. This gap underscores the need for analytical insight rather than additional policy reform.

By identifying where delays occur within the husbanding services process and examining their relationship to cost and service quality outcomes, this study provides a data-driven assessment of process performance rather than a critique of existing policy. The significance of this research therefore lies in its direct connection to the research questions posed and its potential to inform decision-making that balances operational effectiveness with established accountability standards.

## F. ORGANIZATION OF REPORT

This thesis is organized into six chapters. Chapter II provides background information on Navy husbanding services and the current execution framework. Chapter III reviews relevant literature related to government contracting, process efficiency, and cost analysis. Chapter IV describes the methodology and data sources used in this study. Chapter V presents the analysis of the data and interpretation of the results. Chapter VI offers conclusions and recommendations based on the findings of the research.

THIS PAGE INTENTIONALLY LEFT BLANK

# II. BACKGROUND

Before the implementation of more centralized HSP processes, the Navy still submitted LOGREQs, but the process was different. Verrastro (1996) describes that LOGREQs were normally submitted 10 to 14 days prior to a port visit in the mid-1990s, and the government activity forwarded a copy of the LOGREQ to the husbanding agent to begin preparations. Marquez et al. (2009) state that the ship sends its LOGREQ to the regional Fleet and Industrial Supply Center (FISC) (now Fleet Logistics Center [FLC]), and the supply officer provides a copy of the unclassified LOGREQ directly to the HSP. In the 1990s through 2010s the ship's supply officer had more direct communication of requirements to the HSP, while still having shore support from representatives. At the conclusion of the port visit, the ship verified the invoices for services performed and issued one check to the HSP covering the total amount prior to leaving the port (Verrastro, 1996). Marquez et al. (2009) stated that the supply officer and HSP resolved issues on the last day of a port visit and finalize payment, but the supply officer often lacked background information on excessive costs based on prior invoices.

Prior to NAVSUP FLC's GMAC for HSP services, NAVSUP and FISCs were working on solutions to consolidate husbanding contracting. Previously, FISCs regionalized its AORs and subsumed Navy Regional Contracting Centers (Gundemir et al., 2007), leading to NAVSUP being designated the worldwide executive agent for HSP contracting. Marquez et al. (2009) describe FISC's global husbanding initiatives that resulted in FISC Norfolk, FISC San Diego, FISC Sigonella, and FISC Yokosuka each leading efforts to consolidate their husbanding contracts with the goal to ultimately award one contract for outside the continental U.S. regions and one contract for the continental U.S.. Overall, the previous HSP contracting process featured more direct contact with the HSP from ships, payment responsibilities for the ship's supply department, and less consolidated contracts with the goal of a worldwide contract framework.

The Glenn Defense Marine Asia (GDMA), or "Fat Leonard," scandal marked a significant turning point in how the Navy manages its HSP processes. For decades, HSPs supplied visiting ships with essential port services such as fuel, water, sewage removal, transportation, and force protection coordination (Dortch, 2020). However, the investigation into GDMA revealed widespread vulnerabilities in pricing oversight, invoice validation, and contract administration (Whitlock, 2016, p. 124). As reported by *USNI News*, Leonard Glenn "Fat Leonard" Francis, who orchestrated extensive bribery, overbilling, and fraud schemes, was sentenced to 15 years in prison in 2024, formally concluding one of the largest corruption cases in modern Navy history (Mongilio, 2024). The scandal exposed systemic weaknesses in the Navy's port services oversight framework and served as the primary catalyst for subsequent reforms aimed at improving transparency, accountability, and process standardization.

Long before the GDMA case came to public attention, studies had identified structural limitations in how the Navy managed its service-oriented supply chains. Apte et al. (2011) documented fragmented management practices, inconsistent requirements definition, and a lack of standardization across the Navy's services supply chain. Their findings demonstrated that the challenges associated with contracting for port services were not isolated to a single region or vendor but were embedded within the broader organizational structure. These weaknesses created conditions in which oversight lapses, inflated invoices, and inconsistent application of internal controls took root and created issues that later manifested on a much larger scale during the GDMA scandal. This context illustrates that the Navy's husbanding difficulties were part of a longstanding structural problem rather than a sudden failure.

The Naval Audit Service's 2014 report prompted by the GDMA scandal identified widespread systemic weaknesses in the Navy's husbanding and port services process (Naval Audit Service, 2014). The audit found insufficient internal controls across funding oversight, contract language, ordering authority, receipt and acceptance, and invoice verification, leading to inconsistent compliance with acquisition and financial regulations. Ships frequently ordered items outside contract scope, personnel lacked required training and delegation, and receipt inspectors often failed to verify goods and services delivered. The report further noted vulnerabilities in safeguarding ship schedules and unreliable port visit data within Logistics Services Repository (LogSSR). Overall, the audit revealed that the Navy could not ensure it received what it paid hundreds of millions of dollars for contracts, underscoring the urgent need for comprehensive reform.

Figure 1 shows the total dollar amount spent by each fleet for port visits for fiscal year (FY) 2025. This research focuses on the HSP process Navy-wide, but the chart shows the total dollar amount spent by each fleet.

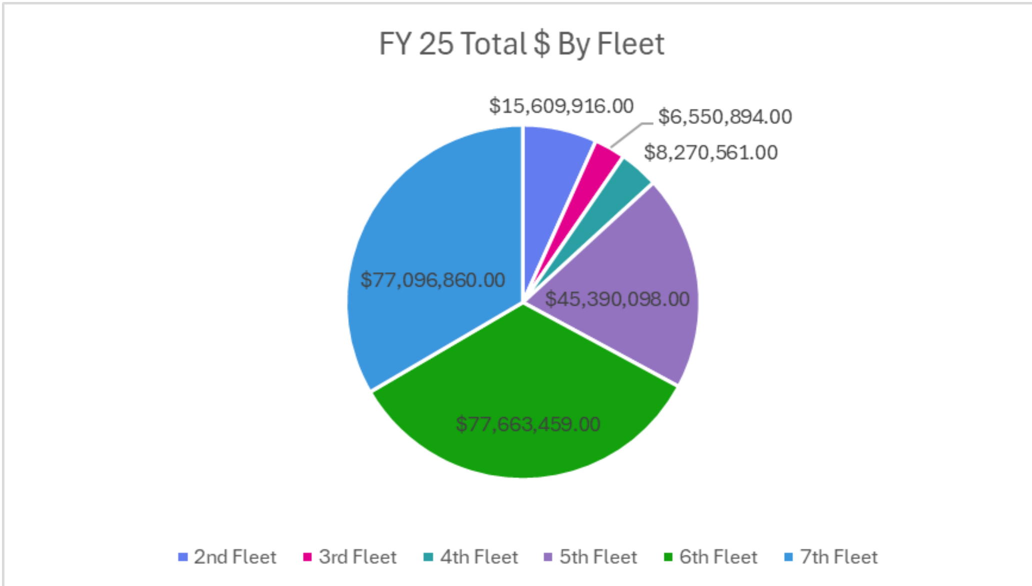


Figure 1. FY2025 Port Visit Expenditures by Fleet. Source: NAVSUP (2025).

In FY2025, the Navy spent $230,581,788 on port visits (NAVSUP, 2025). The Navy can forecast that it will spend approximately this amount yearly, with variations depending on port visit occurrences and requirements as well as inflation.

## A. OPNAV INSTRUCTION 4400.11A

OPNAV Instruction (OPNAVINST) 4400.11A, published in June 2020, serves as the Navy's authoritative HSP program policy. Its purpose is to "prescribe policy, oversight, coordination and direction for the Department of the Navy's (DON) business process for acquiring husbanding services during port visits" (OPNAV, 2020, p. 1) establishing a standardized, repeatable process with clear checks and balances. The instruction outlines the key tenets governing the HSP program, emphasizing required training, adherence to professional standards of conduct, and consistent execution of port-visit support activities across the fleet (OPNAV, 2020). It also designates NAVSUP as the lead organization responsible for providing oversight of HSP procurements and ensuring compliance with financial, contracting, and auditability requirements. The policy includes a ready reference guide that incorporates OSBP procedures established in 2016, mandatory HSPortal usage, and defined roles for all stakeholders involved in the husbanding process.

## B. INDEFINITE DELIVERY CONTRACTS

FAR 16.5 describes indefinite-delivery contracts and prescribes policies and procedures for their use. FAR 16.500 (2026) also states that the preference is for making multiple awards of indefinite-quantity contracts. This policy promotes competition among qualified vendors for the contract. FAR 16.504(c) (2026) further states that "the contracting officer must, to the maximum extent practicable, give preference to making multiple awards of indefinite-quantity contracts under a single solicitation" which is the basis for NAVSUP Fleet Logistics Center (FLC) Sigonella's MAC contract for global HSP services. The MAC concept, through competition among vendors, also prevents the overuse of and abuse by sole-source vendors like GDMA.

## C. GLOBAL MULTIPLE AWARD CONTRACTS

Building on the success of regional MAC indefinite delivery indefinite quantity (IDIQ) contracting, the Navy later expanded its approach to a Global Multiple Award Contract (GMAC) structure to further standardize and streamline husbanding services worldwide. GMAC consolidates previously separate regional contracts into a single global framework, allowing qualified vendors to compete for task orders across multiple geographic areas rather than only within individual fleet regions (NAVSUP FLC Sigonella, 2022). This shift improves consistency, simplifies oversight, and reduces administrative burden by applying uniform terms, pricing structures, and performance expectations. GMAC also increases opportunities for competition by enabling a larger pool of contractors to bid on port visits across different theaters, helping the Navy avoid vendor monopolies in traditionally limited markets. Through this global contracting model, the Navy aimed to strengthen transparency, reduce variability in service delivery, and reinforce competitive principles introduced through the MAC IDIQ system.

## D. OFF-SHIP BILL PAY

The Navy implemented OSBP in FY2016 to increase oversight and mitigate risk. Prior to OSBP, ships' disbursing officers made payments for husbanding and port services. According to the Naval Audit Service (2014), ship personnel did not always ensure payments were in accordance with Department of Defense (DoD) financial management regulation (FMR). Specifically, disbursing officers failed to adhere to their segregation-of-duty mandate and acted as certifying officer or issued treasury checks without the ship's supply officer reviewing and approving all supporting documentation. OSBP takes the payment responsibility away from the ships and further separates the duties of HSP payments.

## E. HSPORTAL

HSPortal serves as the Navy's centralized data repository for husbanding and port visit documentation and is maintained by the NAVSUP Business Systems Center. The system captures all port visit records and stores required documents such as LOGREQs, daily reconciliation reports, post-port visit surveys, and the Material Inspection and Receiving Report (DD 250) (OPNAV, 2020). This standardized repository is essential for initiating and completing the husbanding process; ships must submit an accurate LOGREQ to begin requirements validation, and contractors cannot be paid until a verified DD 250 is uploaded and approved (OPNAV, 2020). By consolidating these documents in a single auditable system, HSPortal enhances oversight, improves data accuracy, and supports the internal controls established under the post-GDMA reform framework.

## F. LOGREQ PROCESSING

LOGREQ processing is critical to awarding HSP contracts. Although the guidance is to submit the ship's LOGREQ 30 days prior to port arrival (OPNAV, 2020), operational and mission requirements often happen on short notice, forcing the ship to submit its LOGREQs in less than the 30-day timeframe. Figure 2 is the LOGREQ processing procedure from the Fourth Fleet pre-deployment brief; although this is the Fourth Fleet procedure, the process is similar for the various fleets.

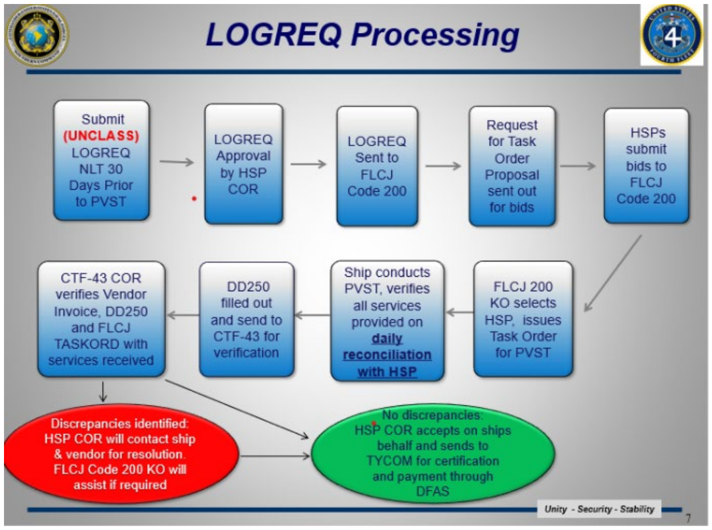


Figure 2. Fourth Fleet LOGREQ Processing Procedure: Source U.S. Navy Fourth Fleet (2022)

As shown by the diagram, the ship's submittal of the unclassified LOGREQ starts the process for the award of the HSP contract. The COR reviews and approves the LOGREQ based on standardized LOGREQ requirements and any deviations from the typical port visit for a specific class of ship. After COR approval, the LOGREQ is sent to Code 200, the NAVSUP FLC contracting office. Then, the task order is sent out for bids, and the contracting officer awards the contract. Once the ship is in port, the supply officer conducts daily reconciliation with the HSP. During daily reconciliation, the supply officer verifies that services were performed and confirms volumetric measurements. For example, if the ship receives potable water, the ship's supply officer or designated representative will check the volume readings to confirm that the ship will be charged appropriately by the HSP. At the conclusion of the port visit, the ship submits the DD 250, which allows the contractor to receive payment from the Wide Area Workflow (WAWF) (OPNAV, 2020). Another requirement not listed in the flow chart is the Port Visit Checklist. This document requires the supply officer and the commanding officer to submit quality assurance ratings based on contractor performance during the port visit; it must be signed by the commanding officer and submitted within 3 days of the conclusion of the port visit along with the DD 250.

## G. CONTRACTING OFFICER'S REPRESENTATIVE RESPONSIBILITIES

The COR plays a critical oversight role throughout the husbanding process by ensuring that requirements, contractor performance, and documentation comply with the terms of the contract (OPNAV, 2020, p. 18). The COR validates LOGREQs, confirms that requested services align with standardized port-visit requirements, and serves as the primary technical liaison between the ship and the contracting office (OPNAV, 2020, p. 8). During and after the port visit, the COR verifies that services are performed as ordered, assists with resolving discrepancies in invoices, and ensures the performance documentation, such as reconciliation reports, DD 250s, and contractor evaluations, are properly completed. Importantly, CORs are not authorized to change contract terms or direct work outside the contract scope, helping preserve the integrity of the contracting process and prevent the types of interactions that contributed to previous oversight failures.

## H. CONTRACTING OFFICER RESPONSIBILITIES

The contracting officer (KO) holds the only legal authority to obligate the government and is ultimately responsible for ensuring that husbanding service contracts are awarded, administered, and executed in accordance with federal law, the FAR, Defense Federal Acquisition Regulation Supplement (DFARS), and Navy policy (OPNAV, 2020, p. 23). In the HSP process, the KO reviews validated LOGREQs, determines whether the requirement is within the scope of the MAC contract, and solicits bids from qualified vendors. The KO evaluates vendor offers, confirms price reasonableness, and awards the task order to the lowest priced technically acceptable contractor in accordance with FAR 16.5. During contract performance, the KO relies on input from the COR but retains sole authority to make contract modifications, address disputes, authorize changes in service levels, or take corrective action if a contractor fails to perform. The KO also ensures that documentation is maintained for auditability, approves final invoices, and certifies that all contractual actions comply with the FAR, DFARS, and NAVSUP policy. By centralizing contractual authority with the KO, the Navy preserves oversight, prevents unauthorized commitments, and maintains the separation of duties necessary to protect the integrity of the HSP process.

## I. TYPE COMMANDER RESPONSIBILITIES

Type commanders (TYCOMs) provide oversight of the husbanding support process by ensuring that ships under their authority have the resources, guidance, and policy direction to execute port visits effectively. TYCOMs validate and allocate funding for HSP requirements, serving as the central authority for port-visit fiscal approval (OPNAV, 2020, p. 4). As the organizations responsible for training, maintaining, and equipping ships, TYCOMs ensure that husbanding requirements align with readiness objectives and established standards.

## J. SUPPLY OFFICER RESPONSIBILITIES

The supply officer plays a central operational role in the husbanding process by ensuring that shipboard requirements are accurately identified, coordinated, and documented throughout the port visit. Before arrival at a port, the supply officer works with the operations officer to draft the LOGREQ based on mission needs and ship-class requirements, and department heads to determine the services necessary for the visit. During the port visit, the supply officer conducts daily reconciliation with the HSP to verify that ordered services are delivered and confirm volumetric measurements, such as potable water quantities or trash removal totals, to ensure accurate billing (OPNAV, 2020, p. 11). At the end of the visit, the supply officer submits DD 250 to the COR, certifying receipt of services so that the contractor can be paid (OPNAV, 2020, p. 11). The supply officer also completes the Port Visit Checklist and provides performance feedback, forming a key link in the oversight chain and ensuring both operational readiness and financial accountability.

## K. BACKGROUND SUMMARY

In summary, the Navy's HSP process has evolved to a more centralized model to improve oversight and accountability. The implementation of OSBP, MAC, and GMAC has strengthened internal controls and standardized processes. The changes have also increased the number of steps in the process, requiring an assessment of their impact on cost, quality, and fleet readiness. As demonstrated in the Navy HSP process background, continuous improvement is essential to meeting mission requirements and ensuring financial accountability and auditability.

THIS PAGE INTENTIONALLY LEFT BLANK

# III. LITERATURE REVIEW

The HSP process has undergone many changes over the past decade due to the GDMA scandal and has much more visibility and scrutiny now as the audit process has improved. Recent literature has shown some positive results from the changes that were made and explained some of the reasoning behind those changes, but it also shows flaws in the HSP process and gaps that need to be addressed.

This literature review focuses on materials written primarily post–GDMA scandal and after the Navy switched from single award contracts (SACs) to the regional MAC and GMAC processes for awarding HSP contracts worldwide. The materials include peer-reviewed articles, reports, Naval Audit Service Audits, and Naval Postgraduate School (NPS) thesis reports with relevant information on the HSP process and policy. The remainder of this section synthesizes the key findings from the literature and examines their relevance to the HSP process.

## A. NAVAL AUDITS

As discussed in Chapter II, the GDMA scandal brought about sweeping changes to the HSP process, but before changes could be made, the Secretary of the Navy (SECNAV) requested an audit of the widespread fraudulent activities conducted by GDMA entities, and naval decision-makers and KOs. Naval Audit Report N2014-0048 focused on identifying existing loopholes and weaknesses in the Navy's HSP contracting process and what auditing and control measures could be utilized to mitigate them in the future (Naval Audit Service, 2014). The Naval Audit Service made several recommendations to address the issues found, including removing ship personnel's ability to make payments to contractors and creating a logistics support services repository that would track all costs (Naval Audit Service, 2014, pp. 21–30). The Navy used these recommendations to issue a new policy that standardized and addressed weaknesses in the HSP process, OPNAV Instruction 4400.11, *Husbanding Service Provider Program Policy*, dated June 26, 2020 (OPNAV, 2020).

In addition to these recommendations and changes, the Naval Audit Service (2019) conducted a follow-up report, Report N2019-0013, to verify that the processes and

HSP program's processes and controls were functioning effectively and that the recommendations from Naval Audit Service Report N2014-0048 had been implemented as intended. The Naval Audit Service (2019) found that the Navy had taken great lengths to address the inadequacies noted in the previous audit and implemented many of the early report's recommendations including standard logistics requirements and the OSBP process; however, it also found that many of the internal controls within the HSP program were missing or inadequately addressed (Naval Audit Service, 2019). One of the more serious issues the Naval Audit Service highlighted was the lack of internal controls and supporting documentation to meet auditability requirements for the HSP program which could put the Navy's financial statements at risk of being viewed with "modified opinion," meaning the auditor identified material misstatements or insufficient evidence preventing a fully unqualified opinion. The Naval Audit Service report included 25 recommendations for the Navy to implement, including that supply officer's receive current and updated HSP training and that the Quality Assurance Surveillance Plan (QASP) be revised to reflect all areas of contractor performance (Quality of Service, Cost Control, Timeliness, Business Relations, Small Business Subcontracting, and regulatory compliance) to be used by the ship supply officer and COR (Naval Audit Service, 2019, p. 26). The Naval Service Audit also recommended that task orders be monitored to ensure a fair and reasonable price was awarded and that the task orders were completed in a timely manner ensuring that competition would be utilized unless in a sole source environment (Naval Audit Service, 2019, p. 32). The Navy agreed to all 25 recommendations and drafted corrective action plans and target completion dates for each; as of March 2026, most of these plans have been completed.

## B. PREVIOUS HSP THESIS RESEARCH

The researchers reviewed *Navy Global Multi Award Contract Effects of Competition on Pricing of Port Visits*, published in 2022 as part of their examination of NPS thesis reports (Cahill et al., 2022). The authors compared the newly executed GMAC process to the regional MAC process to determine if the overall cost savings in average daily port visit costs were due to increased competition under GMAC. Cahill et al. (2022) used data from the HSPortal database to compare daily average costs to competitive influences, fleet and port location, ship platform, vendor performance, and specific exhibit line-item number (ELIN) cost to determine if the GMAC process indeed increased competition which would lead to a reduction in cost for the Navy HSP program. The authors utilized multiple cross-tabulation models to compare to identify any trends or correlations. Cahil et al., (2022) concluded that the increased competition from the GMAC execution had a negative correlation with the average daily cost with only a few exceptions in specific locations. Across the Fifth Fleet, Sixth Fleet, and Seventh Fleet, the ship class with the most competitive offers had the lowest daily cost average, while the ship class with the fewest competitive offers had the highest daily cost average. Additionally, they found that the two vendors with the highest market share of awarded contracts across all fleets had received the most negative QASP ratings raising the concern that performance was not being prioritized when it came to contract award and the two vendors were receiving an unfairly high share in the competitive market (Cahill et al., 2022).

Although Cahill et al. (2022) provided in-depth analysis of the effects of GMAC execution on competition and costs, they utilized sample data from the execution of GMAC in December 2019 until January 2022, which coincided with the COVID-19 pandemic; inflation and scarcity issues because of the pandemic, which raised prices on many products, may, therefore, have skewed their data. During the pandemic, many port visits were also cancelled, and ships remained out to sea longer which may have created data with less information than could be gathered from pre-pandemic port visits. Cahill et al. (2022) determined that further research was required to have a larger data pool of contracts awarded post pandemic and after GMAC execution for expanded analysis; they also recommended a more in-depth study as to why some ports with decreased competition had decreasing daily average costs to determine if there were factors that could be utilized as cost-saving measure at other ports.

In their NPS thesis *Husbanding Service Provider Price Analysis Factors*, Gage et al., (2021) concentrated on short-notice port visits to ascertain if submitting LOGREQs within the expected 30 days was increasing port visit prices due to shorter turnaround times for HSPs to provide contract requisites. Additionally, the authors examined the effects of competition among HSP vendors on port visit costs. They conducted a quantitative analysis using cross-tabulation via pivot tables populated by data from HSPortal to demonstrate the effects of LOGREQ turnaround time on costs. The results showed that quick turnaround times on LOGREQ submission had no correlation with increased port visit prices overall, and that the Navy's regional MAC model was working as intended by increasing competition and driving prices down, as is expected in a competitive market (Gage et al., 2021).

The researchers did not conduct an in-depth analysis of the internal controls utilized by the COR and KO to determine if delays in receiving the LOGREQ from the ship to releasing the request for task order proposal (RTOP) influenced the price or quality of the services and products provided by the HSP. By examining the internal process conducted by the FLC, other researchers may determine that a delay in one of the steps correlate to increased costs from the HSP vendor or leads to decreased quality of services due to less time to acquire all of the required goods and services.

## C. PEER REVIEWED ARTICLE

The researchers examined the peer-reviewed article "Assessing Policy Changes on the Cost of Husbanding Services for Navy Ships" written by Hauser et al., (2022) and published in the *Defense Acquisition Research Journal* Hauser et al. (2022) evaluated whether the policy reforms of OSBP and MAC that came about in 2016 due to the GDMA scandal did influence HSP costs. They used data from 2011–2022 and focused on contract type, ship type, number of days in port, port visit location, oil price, and number of ELINs to determine the effect on costs. The researchers found that OSBP did increase prices initially due to HSP and CORs learning the new process, but after FY2016, it did not have a significant effect on costs. While OSBP did not have a significant effect on costs, Hauser et al. (2022) noted that the new MAC did decrease port visit costs indirectly due to increased competition among vendors. They also found that the number of ELINs requested per LOGREQ had the largest effect on costs, while the number of days a ship spent at a port visit had the second-largest effect.

## D. SUMMARY

The literature discussed in this chapter provided a historical context that is useful for understanding the Navy's HSP policy and the changes that have been necessary to modernize and bring transparency to the process. As the Navy spends hundreds of millions of dollars on husbandry services every year to ensure smooth operations for the fleet globally, it is crucial that the policy, procedures, and personnel continue to develop and improve to ensure auditability of the program (Rendon et al., 2015). The Navy HSP program has been tarnished in the past, but it must continue to show transparency and accountability as it works to improve internal controls and workforce capability to be a good steward of taxpayer dollars and provider for the fleet.

THIS PAGE INTENTIONALLY LEFT BLANK

# IV. DATA & METHODOLOGY

This chapter details the methodology for data aggregation, scrubbing, and analysis used to answer the primary and secondary research questions. By leveraging data from HSPortal, the researchers aim to achieve the objectives set forth in this thesis.

## A. SOURCE OF DATA

All data used in this study were obtained from HSPortal, which recorded 18,951 Navy port visits between October 1, 2015, and January 27, 2026. The data is unclassified and was downloaded directly from HSPortal. Responsibility for accurate and timely data entry rests with the COR, NAVSUP FLC KO, and the Supply Officer aboard each ship, who verify and validate data elements before submission. Key validated elements include ship type, fleet, daily average cost, total port visit cost, arrival and departure dates, and the timelines for the HSP task order process. This dataset serves as the foundation for analyzing cost comparisons based on the timelines of the HSP task order award process and their impact on quality of service. The researchers reviewed and scrubbed the data to ensure accuracy.

## B. DATA SAMPLE

The initial data set comprised 18,951 port visits within the thesis scope, covering the timeframe from the onset of the OSBP process in October 2015 through January 2026. For analysis, the researchers extracted the following variables from the HSPortal "Port Visit" tab: ship type, fleet, daily average cost, total port visit cost, arrival date, departure date, LOGREQ DTG, SENT to CODE 200 Date, RTOP Issue date, RTOP Due Date, Task Order Award date, and Days Vendor to PV Arrival. Embedded HSPortal filters were applied to select port visits from fiscal years 2016 through 2026. Each data element is described in Table 1 and follows conventions established in previous research, such as *Navy Global Multi Award Contract Effects of Competition on Pricing of Port Visits* (Cahill et al., 2022), with additional variables specific to this study. Ship classes were grouped according to the methodology used by Gage et al. (2021), as outlined in Table 2.

Table 1. Summary and Description of Required Date Elements. Adapted from Gage et al. (2021).

| DATA ELEMENT | DESCRIPTION |
|---|---|
| Ship Type | Hull Type of a ship |
| Fleet | Numbered fleet where the PV was executed |
| Total Port Visit Cost | All costs associated with husbanding services for the PV |
| Daily Average Cost | All costs husbanding services costs divided by duration |
| Arrival Date | Date the PV started |
| Departure Date | Date the PV ended |
| LOGREQ DTG | Date the LOGREQ was released by the ship via naval message |
| Sent to Code 200 Date | Date the LOGREQ requirements were sent to the COR |
| RTOP Issue Date | Date the KO released the RTOP to contractors to bid on |
| RTOP Due Date | Date the bids for the RTOP from the contractors are due to the KO |
| Task Order Award Date | Date the Task order was awarded to a contractor |
| Days to Vendor to PV Arrival | Number of days from task order awarded date until the ship pulls in |

Table 2. Ship Classes and Descriptions of Ship Type. Adapted from Gage et al. (2021).

| SHIP CLASS | DESCRIPTION OF SHIP TYPE |
|---|---|
| AMPHIB | Dock Landing Ship (LSD)<br>Landing Platform/Dock (LPD) |
| CRUDES | Guided Missile Destroyer (DDG)<br>Guided Missile Cruiser (CG) |
| LARGE DECK | Landing Helicopter Assault (LHA)<br>Landing Helicopter Dock (LHD)<br>Aircraft Carrier (CVN) |
| MSC SHIP | Afloat Forward Staging Base (AFSB)<br>Submarine Tender (T-AS)<br>Command Ship (LCC)<br>Hospital Ship (T-AH)<br>Dry Cargo/Ammunition Ship (T-AKE)<br>Underway Replenishment Oiler (T-AO)<br>Fast Combat Support Vessel (T-AOE)<br>Cable Laying/Repair (T-ARC)<br>Rescue/Salvage Ship (T-ARS)<br>Fleet Ocean Tugs (T-ATF)<br>Expeditionary Transport Vessel (T-EPF)<br>Expeditionary Mobile Base (T-ESB) |
| SMALL CRAFT | Littoral Combat Ship (LCS)<br>Mine Counter Measure (MCM)<br>Coastal Patrol (PC)<br>Patrol Boat (MK VI) |
| SUBMARINES | Fast Attack (SSN)<br>Ballistic Missile (SSBN)<br>Guided Missile (SSGN) |

A key differentiator of this thesis is its focus on the duration of each step in the HSP Task Order process and how these intervals influence both the daily average price and the quality of service, as measured by quality assurance data. The research team calculated the length of each process step using the Excel DAYS function, measuring the number of days between critical milestones: LOGREQ DTG, Sent to CODE 200 Date, RTOP Issue date, RTOP Due Date, Task Order Award date, and Days Vendor to PV Arrival. Specifically, the following time periods were constructed:

- LOGREQ to COR Assignment (Period 1): LOGREQ DTG to Sent to CODE 200 Date
- COR to TO Issue (Period 2): Sent to CODE 200 Date to RTOP Issue Date
- TO Issue to TO Due (Period 3): RTOP Issue Date to RTOP Due Date
- TO Due to TO Award (Period 4): RTOP Due Date to Task Order Award Date
- TO Award to Arrival (Period 5): Task Order Award Date to Days Vendor to PV Arrival

Additionally, Days in Port was calculated as the number of days between Arrival Date and Departure Date for each port visit.

## C. DATA SCRUBBING

Prior to conducting a thorough analysis, it was necessary to clean, or "scrub," the dataset to ensure its quality and reliability. Data scrubbing refers to the process of identifying and correcting (or removing) inaccurate records from a dataset. This step is critical because it improves the overall quality of the data sample and enhances the validity of any conclusions or relationships observed in the analysis. The steps involved in scrubbing the data are described in detail below:

### 1. Narrowing the Data

The initial step was to focus the analysis on fleets with the most substantial and relevant data. Of the 18,951 port visits from FY16 through FY26, the Second, Third, and Fourth Fleets accounted for only 2,332 visits (12% of the data). Given that the core analysis required robust comparisons between fleets, only port visits from the Fifth, Sixth, and Seventh Fleets were retained. This was accomplished using Excel's filter function to exclude the second, third, and fourth Fleets, resulting in a working dataset of 16,619 port visits concentrated in the most data-rich and operationally significant fleets.

### 2. Excluding Cancelled Port Visits and Non-Awarded Task Orders.

The second step in the data scrubbing process was to further refine the dataset by removing port visits that did not result in a completed and awarded task order. This included records with the status of "cancelled," "defining requirements," "pending KO assignment," and "pending task order awarded." Cancelled port visits were excluded because they typically lack meaningful pricing data or may only contain cancellation fees, which do not provide realistic or comparable pricing information for this analysis. Port visits that were still in process or had not yet been awarded were also excluded, as they did not contain the full set of required fields needed to analyze the time periods between each step of the task order process. Only port visits with awarded task orders contain all the necessary documentation and complete pricing and process data for thorough analysis. The researchers used Excel's filter function to deselect all records with the above statuses. As a result, 4,309 records (about 23% of the initial dataset) were removed, leaving 12,310 port visits eligible for further analysis.

### 3. Excluding Non-Standard Port Visits:

To ensure that the analysis focused only on comparable events, the dataset was refined to include only "standard" port visits. For this study, a standard port visit was defined as an event in which a ship entered a non-organic port and remained at least overnight, thus requiring typical husbandry services. The dataset excluded several categories of non-standard visits:

- Transit port visits, brief stops for fuel, and brief stops for personnel: These events involved a ship entering port for only a few hours, either to refuel, transfer personnel, or transit a strait or canal. Such visits do not require the full range of husbandry support and have significantly lower associated costs.
- AMMO/Boat Offload: Similar to brief stops for fuel, these visits are short in duration and do not involve the standard set of services.
- Dry Dock: In contrast, dry dock events represent unusually long and resource-intensive visits, with costs that are not representative of a standard port visit and would inflate average costs in the analysis.

Excluding these atypical events was necessary to prevent skewing the results and to maintain a consistent definition of a port visit. Using Excel's "EVENT TYPE" filters to remove these categories, 2,381 records (about 13% of the dataset) were excluded, yielding a working set of 9,929 standard port visits.

### 4. Excluding Port Visits with Missing Data Elements.

Accurate modeling and robust statistical analysis require that every observation contains all relevant data fields. For this thesis, the following elements were considered essential for each port visit: ship type, fleet, daily average cost, total port visit cost, arrival date, departure date, LOGREQ DTG, SENT to CODE 200 Date, RTOP Issue date, RTOP Due Date, Task Order Award date, and Days Vendor to PV Arrival. If any of these fields were missing, it would not be possible to compute the key variables needed for analysis, such as time intervals between process steps or daily average cost. Additionally, incomplete records could introduce bias or reduce the statistical power of the models. Therefore, any port visit missing one or more of these required fields was excluded from the sample. This was accomplished by using Excel's filter function to identify and remove records with blank cells in the critical columns, resulting in the exclusion of 2,975 records (approximately 16% of the data), and yielding a final intermediate dataset of 6,954 port visits with complete information.

### 5. Excluding Outliers

The final step in data scrubbing was to identify and remove outliers - data points with daily average costs that were abnormally high or low compared to the rest of the sample. Outliers can arise from data entry errors, unusual operational circumstances, or, in some cases, contractors' strategic pricing practices (such as submitting a low bid for one visit and compensating with a high bid for another) (Lipi et al., 2022). If left in the dataset, these extreme values could heavily skew the results of regression models and mask genuine relationships.

Initially, the empirical rule (removing values beyond a set number of standard deviations from the mean) was considered, but this approach was not suitable due to the skewed distribution of cost data, which sometimes produced negative lower bounds—an impossibility for cost data. Instead, a data trimming approach was used: the top and bottom 1% of daily average cost values (69 and 71 records, respectively) were removed.

This targeted method minimized the influence of extreme values while preserving the integrity of the core sample. After this final cleaning step, the dataset consisted of 6,752 port visits, which formed the analytical foundation for the regression models presented in the next section.

## D. ANALYTICAL METHODOLOGY

Following data cleaning, the analytical methodology for this study consisted of two main phases: preliminary descriptive analysis and multivariate regression modeling. The descriptive analysis provided an initial understanding of the dataset, allowing the research team to identify important trends and inform the selection and construction of variables for regression analysis. The subsequent regression modeling phase was designed to rigorously assess the relationships between contracting process timelines and port visit costs while controlling for relevant operational variables.

### 1. Descriptive Analysis

The researchers began with descriptive statistics and cross-tabulation using Excel pivot tables. This step compared average daily port visit costs across key categories such as fleet, ship type, and duration buckets for each step of the contracting process. To facilitate meaningful comparisons, the process intervals were grouped into standardized day ranges (e.g., less than 1 days, 1–3 days, 4–7 days, 8–14 days, 15–21 days, 22–30 days, and greater than 30 days). This approach allowed for the identification of cost patterns, potential threshold effects, and informed hypotheses for the formal regression analysis.

### 2. Variable Construction

For the regression analysis, variables were constructed from the cleaned HSPortal dataset as follows:

- The dependent variable was Daily Average Cost, defined as the total port visit cost divided by the number of days in port. This normalization enabled fair comparison across port visits of different lengths.
- The primary independent variables were the five time intervals representing each major step of the HSP task order process, as previously defined in Section B. These intervals capture the duration between key

milestones in the contracting workflow (See Section B for detailed definitions).

These calculated time periods represent the duration of each step in the HSP task order process. In addition to these process intervals, the regression models incorporated control variables to account for other operational differences across port visits, specifically Days in Port (Arrival Date minus Departure Date) and Ship Type (categorized into standard groupings and represented as dummy variables).

### 3. Regression Model Specification and Segmentation

The main analytical approach consisted of multivariate linear regression. This method was selected to assess whether the duration of each HSP task order process step was associated with changes in daily port visit cost, while controlling for the operational covariates described above. To further evaluate whether process timing and cost relationships differed across operational environments, separate regression models were estimated for the Fifth, Sixth, and Seventh Fleets. This segmentation allowed for rigorous cross-fleet comparisons.

### 4. Model Evaluation Criteria

Each regression model was evaluated using the following statistical criteria:

- $R^2$ and Adjusted $R^2$: To measure explanatory power
- F-statistic: To assess overall model significance
- P-values: To determine statistical significance of individual variables (at the 95% confidence level)

### 5. Interaction Term Analysis

To further investigate whether the effects of contracting delays varied by ship class, the researchers developed additional regression models incorporating interaction terms between delay duration and ship type (with CRUDES as the reference category). Statistical significance was assessed at the 0.05 level ($p < 0.05$). Comparing regression coefficients across fleets enabled evaluation of whether the impact of process delays was consistent or varied according to operational context.

THIS PAGE INTENTIONALLY LEFT BLANK

# V. DATA ANALYSIS & RESULTS

## A. OVERVIEW

This chapter presents the results of the statistical analyses examining how the timing of contracting processes affects daily port visit costs within the HSP framework. As outlined in Chapter IV, the contracting process is divided into five primary intervals, each corresponding to a major step in the HSP task order sequence. For reference, these intervals are outlined below:

- **LOGREQ → COR:** Time between the ship's LOGREQ submission and assignment of the COR.
- **COR → TO ISSUE:** Time between COR assignment and the issuance of the task order for solicitation.
- **TO ISSUE → TO DUE:** Task order issuance to the solicitation due date, the period during which vendors submit bids.
- **TO DUE → TO AWARD:** Time between receipt of bids and contract award to the winning vendor.
- **TO AWARD → ARRIVAL:** Time period between contract award and arrival of the ship in the foreign port.

These five process intervals serve as the main independent variables, enabling the analysis to identify where delays are concentrated and to assess their relationship with daily port visit costs. The daily average cost is used as the dependent variable, standardizing total port visit cost across visits of different durations. This approach allows for meaningful comparisons across fleets, ports, and ship types.

Separate multivariate regression models were constructed for Fifth Fleet, Sixth Fleet, and Seventh Fleet to determine whether the association between process timing and cost varies by operational environments. In addition to the five process intervals, days in port and ship type (represented as dummy variables) were included as control variables to account for operational differences between port visits.

Each model was evaluated using $R^2$ and adjusted $R^2$ to measure explanatory power, the F-statistic to assess overall model significance, and p-values to determine the statistical significance of individual variables at the 95 percent confidence level.

Table 3. Multivariate Regression Model Summary by Fleet

| Fleet | Observations | $R^2$ | Adjusted $R^2$ | F-Statistic | Significance F | Significant Steps | Strongest Significance Interval |
|---|---|---|---|---|---|---|---|
| Fifth Fleet | 2,035 | 0.224 | 0.220 | 48.76 | <0.001 | 3 of 5 | TO DUE → TO AWARD |
| Sixth Fleet | 2,087 | 0.206 | 0.201 | 44.82 | <0.001 | 4 of 5 | LOGREQ → COR |
| Seventh Fleet | 2,630 | 0.633 | 0.631 | 376.11 | <0.001 | 3 of 5 | TO DUE → TO AWARD |

Table 3 summarizes the regression models for each fleet. The results indicate that the explanatory power of the models varies by fleet, with Seventh Fleet demonstrating substantially higher model fit compared to Fifth and Sixth Fleets. This suggests that contracting process timelines have a stronger and more consistent association with daily port visit costs in Seventh Fleet than in the other operational areas.

In the regression models that follow, process-step coefficients represent the estimated change in daily average port visit cost associated with a one day increase in the corresponding process interval, holding all other variables constant. Positive coefficients indicate that longer process durations are associated with higher daily costs, while negative coefficients indicate that longer process durations are associated with lower daily costs.

The following sections present the results for each fleet individually, followed by a cross-fleet comparison, analysis of control variable, and a review of quality outcomes.

## B. FIFTH FLEET RESULTS

Fifth Fleet accounted for 2,035 port visits during the study period, showing moderate variation in daily average cost across ship classes and operating locations. Amphibious ships and surface combatants comprised the majority of visits, while contracting timelines exhibited greater variability than in Sixth Fleet. To determine where delays were concentrated within the HSP process, process-step timing was examined before conducting regression analysis.

Across all fleets, process-step timing distributions exhibited substantial variability. In many cases, standard deviations exceeded mean durations, indicating highly skewed distributions characterized by a relatively small number of exceptionally long delays rather than uniformly dispersed processing times. Accordingly, median and percentile statistics are presented alongside means throughout the timing analysis to better characterize typical process performance and identify where delays were concentrated within the contracting process.

Table 4. Fifth Fleet Process-Step Timing Summary

| Step | Mean Days | Median Days | Std. Dev | P10 | P90 | % of Total Timeline |
|---|---|---|---|---|---|---|
| **LOGREQ → COR** | 5.00 | 2.00 | 30.55 | 0.00 | 12.00 | 25.13% |
| COR → TO ISSUE | 0.15 | 0.00 | 36.29 | -5.00 | 6.00 | 0.75% |
| TO ISSUE → TO DUE | 4.24 | 3.00 | 23.85 | 0.00 | 8.00 | 21.31% |
| **TO DUE → TO AWARD** | 5.33 | 4.00 | 20.40 | 0.00 | 14.00 | 26.78% |
| **TO AWARD → ARRIVAL** | 5.18 | 4.00 | 6.30 | 1.00 | 11.00 | 26.03% |

Table 4 presents the average duration of each major contracting process step and highlights where delays were most concentrated in the Fifth Fleet contracting process. The TO DUE → TO AWARD, TO AWARD → ARRIVAL, and LOGREQ → COR phases made up more than 75 percent of the total contracting timeline, indicating that delays were primarily concentrated in pre-award contracting and final execution preparation, rather than in administrative turnover from COR assignment to solicitation issuance.

The COR → TO ISSUE step represented less than 1 percent of the total timeline and typically had a median duration of zero days, indicating that this phase was generally completed immediately after requirement validation. Negative lower percentile values in this interval likely result from retrospective data entry or documentation sequencing inconsistencies, rather than actual reverse process flow. Given its minimal operational duration and limited contribution to the total process time, this step was not considered a primary source of contracting delay.

By contrast, the concentration of time in LOGREQ processing and the contract award phase suggests these steps are more likely to affect pricing outcomes and thus merit further statistical analysis. While the timing summary identifies where delays occur, regression analysis is required to determine whether those delays are associated with increased daily average cost.

Table 5. Fifth Fleet Regression Results

| Statistic | Value |
|---|---|
| Observations (N) | 2035 |
| $R^2$ | 0.224 |
| Adjusted $R^2$ | 0.219 |
| F-Statistic | 48.77 |
| Model P-Value | <0.001 |

| Process Step Predictor | Coefficient | Std. Error | P-Value | Significance | Practical Interpretation |
|---|---|---|---|---|---|
| LOGREQ → COR | 94.24 | 32.32 | **0.0036** | *** | Early requirement delays increase daily cost |
| COR → TO ISSUE | 109.44 | 31.66 | **0.0006** | *** | Solicitation preparation delays increase pricing |
| TO ISSUE → TO DUE | 11.49 | 14.1 | 0.4150 | NS | Vendor bid preparation time did not significantly affect daily cost |
| TO DUE → TO AWARD | 111.93 | 33.28 | **0.0008** | *** | Award delays create the strongest cost pressure |
| TO AWARD → ARRIVAL | -62.19 | 48.65 | 0.2013 | NS | Post-award execution timing did not significantly affect daily cost |
| Days in Port | -216.41 | 17.65 | **<0.0001** | *** | Longer port visits reduce average daily cost through cost distribution |

The Fifth Fleet regression model, as shown in Table 5, demonstrates moderate explanatory power. The model yielded an $R^2$ of 0.224 and an adjusted $R^2$ of 0.219, indicating that about 22 percent of the variation in daily port visit cost is explained by the included variables. The regression was statistically significant (F-statistic = 48.77, $p < 0.001$), confirming that the model provides meaningful explanatory value.

Three process steps showed statistically significant positive relationships with daily port visit cost, indicating that delays in early requirement validation, solicitation preparation, and contract award were associated with higher average daily costs. These findings suggest that cost increases were most strongly linked to delays occurring in the pre-award phases, rather than after the task order was awarded.

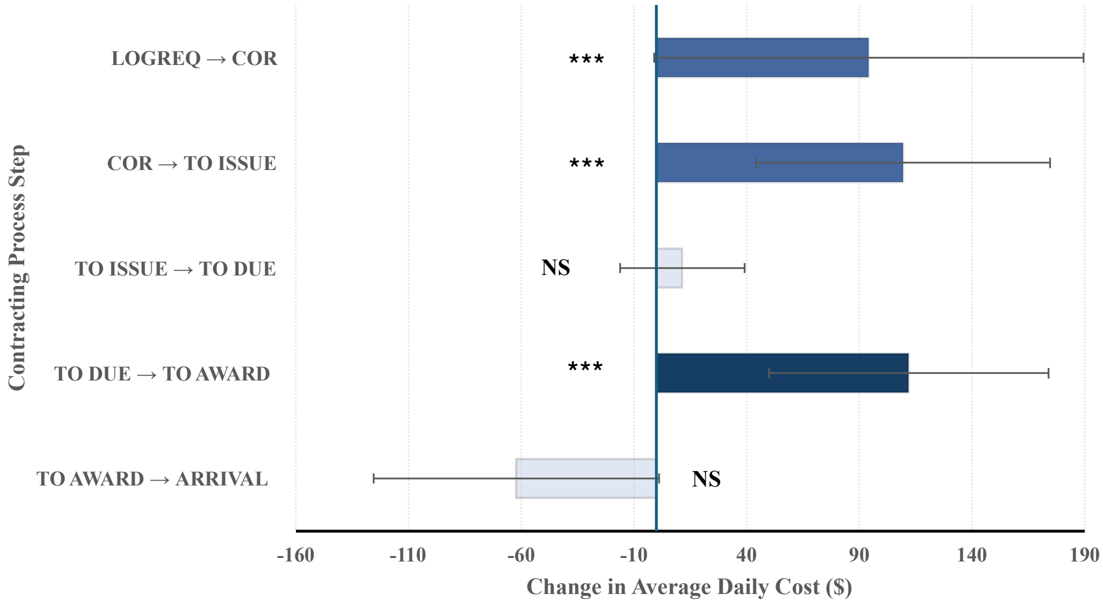


Figure 3. Fifth Fleet Process Step Coefficients and Cost Sensitivity

Figure 3 visually compares the coefficients for the five process intervals in Fifth Fleet, highlighting the relative strength and direction of each step's association with daily port visit cost. The coefficient plot shows that LOGREQ → COR, COR → TO ISSUE, and TO DUE → TO AWARD were the only process intervals with statistically significant positive cost relationships.

The LOGREQ → COR interval was statistically significant, with a coefficient of +94.24 and a p-value of 0.0036. This step captures the period between the ship's LOGREQ submission and the assignment of the COR. The positive coefficient indicates that each additional day of delay in this step increases the daily port visit cost by approximately $94.

This result underscores how inefficiencies during the earliest stage of the contracting process generate cost pressure later in the port visit timeline. Delays in validating requirements reduce available planning time and may force subsequent contracting actions to occur under compressed schedules, which can increase contractor pricing.

The COR → TO ISSUE interval was also statistically significant, with a coefficient of +109.44 and a p-value of 0.0006. This phase spans the period between

COR assignment and the issuance of the solicitation to vendors. Although it accounted for less than 1 percent of the total process timeline, the regression results indicate that even infrequent delays in this phase have a meaningful financial impact. Each additional day of delay during solicitation preparation was associated with an increase of approximately $109 in daily port visit cost.

The TO DUE → TO AWARD interval was the third statistically significant process step, with a coefficient of +111.93 and a p-value of 0.0008. This step covers the period between contractor bid receipt and the final task order award and accounted for the largest share of the Fifth Fleet contracting timeline. Of all process steps, this phase demonstrated the strongest relationship with cost in Fifth Fleet.

In practice, this phase includes proposal review, coordination between the contracting office and the COR, clarification of requirements, and final award decisions. As the duration of this process extends, contractors face greater uncertainty and have less time to prepare for execution prior to ship arrival, both of which can contribute to higher pricing.

The TO ISSUE → TO DUE interval, which represents the solicitation period provided to vendors for bid submission, was not statistically significant (coefficient = +11.49, $p = 0.415$). This finding indicates that the amount of time vendors are given to prepare and submit bids does not meaningfully affect pricing outcomes.

The TO AWARD → ARRIVAL interval was also not statistically significant (coefficient = -62.19, $p = 0.201$). This suggests that after the task order is awarded, the remaining time before ship arrival does not have a measurable impact on cost.

Among the control variables, days in port was strongly significant and negatively associated with daily cost (coefficient = -216.41, $p < 0.001$), indicating that longer port visits were associated with lower average daily cost. This likely reflects the distribution of fixed port visit costs across a greater number of days.

Overall, the Fifth Fleet results demonstrate that cost increases were associated with both early coordination delays and delays during the contract award phase. Specifically, delays in LOGREQ processing, solicitation preparation, and proposal evaluation all contributed to higher daily port visit costs, while vendor bid time and final execution timing did not. Larger and more operationally complex ship classes, particularly amphibious and large deck vessels, also exhibited greater baseline cost exposure, suggesting these platforms present the greatest opportunities for cost control. Accordingly, process improvement efforts should target inefficiencies at the outset of requirement development and during proposal evaluation and award, where the strongest cost relationships and the greatest opportunities for cost control are found.

## C. SIXTH FLEET RESULTS

Sixth Fleet accounted for 2,087 port visits during the study period, with moderate variation in daily average cost across ship classes and operating locations. Surface combatants and amphibious ships comprised the majority of visits, and contracting timelines exhibited greater consistency in process flow compared to Fifth Fleet. To determine where delays were concentrated within the HSP process, process-step timing was examined before conducting regression analysis.

Table 6. Sixth Fleet Process-Step Timing Summary

| Step | Mean Days | Median Days | Std. Dev | P10 | P90 | % of Total Timeline |
|---|---|---|---|---|---|---|
| **LOGREQ → COR** | 6.08 | 2.00 | 42.91 | 0.00 | 11.00 | 20.86% |
| COR → TO ISSUE | 1.63 | 1.00 | 51.89 | 0.00 | 7.00 | 5.59% |
| TO ISSUE → TO DUE | 7.63 | 6.00 | 19.54 | 1.00 | 14.00 | 26.17% |
| **TO DUE → TO AWARD** | 7.25 | 7.00 | 29.84 | 1.00 | 17.00 | 24.87% |
| **TO AWARD → ARRIVAL** | 6.56 | 6.00 | 8.02 | 2.00 | 12.00 | 22.50% |

Table 6 presents the average duration of each major contracting process step and highlights where delays were most concentrated in the Sixth Fleet contracting process. The TO ISSUE → TO DUE, TO DUE → TO AWARD, and TO AWARD → ARRIVAL phases made up more than 73 percent of the total contracting timeline, indicating that delays were concentrated mainly during vendor solicitation, proposal evaluation, and final execution preparation, rather than in early administrative coordination.

Unlike in Fifth Fleet, the COR → TO ISSUE interval accounted for a larger share of the total process timeline at 5.59 percent, with a median duration of one day. This suggests that solicitation preparation in Sixth Fleet required more deliberate coordination, rather than immediate same-day execution. The LOGREQ → COR interval remained operationally important, accounting for over 20 percent of the total timeline, but the greatest concentration of time occurred later in the contracting process, during vendor engagement and contract award.

The relatively balanced distribution of time across multiple later-stage process steps suggests that contracting outcomes in Sixth Fleet may be more sensitive to deliberate planning and schedule flexibility than to compressed early-stage execution. While the timing summary identifies where delays occur, regression analysis is needed to determine whether those delays are associated with increases or decreases in the daily average cost.

Table 7. Sixth Fleet Regression Results

| Statistic | Value |
|---|---|
| Observations (N) | 2087 |
| $R^2$ | 0.206 |
| Adjusted $R^2$ | 0.201 |
| F-Statistic | 44.82 |
| Model P-Value | <0.001 |

| Process Step Predictor | Coefficient | Std. Error | P-Value | Significance | Practical Interpretation |
|---|---|---|---|---|---|
| LOGREQ → COR | -242.55 | 58.55 | <0.0001 | *** | Longer requirement validation reduces daily cost |
| COR → TO ISSUE | -217.64 | 57.15 | <0.0001 | *** | Deliberate solicitation preparation reduces pricing pressure |
| TO ISSUE → TO DUE | 20.95 | 43.24 | 0.6281 | NS | Vendor bid preparation time did not significantly affect daily cost |
| TO DUE → TO AWARD | -177.60 | 54.57 | 0.0012 | *** | Longer proposal review and award coordination reduces cost pressure |
| TO AWARD → ARRIVAL | -199.95 | 89.57 | 0.0257 | ** | Additional post-award preparation time reduces execution cost |
| Days in Port | -439.57 | 72.88 | <0.0001 | *** | Longer port visits reduce average daily cost through cost distribution |

The Sixth Fleet regression model, as shown in Table 7, demonstrates moderate explanatory power. The model yielded an $R^2$ of 0.206 and an adjusted $R^2$ of 0.201, indicating that about 20 percent of the variation in daily port visit cost is explained by the included variables. The regression was statistically significant (F-statistic = 44.82, $p < 0.001$), indicating that the model captures meaningful relationships between contracting timelines and daily port visit cost.

In contrast to Fifth Fleet, four process steps in Sixth Fleet demonstrated statistically significant negative relationships with daily port visit cost, indicating that longer durations in these phases were associated with lower average daily cost rather than cost growth. These findings suggest that cost outcomes in Sixth Fleet benefited from longer planning horizons and reduced schedule compression, particularly during requirement validation, solicitation preparation, contract award, and final execution preparation.

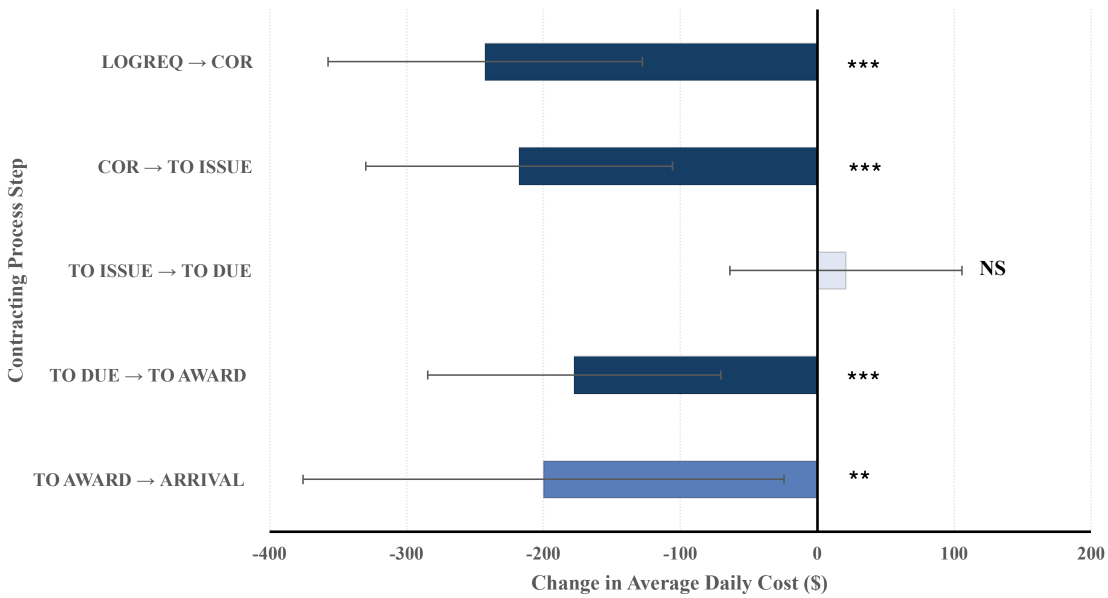


Figure 4. Sixth Fleet Process Step Coefficients and Cost Sensitivity

Figure 4 visually compares the coefficients for the five process intervals in Sixth Fleet, highlighting the relative strength and direction of each step's association with daily port visit cost. The coefficient plot shows that LOGREQ → COR, COR → TO ISSUE, TO DUE → TO AWARD, and TO AWARD → ARRIVAL were all statistically significant and negatively related to cost.

The LOGREQ → COR interval was statistically significant, with a coefficient of -242.55 and a p-value of 3.57E-05. This step covers the period between the ship's LOGREQ submission and the assignment of the COR. The negative coefficient indicates that longer duration in this step was associated with lower daily port visit cost, suggesting that spending more time on requirement validation reduces later pricing pressure by improving planning accuracy and minimizing last-minute adjustments.

The COR → TO ISSUE interval was also statistically significant, with a coefficient of -217.64 and a p-value of 0.00014. This phase spans the time between COR assignment and issuance of the solicitation to vendors. In contrast to Fifth Fleet, where delays in this phase increased cost, the Sixth Fleet results suggest that more deliberate solicitation preparation reduced pricing pressure by enabling clearer requirements development and more stable contractor expectations.

The TO DUE → TO AWARD interval was statistically significant, with a coefficient of -177.60 and a p-value of 0.00115. This step covers the period between contractor bid receipt and final task order award. Additional time spent on proposal review and award coordination appears to reduce contractor uncertainty and improve pricing outcomes, likely by lowering urgency premiums and supporting a more competitive evaluation of vendor proposals.

The TO AWARD → ARRIVAL interval was also statistically significant, with a coefficient of -199.95 and a p-value of 0.0257. Longer post-award preparation time before ship arrival likely reduced daily cost by giving contractors more opportunity for execution planning, staffing, and logistics coordination.

The TO ISSUE → TO DUE interval, which represents the solicitation period provided to vendors for bid submission, was not statistically significant (coefficient = +20.95, $p = 0.628$). This result indicates that the time allocated to vendors for bid preparation and submission did not have a meaningful effect on pricing outcomes.

Among the control variables, days in port was strongly significant and negatively associated with daily cost (coefficient = -439.57, $p < 0.001$), indicating that longer port visits were associated with lower average daily cost. This likely reflects the distribution of fixed port visit costs across a greater number of operational days.

Taken together, the Sixth Fleet findings suggest that longer contracting timelines were generally associated with lower daily port visit cost, in contrast to the escalation patterns observed in Fifth Fleet. Specifically, additional time spent on requirement validation, solicitation preparation, proposal evaluation, and final execution preparation contributed to lower daily costs, while vendor bid time itself did not significantly affect pricing outcomes. Larger and more operationally complex ship classes, particularly amphibious and large deck vessels, also exhibited greater baseline cost exposure, suggesting that preserving schedule flexibility for these platforms may offer the greatest cost benefits. Accordingly, process improvement efforts should focus on allowing adequate planning time and avoiding unnecessary schedule compression, particularly in pre-award coordination and contract award phases where longer timelines produced the strongest cost benefits.

## D. SEVENTH FLEET RESULTS

Seventh Fleet accounted for 2,630 port visits during the study period and exhibited the strongest statistical relationship between contracting process duration and daily average port visit cost among all three fleets. Large deck vessels, amphibious ships, and surface combatants made up the majority of visits, while contracting timelines showed substantial concentration in both early requirement development and the contract award process. To determine where delays were concentrated within the HSP process, process-step timing was examined before conducting regression analysis.

Table 8. Seventh Fleet Process-Step Timing Summary

| Step | Mean Days | Median Days | Std. Dev | P10 | P90 | % of Total Timeline |
|---|---|---|---|---|---|---|
| **LOGREQ → COR** | 8.60 | 5.00 | 21.11 | 0.00 | 21.00 | 27.02% |
| COR → TO ISSUE | 1.31 | 1.00 | 23.23 | -1.10 | 6.00 | 4.12% |
| TO ISSUE → TO DUE | 6.07 | 5.00 | 10.57 | 1.00 | 11.10 | 19.07% |
| **TO DUE → TO AWARD** | 7.67 | 7.00 | 14.56 | 1.00 | 16.00 | 24.10% |
| **TO AWARD → ARRIVAL** | 8.18 | 6.00 | 19.53 | 1.00 | 16.00 | 25.70% |

Table 8 presents the average duration of each major contracting process step and highlights where delays were most concentrated in the Seventh Fleet contracting process. The LOGREQ → COR, TO AWARD → ARRIVAL, and TO DUE → TO AWARD phases accounted for more than 76 percent of the total contracting timeline, indicating that delays were primarily concentrated in early requirement validation, final contract award decisions, and execution preparation, rather than during vendor solicitation.

The LOGREQ → COR interval accounted for the largest portion of the timeline at 27.02 percent, underscoring the importance of early requirement development and COR assignment in Seventh Fleet operations. Similarly, TO DUE → TO AWARD and TO AWARD → ARRIVAL together made up nearly half of the total contracting timeline, suggesting that proposal evaluation, award coordination, and final execution preparation created substantial schedule pressure.

The COR → TO ISSUE interval accounted for only 4.12 percent of the total timeline and included slightly negative lower percentile values, likely resulting from retrospective administrative entry rather than actual reverse workflow. Despite its brief operational duration, this step remained analytically important because even minor delays in solicitation preparation may have measurable pricing effects. While the timing summary identifies where delays occur, regression analysis is required to determine whether those delays are associated with increased daily average cost.

Table 9. Seventh Fleet Regression Results

| Statistic | Value |
|---|---|
| Observations (N) | 2630 |
| $R^2$ | 0.633 |
| Adjusted $R^2$ | 0.631 |
| F-Statistic | 376.11 |
| Model P-Value | <0.0001 |

| Process Step Predictor | Coefficient | Std. Error | P-Value | Significance | Practical Interpretation |
|---|---|---|---|---|---|
| LOGREQ → COR | 126.26 | 27.70 | **<0.0001** | *** | Early requirement delays increase daily cost |
| COR → TO ISSUE | 158.52 | 30.31 | **<0.0001** | *** | Solicitation preparation delays increase pricing pressure |
| TO ISSUE → TO DUE | 2.29 | 29.98 | 0.9392 | NS | Vendor bid preparation time did not significantly affect daily cost |
| TO DUE → TO AWARD | 203.81 | 31.52 | **<0.0001** | *** | Award delays create the strongest cost pressure |
| TO AWARD → ARRIVAL | 48.47 | 29.48 | 0.1002 | NS | Post-award execution timing did not significantly affect daily cost |
| Days in Port | 71.27 | 17.05 | **<0.0001** | *** | Longer port visits are associated with higher daily cost |

The Seventh Fleet regression model demonstrates strong explanatory power, as shown in Table 9. The model yielded an $R^2$ of 0.633 and an adjusted $R^2$ of 0.631, indicating that about 63 percent of the variation in daily port visit cost is explained by the included variables. The regression was statistically significant (F-statistic = 376.11, $p < 0.001$), reinforcing the strong explanatory power of the model.

The substantially higher explanatory power of the Seventh Fleet model indicates that contracting process duration was more consistently associated with cost outcomes than in Fifth and Sixth Fleets. This finding suggests that schedule variation within the contracting process played a larger role in determining pricing outcomes in Seventh Fleet, making process timing a more reliable predictor of cost in that operational environment.

Three process steps showed statistically significant positive relationships with daily port visit cost, indicating that delays during early requirement validation, solicitation preparation, and contract award were associated with higher average daily costs. These findings suggest that Seventh Fleet cost increases were driven primarily by delays occurring before vendor execution, especially during early planning and proposal evaluation phases where the strongest timing-related cost relationships were observed.

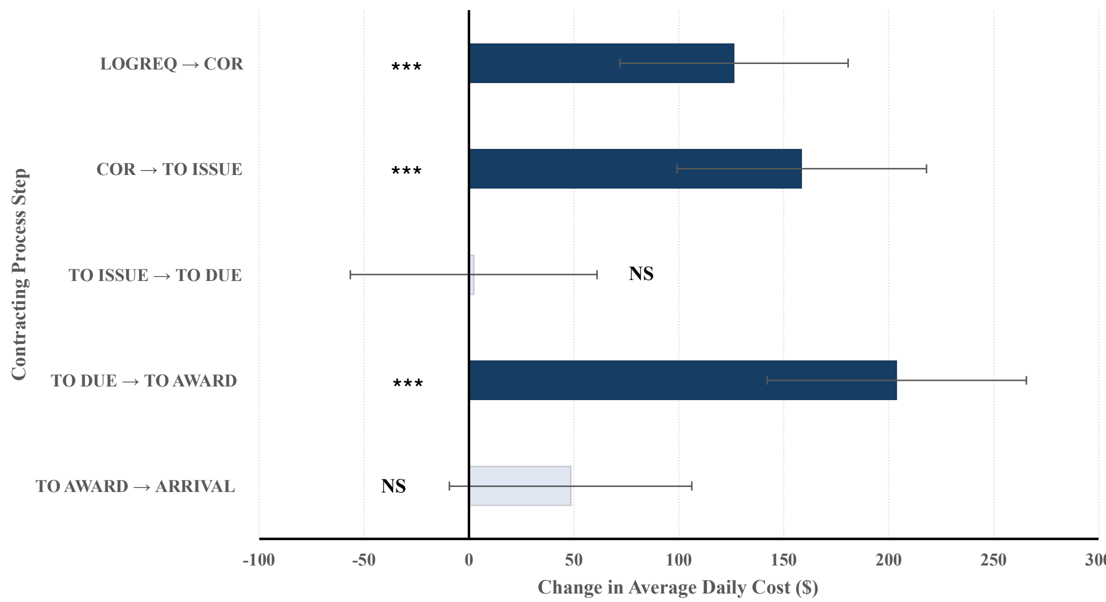


Figure 5. Seventh Fleet Process Step Coefficients and Cost Sensitivity

Figure 5 visually compares the coefficients for the five process intervals in Seventh Fleet, highlighting the relative strength and direction of each step's association with daily port visit cost. The coefficient plot shows that LOGREQ → COR, COR → TO ISSUE, and TO DUE → TO AWARD were the only process intervals with statistically significant positive cost relationships.

The LOGREQ → COR interval was statistically significant, with a coefficient of +126.26 and a p-value of 5.39E-06. This step covers the period between the ship's LOGREQ submission and the assignment of the COR. The positive coefficient means that each additional day of delay in this step increases the daily port visit cost by approximately $126.

Inefficiencies during the earliest stage of contracting appear to create substantial downstream pricing pressure. Delays in validating requirements reduce the planning time available for subsequent contracting actions and increase the likelihood of compressed execution timelines, which may lead to higher contractor pricing and reduced competition.

The COR → TO ISSUE interval was also statistically significant, with a coefficient of +158.52 and a p-value of 1.82E-07. This phase spans the time between COR assignment and issuance of the solicitation to vendors. Although it accounted for only 4.12 percent of the total process timeline, the regression results show that even minor delays in this phase have meaningful financial consequences. Each additional day of delay during solicitation preparation was associated with an increase of approximately $159 in daily port visit cost.

The TO DUE → TO AWARD interval was the most statistically significant process step, with a coefficient of +203.81 and a p-value of 1.19E-10. This step covers the period between contractor bid receipt and final task order award and accounted for more than 24 percent of the total Seventh Fleet timeline. Of all process steps, this phase demonstrated the strongest relationship with cost in Seventh Fleet and the largest process-step effect observed across all three fleets.

In practice, this phase includes proposal review, coordination between the contracting office and the COR, clarification of requirements, and final award decisions. As this process extends, contractors face greater uncertainty and have less time to prepare prior to ship arrival, which increases pricing pressure and creates the greatest risk for cost escalation.

The TO ISSUE → TO DUE interval, which represents the solicitation period provided to vendors for bid submission, was not statistically significant (coefficient = +2.29, $p = 0.939$). This result indicates that the time allocated to vendors for bid preparation and submission did not have a meaningful effect on pricing outcomes.

The TO AWARD → ARRIVAL interval was also not statistically significant (coefficient = +48.47, $p = 0.100$). Although positive, this suggests that after the task order is awarded, the remaining time before ship arrival does not have a statistically reliable impact on daily cost.

Among the control variables, days in port was statistically significant and positively associated with daily cost (coefficient = +71.27, $p < 0.001$), indicating that longer port visits were associated with higher average daily cost. Unlike in Fifth and Sixth Fleet, where longer visits reduced average daily cost through cost distribution, the Seventh Fleet results suggest that longer visits reflected larger service scope, greater operational complexity, and higher overall husbanding requirements.

Collectively, the Seventh Fleet findings show that cost increases were strongly associated with both early coordination delays and delays during the contract award phase. Specifically, delays in LOGREQ processing, solicitation preparation, and proposal evaluation contributed substantially to higher daily port visit costs, while vendor bid time and final execution timing did not. Larger and more operationally complex ship classes, particularly large deck and amphibious vessels, also exhibited the greatest baseline cost exposure, indicating that these platforms face the highest financial risk when contracting delays occur. Accordingly, process improvement efforts should focus on reducing inefficiencies at the outset of requirement development and during proposal evaluation and award, where the strongest cost relationships and the greatest opportunities for cost control remain.

## E. CROSS-FLEET COMPARISON

Results from Fifth Fleet, Sixth Fleet, and Seventh Fleet were compared to identify consistent patterns and key differences in how contracting process timelines affect daily port visit cost. As outlined in Chapter IV, regression coefficients were examined across fleets to determine whether similar process delays yield comparable cost outcomes in distinct operational environments.

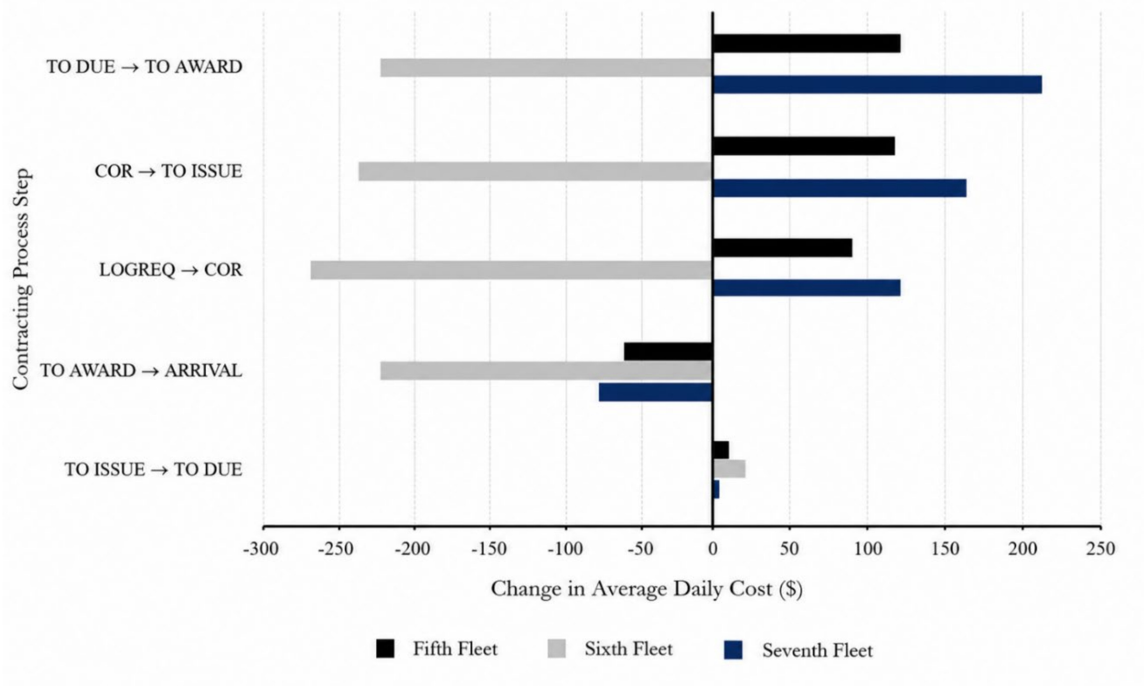


Figure 6. Comparison of Process Step Coefficients Across Fleets

Figure 6 presents a grouped comparison of the five process interval coefficients across all three fleets. The most consistent finding is that the TO ISSUE → TO DUE interval was not statistically significant in any fleet. This step represents the period during which contractors prepare and submit bids.

In all three fleets, the coefficient for this interval remained small and statistically insignificant. This indicates that the time vendors are given to prepare and submit bids does not have a measurable relationship with daily port visit cost. The consistency of this finding suggests that contractor pricing is influenced more by internal government contracting timelines and operational conditions than by the length of the solicitation period itself.

The second major finding is that the TO DUE → TO AWARD interval is statistically significant in every fleet. This interval represents the period between contractor bid receipt and final task order award, encompassing proposal evaluation, coordination, clarification of requirements, and contract award decisions.

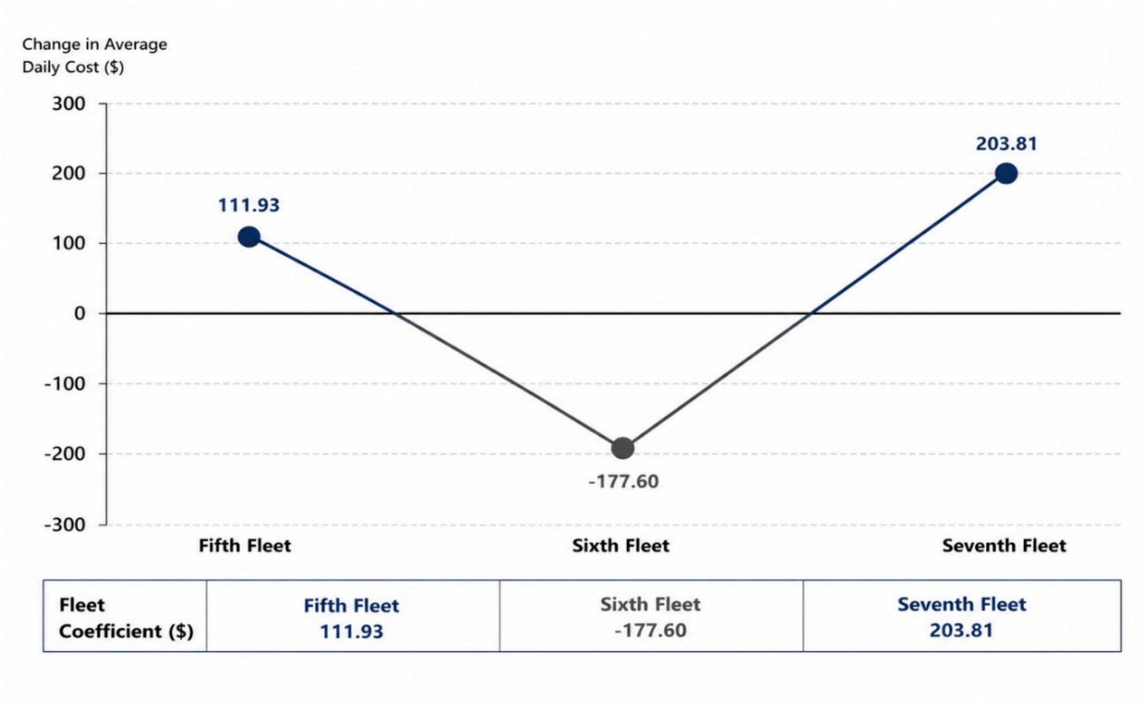


Figure 7. TO DUE → TO AWARD Comparison Across Fleets

Figure 7 shows that while this process step is significant across all fleets, the direction of the relationship varies. In Fifth Fleet, the coefficient is +111.93, and in Seventh Fleet, it is +203.81, indicating that longer durations in proposal evaluation and contract award were associated with increased daily port visit cost. In contrast, Sixth Fleet has a coefficient of −177.60, indicating that longer duration in this phase was associated with lower daily cost.

This contrast represents one of the most important findings of the study. In Fifth and Seventh Fleet, longer timelines during the contract award phase were associated with increased pricing pressure, likely due to reduced contractor planning certainty and compressed execution timelines before ship arrival. In Sixth Fleet, the opposite relationship suggests that additional planning time during proposal evaluation and award was associated with lower daily cost, while higher-cost port visits may be linked to compressed contracting timelines driven by operational urgency.

This pattern extends beyond the TO DUE → TO AWARD interval. Both Fifth Fleet and Seventh Fleet show positive relationships between early coordination durations (LOGREQ → COR and COR → TO ISSUE) and cost, indicating that longer timelines in these steps are associated with higher pricing. Sixth Fleet, by contrast, again demonstrates the opposite pattern, with longer durations in these steps associated with lower daily cost.

An additional cross-fleet difference is seen in the control variable for days in port. In both Fifth Fleet and Sixth Fleet, days in port was negatively associated with average daily cost, indicating that longer port visits reduced daily cost by distributing fixed husbanding expenses across more operational days. In contrast, Seventh Fleet showed a positive and statistically significant relationship between days in port and daily cost, indicating that longer port visits were associated with higher average daily cost. This suggests that in Seventh Fleet, longer visits typically reflected greater service scope, larger operational requirements, and higher overall husbanding complexity rather than simple cost distribution.

These observations indicate that the relationship between contracting timelines and daily port visit cost differs across fleets, depending on whether longer timelines reflect inefficiency or whether compressed timelines are driven by operational urgency and mission requirements.

Figure 8 compares the explanatory power of the regression models across fleets. Seventh Fleet produced the strongest model with an adjusted $R^2$ of 0.631, compared to 0.219 in Fifth Fleet and 0.201 in Sixth Fleet.

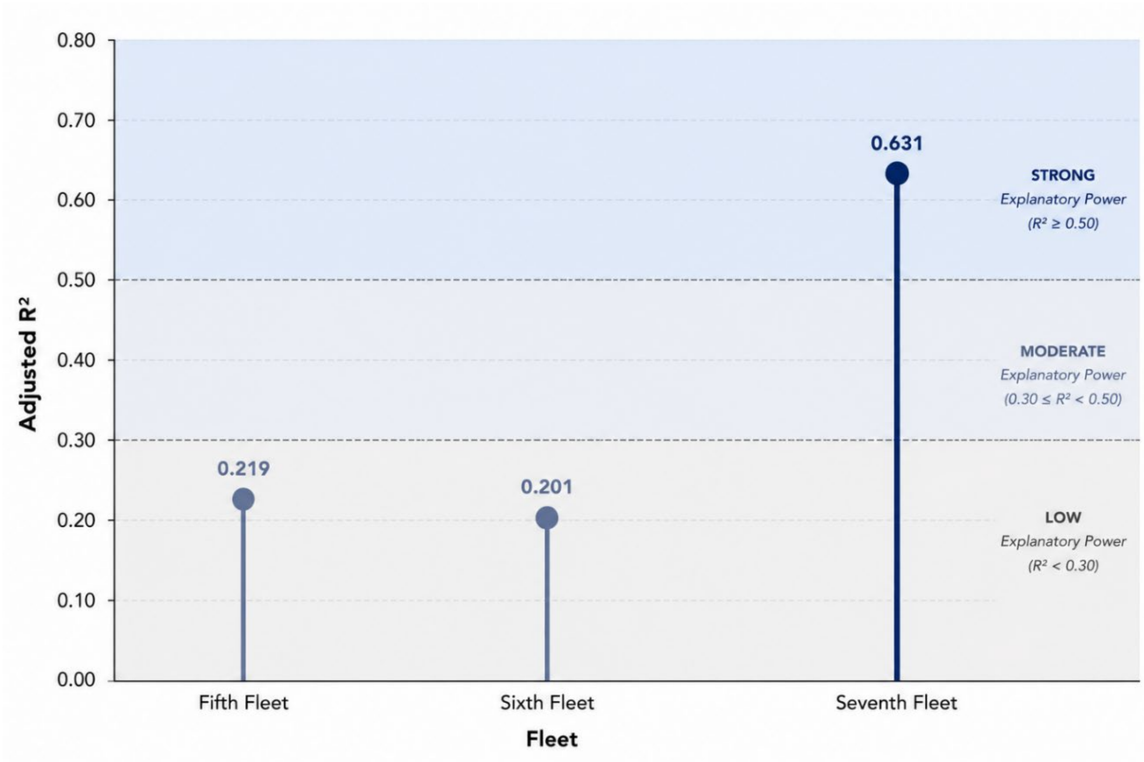


Figure 8. Adjusted $R^2$ Comparison by Fleet

This result shows that the full regression model—including process-step durations, days in port, and control variables—explains a much greater share of cost variation in Seventh Fleet than in the other two fleets. In practice, this suggests that contracting process efficiency has a more direct and measurable effect on pricing outcomes in Seventh Fleet, while additional operational factors not captured in the model may play a larger role in Fifth and Sixth Fleet.

Overall, the cross-fleet comparison demonstrates that the impact of contracting process duration depends heavily on operational context. The strongest and most consistent finding is that the contract award phase (TO DUE → TO AWARD) is the most consistently significant process step across all fleets. However, whether longer timelines increase cost, or whether compressed timelines are associated with higher cost, depends on operational environment, mission urgency, and regional contracting conditions within each fleet's area of responsibility.

## F. CONTROL VARIABLE ANALYSIS

In addition to the five process intervals, days in port and ship type (represented as dummy variables) were included as control variables in each regression model to account for operational differences across port visits. Including these variables isolates the effect of contracting timelines on daily port visit cost and prevents confounding cost differences driven by ship size or visit duration. Table 10 summarizes the regression results for the control variables across all three fleets and highlights which operational factors are most strongly associated with daily port visit cost.

Table 10. Control Variable Coefficients by Fleet

| Control Variable | Fifth Fleet | Sixth Fleet | Seventh Fleet | Significant Fleets |
|---|---|---|---|---|
| *Days in Port* | **-216.41** | **-439.57** | **+71.27** | All |
| Large Deck | **+30,127.65** | **+49,990.12** | **+31,464.92** | All |
| Amphib | NS | **+29,364.39** | **+4,728.23** | 6th, 7th |
| Submarines | **+20,383.88** | **+8,376.15** | NS | 5th, 6th |
| MSC Ships | **-2,739.70** | **-5,801.74** | NS | 5th, 6th |
| Small Craft | **-5,940.38** | NS | NS | 5th |

**Note: CRUDES ship class served as the baseline category for ship-type comparisons. Bolded coefficients indicate statistical significance at p< .05.**

### 1. Days in Port

Days in port exhibited distinct relationships across the fleets. In Fifth Fleet, the coefficient was −216.41 ($p < 0.001$), and in Sixth Fleet, −439.57 ($p < 0.001$), indicating that longer port visits were associated with lower average daily cost. This negative relationship suggests that many port visit costs are fixed, so as duration increases, those fixed costs are distributed over more days, lowering the daily average. This effect is particularly pronounced in Sixth Fleet, where the coefficient is over twice that of Fifth Fleet.

Seventh Fleet produced a different result. The coefficient for days in port was +71.27 ($p < 0.001$), indicating that longer port visits were associated with higher daily cost. This implies that in Seventh Fleet, longer visits are typically tied to more complex or resource-intensive support requirements rather than simply extended duration. This difference reinforces the broader findings of the study: operational context is critical. The same variable can produce markedly different cost relationships depending on fleet conditions and mission requirements.

### 2. Ship Type

Ship type was included as a series of dummy variables with CRUDES as the baseline category for comparison. CRUDES was selected as the reference category because it represented the largest ship-type group in the dataset, providing a stable basis for comparison across the remaining vessel classes. This enabled the regression model to evaluate the relative cost impact of different ship classes while controlling for process timing. Interaction-term analysis indicated that, for most process steps, ship-type-specific delay effects were not statistically significant. This means that while ship type strongly influences baseline port visit cost, it does not consistently change the marginal cost effect of contracting delay. An important exception appeared in Fifth Fleet during the LOGREQ → COR phase, where Amphib platforms showed significantly greater cost sensitivity to delay—highlighting the operational risk of early-stage delays for these vessels. Figure 9 shows that larger platforms consistently demonstrate higher daily port visit costs across all fleets.

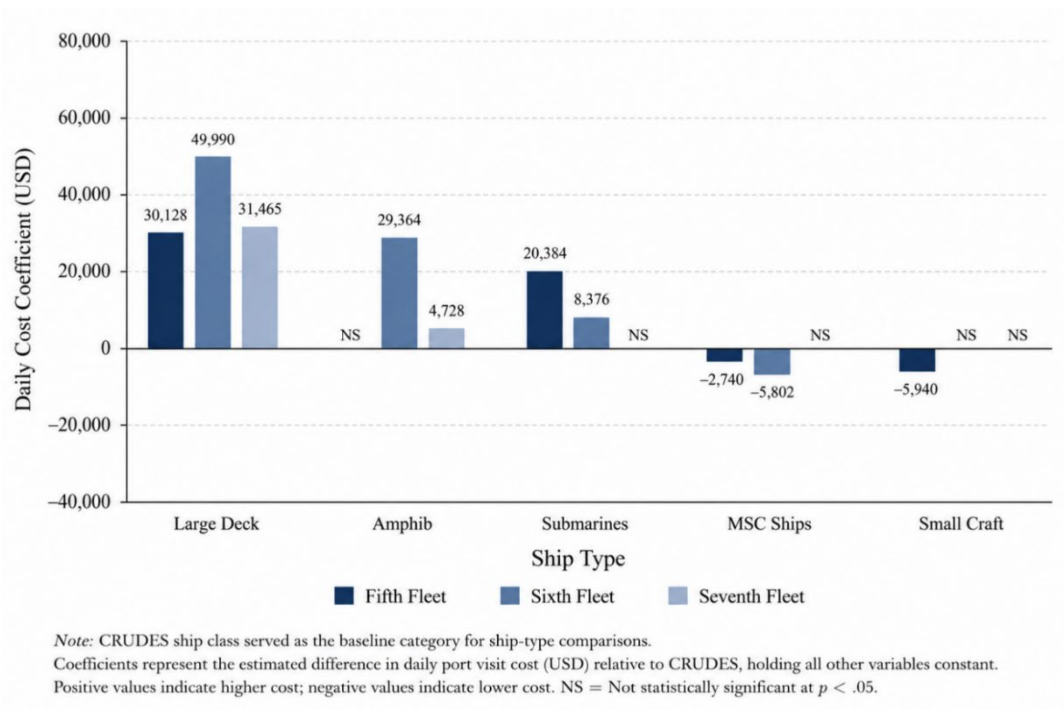


Figure 9. Daily Cost by Ship Type

Large deck ships exhibited the strongest positive relationship with cost. In Sixth Fleet, large deck ships had a coefficient of approximately +49,990 ($p < 0.001$), representing the largest ship-type effect observed in the study. In Seventh Fleet, large deck ships remained strongly significant with a coefficient of +31,464.92 ($p < 0.001$). Amphibious ships also showed positive and statistically significant relationships with cost, particularly in Seventh Fleet, where the coefficient was +4,728.23 ($p < 0.01$). These results align with operational expectations, as larger ships require significantly more husbanding support, including tug services, force protection, transportation, waste removal, and coordination with port authorities.

Conversely, some ship types demonstrated lower relative cost. In Sixth Fleet, MSC ships showed a significant negative relationship with cost (coefficient = −5,801, $p < 0.001$), indicating these vessels generally require less complex support than the baseline category. The recurring significance of several ship-type categories across fleets confirms that vessel class is one of the strongest predictors of port visit cost and validates its use as a control variable in the regression model.

Overall, the control variable analysis confirms that both ship type and days in port significantly influence daily port visit cost. Controlling for these operational factors enhances the validity of the regression results and ensures that the measured impact of contracting timelines reflects true process effects rather than differences in ship requirements or visit duration.

## G. COST DISTRIBUTION AND VARIABILITY

In addition to regression analysis, daily port visit cost distributions were examined across Fifth Fleet, Sixth Fleet, and Seventh Fleet to better understand the variability of pricing outcomes within each operational environment. Analyzing cost distribution offers critical context for interpreting the strength of regression models and helps clarify why the relationship between contracting timelines and cost may differ across fleets.

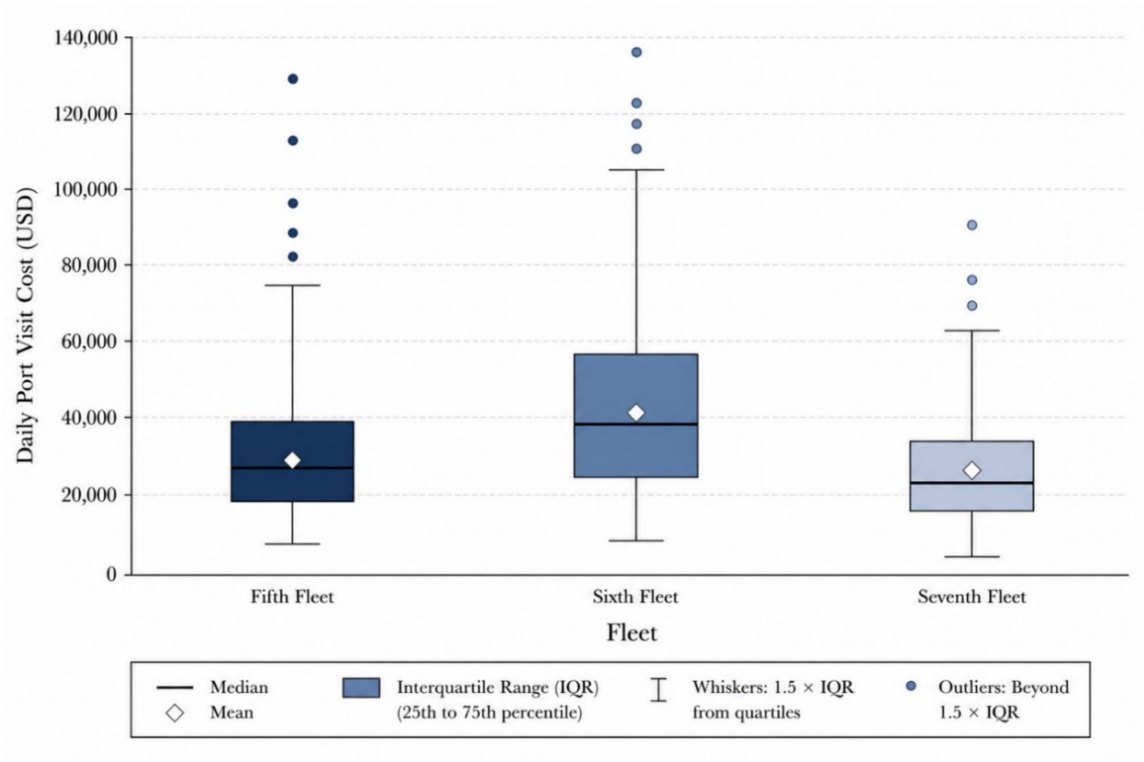


Figure 10. Daily Cost Distribution by Fleet

Figure 10 presents the distribution of daily port visit cost across all three fleets, using data that has been trimmed by removing the upper and lower one percent of extreme values. This approach minimizes the influence of outliers while preserving the overall structure of the dataset and improving the reliability of regression estimates.

The distribution results reveal meaningful differences in both cost variability and central tendency across fleets. Sixth Fleet exhibits the greatest overall variability, with the widest interquartile range, the largest whisker range, and the highest concentration of upper-value outliers. This broader spread suggests that daily port visit costs in Sixth Fleet are influenced by a wider range of operational and contracting conditions, including potentially urgent or irregular mission requirements.

By comparison, Seventh Fleet demonstrates a narrower and more concentrated cost distribution, despite producing the strongest regression model in the study (adjusted $R^2 = 0.631$). This suggests that variation in Seventh Fleet daily costs is more consistently explained by the variables included in the regression model, particularly contracting process durations and operational control variables. Rather than indicating greater overall variability, the stronger model in Seventh Fleet points to a more structured and predictable relationship between contracting timelines and pricing outcomes.

Fifth Fleet demonstrates moderate variability, with cost distributions that are broader than those in Seventh Fleet but less dispersed than in Sixth Fleet. This intermediate pattern aligns with the Fifth Fleet regression results, where several contracting process intervals were statistically significant but the overall explanatory power of the model was substantially lower than in Seventh Fleet.

These distribution patterns reinforce the differing interpretations between fleets. In Sixth Fleet, where longer contracting durations were associated with lower daily cost, the wider spread in pricing outcomes may reflect mission urgency, irregular operational demands, or regional conditions outside the scope of the regression model. In Seventh Fleet, where longer process durations consistently corresponded with higher daily cost, the tighter distribution and stronger model fit suggest that contracting timelines exert a more direct and measurable influence on pricing outcomes.

These findings support the conclusion that regression strength is not solely a function of overall cost variability, but also depends on how consistently operational and contracting variables explain pricing behavior within each fleet environment. Understanding cost distribution is therefore essential for interpreting regression results and for comparing the operational dynamics of Navy husbanding services across fleet areas of responsibility.

# VI. CONCLUSION AND RECOMMENDATIONS

## A. SUMMARY OF FINDINGS

This study examined the relationship between contracting process timelines and daily port visit cost within the HSP program across Fifth Fleet, Sixth Fleet, and Seventh Fleet. Using multivariate linear regression, the analysis evaluated whether delays in specific stages of the task order process were associated with changes in daily port visit cost, while controlling for ship type and days in port.

The results demonstrate that the effect of contracting timelines were not uniform across fleets and that operational environment significantly influenced how process duration related to pricing outcomes. Several government-controlled contracting intervals consistently showed measurable relationships with daily average port visit cost, while contractor proposal preparation periods had no significant effect in any fleet model. The analysis also identified substantial differences in how contracting timelines behaved across operational theaters, particularly between Sixth and Seventh Fleets.

This research was guided by three research questions. The findings associated with each research question are summarized below.

1. What contracting process intervals within the Husbanding Service Provider (HSP) pre-port visit workflow have the greatest influence on daily port visit cost across Fifth, Sixth, and Seventh Fleets under the Off-Ship Bill Pay (OSBP) framework from FY2016 through FY2026?

The analysis demonstrated that the LOGREQ → COR, COR → TO ISSUE, and TO DUE → TO AWARD intervals exerted the most consistent influence on daily average port visit cost across the analyzed fleets. These intervals represent government-controlled contracting activities associated with requirement validation, solicitation preparation, and contract award processing. In contrast, the TO ISSUE → TO DUE interval, representing the contractor proposal preparation period, did not demonstrate statistically significant relationships with cost in any fleet.

The direction and magnitude of the observed relationships varied by operational environment. Fifth and Seventh Fleets generally showed positive relationships between increased process duration and higher daily average cost, while Sixth Fleet demonstrated inverse relationships across several intervals. These findings suggest that operational environment and fleet-specific execution conditions significantly influence how contracting timelines affect cost outcomes.

2. Where do the most significant time delays occur between LOGREQ submission and ship arrival, and how consistently are these delays associated with increased daily port visit cost across fleets?

Timeline composition analysis showed that overall process duration was distributed relatively evenly across contracting stages, with no single process interval representing a dominant enterprise-wide bottleneck. However, the LOGREQ → COR, TO DUE → TO AWARD, and TO AWARD → ARRIVAL intervals consistently represented the largest portions of total contracting timeline duration across all fleets.

The COR → TO ISSUE interval represented the smallest percentage of overall process duration within all three fleets, indicating that solicitation preparation itself was not a major source of contracting delay. Additionally, the TO ISSUE → TO DUE interval demonstrated no measurable relationship with daily average port visit cost, suggesting that contractor proposal preparation time did not significantly influence pricing outcomes within the analyzed dataset.

The strongest and most consistent relationships between timeline growth and cost outcomes occurred within government-controlled administrative and award-processing intervals. These findings suggest that the relationship between delay and cost is concentrated primarily within internal contracting coordination activities, rather than contractor response periods.

3. Which stages of the HSP contracting process present the greatest opportunity for process improvement, cost reduction, and strengthened audit readiness without reducing operational responsiveness?

The findings indicate that the greatest opportunities for process improvement exist within the government-controlled portions of the contracting workflow that demonstrated the strongest and most consistent relationships with daily average port visit cost. Specifically, the LOGREQ → COR, COR → TO ISSUE, and TO DUE → TO AWARD intervals demonstrated the greatest potential value for improved process visibility, schedule management, and process oversight.

The analysis further suggests that improvements in predictability and transparency may provide greater benefit than efforts focused solely on accelerating total process timelines. Based on these findings, enterprise-wide target date reporting and schedule variance tracking may improve management visibility into contracting performance while preserving regional operational flexibility and responsiveness.

## B. CONCLUSIONS

The regression models demonstrated substantially different explanatory power across the analyzed fleets, indicating that operational environment significantly influences how contracting timelines relate to daily port visit cost outcomes. Seventh Fleet produced the strongest overall model performance, suggesting that contracting timelines may have a more stable and measurable relationship with pricing outcomes within the Indo-Pacific operational environment. While the model cannot directly identify the causal mechanisms underlying this relationship, the result indicates that process timing explained a substantially larger share of cost variation in Seventh Fleet than in the other fleets examined.

By comparison, Sixth Fleet demonstrated inverse relationships across several contracting intervals, indicating that compressed timelines, rather than extended delays, were associated with increased daily average port visit cost. One possible explanation is that Sixth Fleet operations may involve greater concentrations of emergent operational requirements, geopolitical variability, and short-notice mission adjustments. Under these conditions, compressed contracting timelines may reflect operational urgency rather than administrative efficiency, while longer planning windows may contribute to improved coordination and reduced pricing pressure.

The analysis also demonstrated that contractor proposal preparation periods did not significantly influence pricing outcomes in any fleet. This finding suggests that the most meaningful cost relationships occur within government-controlled administrative and award activities, rather than contractor response periods. As a result, efforts to improve HSP contracting performance may be more effective when focused on internal process visibility, coordination, and schedule management, rather than reducing contractor response windows.

Overall, the findings indicate that predictability, transparency, and improved visibility within contracting execution may provide greater enterprise value than simply accelerating the contracting process. Improved understanding of schedule variance, process composition, and operational context may support more informed management decisions across the HSP enterprise, while preserving operational flexibility within geographically distinct fleet environments.

## C. RECOMMENDATIONS AND FUTURE RESEARCH

Based on the findings of this study, NAVSUP should consider implementing enterprise-wide target-date reporting for key HSP contracting process intervals, specifically LOGREQ → COR, COR → TO ISSUE, and TO DUE → TO AWARD. Tracking planned milestone dates, actual completion dates, and schedule variance across these intervals may improve visibility into administrative delays, contracting performance, and process predictability across fleets. Additionally, NAVSUP should consider developing standardized reporting metrics and enterprise management tools that support cross-fleet comparison while preserving operational flexibility for regional mission requirements. Increased visibility into process execution timelines may strengthen oversight, resource planning, historical trend analysis, and audit readiness without reducing responsiveness to operational demands.

The purpose of this reporting structure should not be to penalize FLCs for every variance from target. Rather, it should improve visibility into where contracting actions are progressing efficiently, where recurring delays occur, and where compressed timelines reflect legitimate operational urgency. This distinction is particularly important because the analysis demonstrated that contracting timelines do not affect cost uniformly across fleets. Standardized reporting would enable NAVSUP to distinguish between avoidable administrative delay and mission-driven schedule compression while improving enterprise-wide visibility into contracting performance.

Future research should examine additional operational and contracting variables that were outside the scope of this study. Potential areas for further analysis include service quality outcomes, labor-hour expenditures, contractor competition levels, and regional operational risk factors. Additional longitudinal analysis may also help determine whether the observed fleet-specific relationships remain consistent over time or evolve in response to changing operational conditions and contracting policies.

Further research incorporating qualitative operational perspectives from contracting personnel, husbanding service providers, and fleet operators may also improve understanding of the underlying factors influencing contracting timeline performance and pricing outcomes across the HSP enterprise.

THIS PAGE INTENTIONALLY LEFT BLANK

# LIST OF REFERENCES


Apte, A., Apte, U. M., & Rendon, R. G. (2011). Services supply chain in the United States Navy: An empirical study. *Journal of Public Procurement*, *11*(4), 538–562. https://www.proquest.com/docview/914695556?accountid=12702&parentSessionId=IT4U498VDdb%2BcP9xoDeo2V%2FFVX6zaBG9YylBqEWYVjc%3D&parentSessionId=naVb4%2BQQ8jYoFkHyiXhV%2FSRkX1Gt9BO7aYzXPZFaToA%3D&pq-origsite=primo&sourcetype=Scholarly%20Journals

Cahill, R., Degollado, F., & Ortiz, B. (2022). *Navy global multi award contract: Effects of competition on pricing of port visits* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/entities/publication/4c9dc81b-c9fa-4fa8-a00e-5fb44b2c1be8

Dortch, D. (2020, October 2). *NAVSUP's new husbanding contract offers worldwide support*. Department of the Navy. https://www.navy.mil/Press-Office/News-Stories/Article/2369929/navsups-new-husbanding-contract-offers-worldwide-support/

FAR 16.5, Indefinite-Delivery Contracts (2026). https://www.acquisition.gov/far/part-16#FAR_Subpart_16_5

FAR 16.500, Scope of Subpart (2026). https://www.acquisition.gov/far/16.500

Gage, A., Escobar, L., & Sturgis, B. (2021). *Husbanding service provider price analysis factors* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/entities/publication/b2df21ed-0b0b-468e-8328-cebc952736be

Gundemir, M., Manalang, R., Metzger, P. W., & Pitel, J. P. (2007). *Worldwide husbanding process improvement: Comparative analysis of multiple contracting methodologies* [Master's Thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/server/api/core/bitstreams/5f0e52ff-97be-41c3-9950-d885fdc8c48e/content

Hauser, M., Ferrer, G., & Mortlock, R. F. (2022). Assessing policy changes on the cost of husbanding services for Navy ships. *Defense Acquisition Research Journal*, *29*(4), 360–386. https://www.proquest.com/docview/2722404724/abstract/709B61CE21644F66PQ/1

Lipi, Apra et al. *Outliers : Detection and Analysis*. Nova Science Publishers, 2022, https://doi.org/10.52305/HNKB4808.

Marquez, M. A. A., Rayos, R. M., & Mercado, J. I. (2009). *Standard port-visit cost forecasting model for U.S. Navy husbanding contracts* [Master's Thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/server/api/core/bitstreams/2646dc5c-5207-44f8-8059-aa978c934110/content

Mongilio, H. (2024, November 5). *'Fat Leonard' sentenced to 15 years in prison for masterminding Navy corruption case*. USNI News. https://news.usni.org/2024/11/05/fat-leonard-sentenced-to-15-years-in-prison-for-masterminding-navy-corruption-case

Mortlock, R. F., Cortes-Rodriguez, Z., Booc, M. A., & Lynch, W. J. (2024). Contracting strategies for Navy ship port visit support. *Journal of Contract Management*, *18*, 74–93. https://content.ncmahq.org/contractmanagement/library/item/journal_of_contract_management_2023_2024/4280737/

Naval Audit Service. (2014). *Navy husbanding and port services contracts* (Audit Report No. N2014-0048). Department of the Navy. https://www.secnav.navy.mil/navaudsvc/FOIA/N2014-0048%20redacted%20for%20website.pdf

Naval Audit Service. (2019). *Department of the Navy husbanding and port services provider program* (Audit Report No. N2019-0013). Department of the Navy. https://www.secnav.navy.mil/navaudsvc/FOIA/N2019-0013%20redacted%20for%20website.pdf

Naval Supply Systems Command. (2025). *Summary by FY, fleet and tycom*. https://mynavsup.nag.navy.mil/apps/ops$logssrv2.report_fy_summary?p_fy=FY25&p_from=&p_to=&p_fleet=&p_ship_tycom=&p_export_summary=

Naval Supply Systems Command Fleet Logistics Center Sigonella. (2022, January 21). *Global husbanding contract multiple award contract (GLOBAL MAC) solicitation N68171-22-R-0005*. Department of the Navy. https://sam.gov/workspace/contract/opp/59963460e2d143a7841e1001b36752f2/view

Office of the Chief of Naval Operations. (2020, June 26). *Husbanding service provider program policy*. (OPNAVINST 4400.1A). Department of the Navy. https://www.secnav.navy.mil/doni/Directives/04000%20Logistical%20Support%20and%20Services/04-400%20Supply%20and%20Material%20Services/4400.11A.pdf

Rendon, R., & Rendon, J. (2015). Auditability in public procurement: An analysis of internal controls and fraud vulnerability. *International Journal of Procurement Management, 8*(6), 710–730. https://doi.org/10.1504/IJPM.2015.072388

Verrastro, P. J. (1996). *Applying commercial practices to Navy husbanding services contracts* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. https://calhoun.nps.edu/server/api/core/bitstreams/c74528bc-fc64-4ac4-a94f-935a0bcdad24/content

Whitlock, C. (2024). *Fat Leonard: How one man bribed, bilked, and seduced the U.S. Navy*. Simon & Schuster.

U.S. Navy Fourth Fleet (2022, January). *LRC pre-deployment logistics brief* [PowerPoint slides]. https://mynavsup.nag.navy.mil/apps/ops$logssrv2.resources

Acquisition Research Program
Naval Postgraduate School
555 Dyer Road, Ingersoll Hall
Monterey, CA 93943

www.acquisitionresearch.net