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Qualitative Investigation of 4PL Value Offerings to the USCG and USMC

December 2021

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

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ABSTRACT

This study fills the gap in knowledge surrounding military services outsourcing their procurement activities to fourth-party logistics (4PL) providers. A 4PL provider serves as a single interface integrating and coordinating supply chain activities including logistics management. The existing partnerships between General Services Administration (GSA) Retail Operation's 4PL and both the USMC ServMart and USCG Yard formed the basis of a qualitative analysis using case studies to examine the 4PL program implementation process, limitations, and effectiveness. The results revealed that the factors inhibiting 4PL adoption include long lead times to add items, vague Federal Acquisition Regulation (FAR) clause on mandatory usage, and incompatible financial systems. Despite these limiting factors, we discovered that GSA 4PL has been able to reduce inventory cost, improve procurement performance and enhance customer value for the USMC and USCG on commercially available recurring items. This study will assist military services considering the use of 4PL to augment and improve their procurement processes. Future research using a comparative analysis approach assessing GSA and commercial 4PL providers is recommended to broaden the knowledge on the benefits, limitations, and risks of 4PL outsourcing.

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ABOUT THE AUTHORS

LCDR Kenneth Au from New York, NY enlisted in the U.S. Coast Guard in 2002 and completed Officer Candidate School in 2008. His first tour after receiving his commission was as Damage Control Assistant on USCGC *Bear* (WMEC-901), and a follow-on assignment on USCGC *Sturgeon Bay* (WTGB-109) as Executive Officer. He next attended the University of Michigan and graduated with Master of Science in Engineering degrees in both Naval Architecture and Marine Engineering, and in Industrial and Operations Engineering. From 2014 to 2018 he was assigned to U.S. Coast Guard Yard and served as Ship Superintendent for patrol boats and small boats and fleeted up to Asset Program Manager for his final year. His most recent tour was as Engineer Officer on USCGC *Healy* (WAGB-20). After graduation from the Naval Postgraduate School, LCDR Au will serve as Deputy Program Manager for the Great Lakes Icebreaker program at Coast Guard Headquarters in Washington, DC.

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—Kenneth Au

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—Annalee Blake

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LIST OF ACRONYMS AND ABBREVIATIONS

1PL	first-party logistics
2PL	second-party logistics
3PL	third-party logistics
4PL	fourth-party logistics
4PLP	fourth-party logistics providers
5PL	fifth-party logistics
ALD	Asset Logistics Division
Am	material availability
Ao	operational availability
APS	advanced planning systems
BM	bill of materials
BPA	blanket purchase agreement
BRAC	Base Realignment and Closure
CC	Credit Card/Government Purchase Card
CLIN	contract line item number
COMFRC	Commander Fleet Readiness Centers
CPD	Contracting and Procurement Division
CSMP	Council of Supply Chain Management Professionals
D2D	data to decisions
DLA	Defense Logistics Agency
DMAIC	define, measure, analyze, improve, and control
DOD	Department of Defense
ERP	enterprise resource planning
FAR	Federal Acquisition Regulation
FSSI	Federal Strategic Sourcing Initiative
GAO	Government Accountability Office
GRSC	Garrison Retail Supply Chain
GRSS	Garrison Retail Supply System
GSA	General Services Administration
GTGS	government-to-government solutions

ICP	inventory control point
IOD	industrial operations divisions
IPAC	intergovernmental payment and collection system
JIT	just-in-time
LSP	logistics service providers
MAS	multiple award schedule
MCBH	Marine Corps Base Hawaii
MOA	memorandum of agreement
MRFS	maintenance repair facility supplies
MRO	maintenance, repair, and operations
NESSS	naval engineering and electronics supply support system
PALT	procurement action lead time
PO	purchase order
SAP	simplified acquisition procedures
SAT	simplified acquisition threshold
SCM	supply chain management
SFLC	Surface Forces Logistics Center
SIN	special identification number
SS&D	supply, storage, and distribution
USCG	U.S. Coast Guard
USMC	U.S. Marine Corps

I. INTRODUCTION

The seeding for the General Service Administration's (GSA) role as a fourth-party logistics (4PL) service provider can be traced back to the 2005 Defense Base Closure and Realignment Commission. One of the recommendations made by the commission was to realign the Navy's intermediate maintenance activities and depots into fleet readiness centers (Department of Defense [DOD], 2005). While the previous base realignment and closure (BRAC) rounds in 1991, 1993, and 1995 focused on reducing cost and downsizing the military, the commission report contended that the objective of the Department of Defense's (DOD) 2005 BRAC list was targeted at transformational goals:

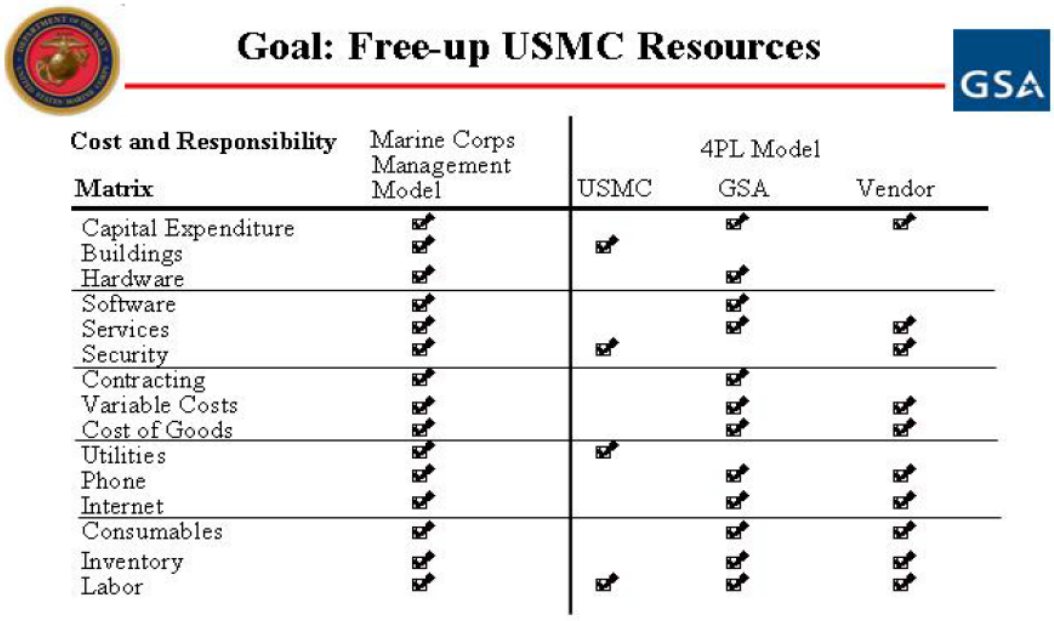
> In fact, several DOD witnesses at Commission hearings made it clear that the purpose of many 2005 BRAC recommendations was to advance the goals of transformation, improve capabilities, and enhance military value. In some cases, accomplishing these new goals meant proposing BRAC scenarios that either never paid off (i.e., resulted in a net increased cost) or had very long payback periods. (Defense Base Closure and Realignment Commission [BRAC Commission], 2005, p. 3)

Prior to the DOD's 2005 BRAC list, the National Defense Authorization Act (NDAA, 2001) for Fiscal Year (FY) 2002—which authorized the 2005 BRAC—amended Section 3002 selection criteria with Section 2913, directing the DOD to prioritize military value when selecting the bases for realignment and closure. The minimum requirement for military value is defined under Section 2913(b) and emphasizes joint military operations and the ability to meet surge requirements (Government Accountability Office [GAO], 2012a).

Neither the *Base Closure and Realignment Report* (DOD, 2005) nor the BRAC Commission (2005) report made specific mention of outsourcing to logistics service providers (LSP) at the time. However, to achieve military value, it became necessary to foster the development of strategic distribution of parts mainly by optimizing the physical placement of distribution locations. This was accomplished by consolidating supply and storage functions and adopting a spoke–hub distribution paradigm. Regional hubs, called strategic distribution platforms, supplied the forward distribution points or spokes (GAO, 2012a).

One of the first government-to-government 4PL partnerships was established on October 26, 2007, between the GSA and the U.S. Marine Corps (USMC), when both parties signed a memorandum of agreement (MOA) to create a garrison retail supply chain (GRSC; DOD, 2009). Prior to the formation of the GRSC, the USMC Garrison Retail Supply System (GRSS) consisted of 11 ServMart stores and internet purchases made using purchase cards or the online ordering platform DOD EMALL (now called FedMall), totaling $100 million in spending requirements (DOD, 2009).

Shifting to a vendor-managed inventory provided for faster product introduction and targeted product selection to serve the needs of a specific ServMart; that was not possible while operating under the Navy Working Capital Fund (GSA, n.d.-d). The GRSS introduced a single enterprise approach, leveraged GSA's acquisition experience to increase its purchasing power, and lowered prices through economies of scale. In addition, the GRSS supported socioeconomic goals by ensuring compliance with small business, AbilityOne mandates, and the Buy America Act (GSA, n.d.-d). As shown in Figure 1, accountability, and inventory management under GRSS were transferred from the USMC to GSA and vendors.



Cost and Responsibility Matrix	Marine Corps Management Model	4PL Model		
		USMC	GSA	Vendor
Capital Expenditure	✓		✓	✓
Buildings	✓	✓		
Hardware	✓		✓	
Software	✓		✓	
Services	✓		✓	✓
Security	✓	✓		✓
Contracting	✓		✓	
Variable Costs	✓		✓	✓
Cost of Goods	✓		✓	✓
Utilities	✓	✓		
Phone	✓		✓	✓
Internet	✓		✓	✓
Consumables	✓		✓	✓
Inventory	✓		✓	✓
Labor	✓	✓	✓	✓

Figure 1. GRSS 4PL Model Matrix. Source: DOD (2009).

This allowed military procurement personnel to focus on administratively complicated formal contracts that required more time and effort. The GSA cited a USMC reduction in ServMart operation spending from $66 million annually, when GRSS began, to $5 million in 2017 (Folz, 2017).

A. SPECIFIC PROBLEM

In its report titled *Strategic Sourcing: Leading Commercial Practices Can Help Federal Agencies Increase Savings When Acquiring Services*, the Government Accountability Office (GAO, 2013) observed that since profit is not a motivator in federal agencies, there is a disincentive to adopt commercial practices in pursuing strategic sourcing opportunities to provide more services with continued budget declines. In another GAO report titled *Strategic Sourcing: Improved and Expanded Use Could Save Billions in Annual Procurement Costs*, the GAO (2012b) noted that DOD and Army leaders have not provided the resources needed to realize the benefits of strategic sourcing opportunities due to the inability to collect and analyze spending data and to effectively communicate cost savings initiatives. The hesitancy and lack of awareness of available commercial and government services inhibit the adoption of business process improvement resources such as 4PL.

Moreover, the name 4PL itself can be enigmatic and difficult to define, resulting in confusion and further limiting its use. Win cited a 2005 study conducted by Langley, which found that when asking if respondents understood the difference between 3PL and 4PL, 78% of individuals said "yes" or "somewhat." However, 76% of respondents answered "yes" or "somewhat" when asked if 4PL terminology was "confusing" and "ambiguous" (Win, 2008).

Our study brings awareness and understanding of 4PL by analyzing the existing government-to-government partnerships between GSA 4PL and both the USMC ServMart and Coast Guard Yard. Service agencies should recognize 4PL as a strategic sourcing opportunity with the potential to reduce costs, improve procurement performance, and enhance customer value.

B. RESEARCH QUESTIONS

The primary purpose of this study is to report on existing government-to-government partnerships between the GSA and both the USMC and the U.S. Coast Guard (USCG) to determine the effectiveness of 4PL outsourcing. In addition, we seek to identify the 4PL implementation process, program limitations, and implications to the military logistics workforce. The following research questions were developed to guide and support our study. A justification is provided after each question.

1. What are the benefits of outsourcing to a 4PL provider (4PLP)?

- A goal of this study is to understand why organizations decide to outsource. This question reveals the type of noncore functions fulfilled by 4PL. Additionally, understanding the benefits assists other service agencies in determining if they should consider using 4PL as a procurement resource.

2. Why do some military services decide to partner with the GSA to implement a 4PL solution?

- The answer to this question explains the differences between the GSA 4PL program and 4PL services offered by commercial providers. We also wanted to know if there are any requirements mandating the use of the GSA and if this impacts an agency's decision to use 4PL.

3. What are factors limiting adoption of GSA 4PL?

- This question could address why other services have not implemented GSA 4PL and identify barriers to adoption. Improvements that are needed for the GSA 4PL program are also be identified.

4. How is the GSA 4PL program implemented?

- Understanding the process on how the GSA 4PL program is implemented and combining it with lessons learned from the two case studies could be developed into a framework for other services to follow. The ease of implementation often impacts the probability for a program's adoption.

5. What are the results of the GSA 4PL partnerships between the USMC and USCG?

- The level of satisfaction experienced by both agencies on the use of GSA 4PL partly determines the effectiveness of the program. Best practices can be developed from the lesson learned by the two agencies.

6. What are the implications for the military logistics workforce?

- This question aims to identify both the positive and negative impacts to military personnel within the logistics field from outsourcing to a 4PLP.

C. SCOPE

Our research focuses on how the USCG and the USMC have used 4PL services provided by the GSA. We selected the case study method to examine 4PL adoption across multiple stages—encompassing selection, implementation, and sustainment periods—from both the vendor and customer perspectives. For the USMC, we examined the service's partnership with GSA's 4PL retail solution and the USMC GRSC in the planning, management, and operation of its ServMart dating back to its genesis in 2007. Commencing in 2014, the USCG and GSA partnership presents a more recent case study in the use of GSA 4PL program services at a smaller scale when compared to the ServMart and is applied to a federal industrial shipyard setting. In addition, we studied and summarized the development of both commercial and GSA 4PL, the current 4PL trends, and future expansions of the program.

D. METHODOLOGY

The purpose of our research is to fill the knowledge gap surrounding the use of 4PL in the U.S. military. Our primary research approach is a qualitative research method, which involved conducting case studies to determine how the USCG and USMC have used 4PL services provided by the GSA.

The case study method offers a more detailed data analysis as compared to a survey or questionnaire designed approach. Moreover, Houé and Murphy (2017) found that given the dynamic and complex relational nature of logistics networks, a qualitative methodology would be most appropriate. They also noted an increase in the use of qualitative methods in examining SCM, such as Wagner and Sutter's (2012) use of a qualitative case study method to investigate the relationship between a 3PL provider and their customer while collaborating on innovation projects.

The USCG case study examines 4PL across a 4-year period and provides a customer perspective, including the challenges and lessons learned during the adoption process. The USMC case study provides a longer-term examination of GSA's role and effectiveness as a supply chain integrator.

Additionally, we spoke with subject matter experts from the USMC, USCG, and GSA to ascertain the reasons to transition to a 4PL construct, including implementation and operation. The secondary research methodology involved a review and analysis of relevant literature and additional information obtained from federal agencies and professional organizations relevant to logistics and SCM.

E. CHAPTER SUMMARY

In this chapter we introduced GSA's role as a 4PL service provider and identified that there is a lack of awareness of GSA 4PL services within the military. We presented the research questions that are investigated in this paper. We explained the reasoning behind the methodology selected and provided an outline of the relationship and activities between the entities that are analyzed in this research. The background presented in Chapter II will define logistics and supply chain vernacular as well logistics service levels.

II. BACKGROUND

To maintain logistic procurement efficiency in a resource-constrained environment, the military needs to take advantage of the benefits offered by LSPs. While the GSA Retail Operations 4PL program has been in operation since 2007, there are currently only 35 physical locations utilizing this service (General Services Administration [GSA], 2019a). Military units can reduce purchasing cycle time, achieve inventory cost savings, lessen delivery time, and improve procurement performance by outsourcing portions of their procurement activities to a 4PLP.

A. BASIC DEFINITIONS

To aid in understanding 4PL, we first define the common terms that are consistently used throughout this study, beginning with *logistics*. There are numerous ways to define the term logistics, including this meaning, which has been in use since 1861: "The aspect of military science dealing with the procurement, maintenance, and transportation of military matériel, facilities, and personnel" (Merriam-Webster, n.d.). To be rooted in science, logistics must be systematically studied, and the use of logistics in the military inherently conveys the need to apply a strategic acumen to achieve the desirable outcome. Logistics is such a crucial process in the military that the *DOD Dictionary of Military and Associated Terms* succinctly defines it as "planning and executing the movement and support of forces" (Department of Defense [DOD], 2021, p. 132). Regardless of the size and scope, and the actual materiel being moved, logistics encompasses the purchase, movement, storage, and distribution of goods, services, and information.

Logistics is an integral component of the following two terms: *supply chain* and *supply chain management*. The Council of Supply Chain Management Professionals (CSMP) defines a supply chain as "the material and informational interchanges in the logistical process stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers and customers are links in the supply chain" (Council of Supply Chain Management Professionals [CSMP], 2013, p. 186). Extracting the maximum value from the supply chain requires expert management

of all the elements and activities occurring within the chain. The term supply chain management (SCM) was created in 1982 (Stadtler, 2015, p. 18) and can best be defined as "the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole" (Christopher, 2011, p. 3).

B. LOGISTICS SERVICE LEVELS DEFINED

We now define the different levels of logistic services commonly offered. The first level of logistics operations is first-party logistics (1PL), which is when a firm performs its own logistic functions. This simply means that the firm moves material from one location to another using equipment it already owns (Horzela et al., 2018). Second-party logistics (2PL) involves hiring an outside carrier to perform delivery. Here, the external carrier specializes in an area of the supply chain and owns the means of transport for the movement of the material (Horzela et al., 2018).

Third-party logistics (3PL) advances 2PL a step further and incorporates freight forwarders where material is packed, stored, and delivered by specialized transport companies (Horzela et al., 2018). A 3PL provides "management skills along with physical assets, labour, and system responsibility to perform such services themselves" (Horzela et al., 2018, p. 302). Third-party logistics providers are logistic specialists when it comes to executing the physical movement of material and may provide value-added activities such as "co-manufacturing, co-packing, crossdocking, pooling, and reverse logistics" (Fulconis & Paché, 2018, p. 11). Third-party logistics represents the logistic element of moving and storing material from the point of origin to the point of final consumption and is a component process that flows through a sequence of business processes and activities that are linked in a supply chain (CSMP, 2013; DOD, 2005).

Fourth-party logistics encompasses logistics management where integrators combine their own technology, resources, and capabilities with 3PL to create comprehensive supply chain solutions (Horzela et al., 2018). "Fourth-party logistics is the planning, steering, and controlling of all logistics procedures ... by one service provider with long term strategic objectives" (Horzela et al., 2018, p. 302). While 3PL is effective at focusing on logistics management, transportation management, and warehouse

operations to reduce transportation, storage, and inventory costs, it lacks the capability to increase customer value across the supply chain. This is due to the inability of 3PL to effectively align a company's business to a complimentary supply chain strategy. As a result, consultant companies saw an opportunity to fill this capability gap by leveraging their business expertise and combining it with technology advancements to offer an end-to-end supply chain solution.

One of the first companies in this arena was Andersen Consulting (now Accenture), which created and registered the term *fourth-party logistics* in 1996 (Rushton & Walker, 2007) to describe an organization that serves as an integrator responsible for managing and coordinating resources, capabilities, and technology with other complementary service providers to maximize benefits to the supply chain (Bade & Mueller, 1999).

Integration and coordination are key building blocks to illustrate the many facets of SCM in the House of SCM model created by Stadtler (2015, p. 6), which is presented in Figure 2.

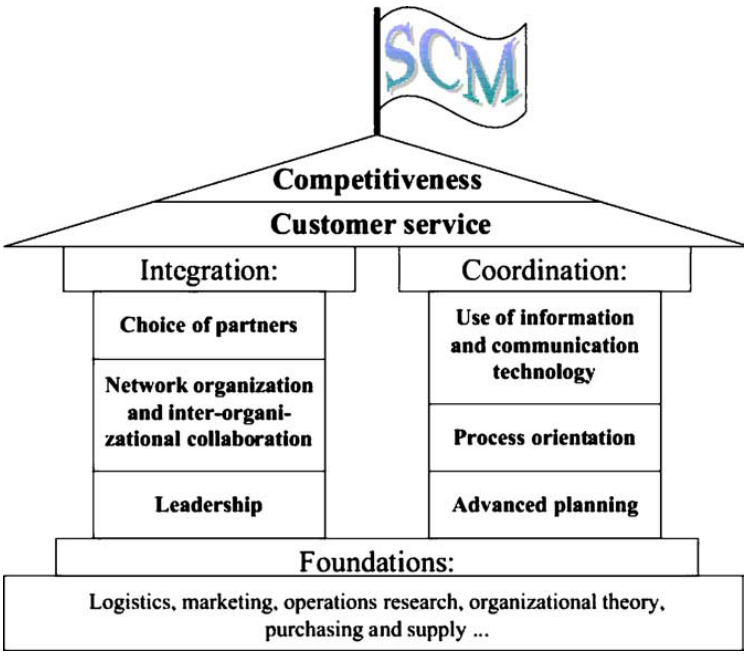


Figure 2. House of Supply Chain Management. Source: Stadtler (2015, p. 6).

Using Stadtler's model, coordination includes the leveraging of technology to gather, process, and transfer information encompassing sales, distribution, procurement,

and customer support data to make informed decisions for planning. The ability to provide rapid real-time information is a quality desired by all companies. Of equal importance is integration, which involves the forming of partnerships and developing relationships between organizations engaged in network activities across the supply chain.

Table 1 illustrates the differences from 1PL to fifth-party logistics (5PL) using the example of flowers moving from a florist to customers. Military-specific examples are shown in Table 2.

Table 1. 1PL to 5PL Classification Scheme

Logistics Type	**Example**
1PL (Single-Service Provider)	A florist drives her truck to deliver flowers from her greenhouse to a local store for sale.
2PL (2nd-Party Logistics Provider)	A courier delivers flowers from the greenhouse to a local store.
3PL (3rd-Party Logistics Provider)	A fulfillment company uses its fleet of trucks to wrap and pack flowers and then transports them from the greenhouse to a local store.
4PL (4th-Party Logistics Provider)	A logistics company manages and optimizes the whole logistics function and provides solutions to enhance portions of the supply chain. The logistics company coordinates with 3PLs on the florist's behalf to package flowers and deliver them to the local store.
5PL (5th-Party Logistics Provider)	A logistics company manages the florist's complete supply chain network from seed to delivery.

Examining the differences between 3PL and 4PL using an integration strategy lens, an individual 3PL seeks to increase market share by reducing competition through horizontal integration, while a 4PL provides the benefits of vertical integration not through domination, acquisition, or elimination of firms across the supply chain, but by "acting as the single interface between clients and the full scope of supply chain services" (Gattorna, 1998, p. 433).

Fifth-party logistics takes the process beyond logistics management and incorporates complete management of multiple supply chains. Horzela et al. (2018) described 5PL as "logistics services providers who develop, implement and control, preferably in close consultation with the consumer, the best possible supply chains or networks" (p. 304).

Table 2. 1PL to 5PL Classification Scheme Within the Military

Logistics Type	Example
1PL	A supply service member drives a government vehicle to a local vendor to purchase parts and brings them back to the unit. (The 1PL here is the "last-mile" delivery).
2PL	Transportation Command (USTRANSCOM) uses a commercial bill of lading (CBL) for a 2PL to ship parts in CONUS or OCONUS.
3PL	Defense Logistics Agency (DLA) "warehous[es] supplies to forecast demand, then works with DLA supply chain representatives, vendors and DLA Distribution to ensure on-time delivery of items at customers' locations around the world" (Defense Logistics Agency [DLA], 2019).
4PL	GSA Retail Operations integrates and coordinates between commercial vendors and component agencies to provide tailored and optimized parts delivery services. As of 2014, GSA transitioned "out of the warehouse business and GSA will no longer buy, store and ship those retail items" (Sharpe, 2014).
5PL	The preference and need for public-private partnerships limit the opportunity and feasibility for a government agency to manage multiple end-to-end supply chains from raw material acquisition to final product delivery to the user. The DLA's end-to-end management of defense supply chains, include its own warehousing and materiel handling, extending beyond the outsource consultancy and management role of a 5PL provider.

While these examples are helpful to simply articulate the differences between logistic provider types, the comprehensive definition and meaning of 4PL is more complex. Table 3 presents descriptions of 4PL from three different journal articles. Considering these descriptions, 4PL is deemed as the integrator of complex supply chain solutions.

Table 3. 4PL Descriptions

Source	Description
Saglietto (2013)	"Pure 4PL is described in the literature on the basis of the famous definition proposed in 1996 by Arthur Andersen (now Accenture Consulting), which originally registered the name as a trademark: 'the 4PL is an integrator that assembles its own resources, capabilities and technology and those of other service providers to design and manage complex supply chains'" (p. 1).
Hosie et al. (2007)	"4PL has emerged as a breakthrough supply chain solution by comprehensively integrating the competencies of 3PL providers, leading edge consulting firms and technology providers" (p. 10).
Huang et al. (2019)	"Fourth-party logistics companies ... can integrate the mass of third-party logistics companies (referred to as 3PL) and further control and optimize the entire logistics process to achieve high operational efficiency" (p. 1).

The organizations that perform 4PL operations are 4PLPs. Schramm et al. (2019) conducted a study to analyze the future potential of 4PL in a digital future. The authors used a mixed-methods research approach with semi-structured interviews and an expert panel on the subject. In their research, they discussed that the responsibilities of 4PLPs are usually associated with planning activities and pointed out that the 4PLPs are responsible for selecting acceptable service providers. "Warehouse management, inventory planning, forecasting activities, customs management, routing operations and network optimization are further activities performed by 4PLPs in respect" (Schramm et al., 2019, p. 6). Additionally, a 4PLP serves as a consultor, intermediary, and integrator between client companies and the supply chain. Schramm suggested that there is no standard method for conducting 4PL solutions. This lack of a standard method for 4PLPs contributes to some of the confusion in understanding the entirety of 4PL, which is addressed further in this analysis.

C. CHAPTER SUMMARY

In this chapter we defined logistics, supply chain, and supply chain management. Additionally, we defined logistics service levels from 1PL to 5PL. The literature review

presented in Chapter III provides an overview of outsourcing, including its definition, purpose, and application. 4PL is further defined and its utility examined as an outsourcing option, accompanied with an analysis of the benefits and potential harm.

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III. LITERATURE REVIEW

To begin, there is little existing literature regarding the use of 4PL in the military context. Commercial industry has utilized 4PL for decades but select military services have been using it only since 2007 (DOD, 2009). The main themes discovered throughout literature on the topic include various advantages, disadvantages, and implications of outsourcing and how 4PL solutions have been utilized in private industry. There also exists literature that suggests a framework that is needed to accurately assess the value of 4PL.

A. REASONS TO OUTSOURCE

The foundation of 4PL is based on providing an outsourced service. In 1996, Thomas J. Thompson produced a thesis for the Air Force Institute of Technology on 3PL and its implications for U.S. Air Force logistics. At the time, 3PL use was on the rise, but there was caution around how to approach and implement it in the military context (Thompson, 1996). Through his analysis, Thompson concluded, "DOD logistics managers should use methods of successful outsourcing relationships" (Thompson, 1996, p. 5-22). He determined the use of 3PL to be a success and would continue to grow within the military. Over the next 25 years, Thompson's conclusions were proven to be true. Third-party logistics became a go-to strategy for military logistics operations and has evolved into 4PL practices.

One of the classic reasons why companies outsource an aspect of their business is that it affords them the opportunity to focus on their core competencies (Christopher, 2011; Farahani et al., 2011; Gattorna, 1998, p. 426; Rushton & Walker, 2007; Skjøtt-Larsen et al., 2007; Stadtler, 2015, p. 9). In economic terms, a rationally acting company would allocate their scarce resources on the activities that have the most incentives, return the highest profits, and maximize their competitive advantage.

Along with economic considerations, benefits of outsourcing include an assured capacity to meet fluctuations in supply and demand via service-level agreements, and that the risks of delivery delays, damages, and returns are shared or transferred to the logistics provider (Rushton & Walker, 2007). Unlike subcontracting, where there is little to no

involvement from the parent company once the activity is passed to another company to execute (Christopher, 2011), outsourcing is a continuous partnership aligning strategic, financial, and operational factors between the parent and logistics companies (Nowodziński, 2014).

Whether a company chooses to acquire an outside solution to solve an organizational problem is influenced by the methods needed for its integration. Salonen and Jaakkola (2015) identified the methods as a firm boundary decision between an internal integration approach that aims to retain control and management and an external one that cedes more control to a partner network. The four factors influencing the decision include identity, competence, efficiency, and power (Santos & Eisenhardt, 2005). Firms that seek internal resource integration for any of the four factors would be less likely to outsource to a 4PLP.

Competence relates to "maximizing the value of the resources required for solution provision" (Salonen & Jaakkola, 2015, p. 179). A company with an experienced staff and knowledge of the resource being acquired would seek to have greater internal control and the application of this control to where it deems most valuable to generate the greatest return on investment. Conversely, a firm that is unfamiliar with the acquired resource would assign greater value to a transaction by having a partner perform the external resource integration. The latter allows the customer to focus its key resources in its core competencies and mission execution.

Cui and Hertz (2011) analyzed the ability of logistic firms themselves to expand their capabilities and concluded that they are bounded by their core competencies: "The main challenges are to obtain competence and adapt to a new value creation logic" (p. 1010). Notably, value goes beyond the purchase price and must include the total cost of ownership (Pardo et al., 2011) and the benefits of building a relationship with the supplier, which can generate further value.

The amount of management or governance of an acquired resource determines its efficiency, with the goal to minimize its cost. Companies operating in a highly regulated and standardized industry will find internal resource integration more efficient due to the high coordination and information exchange needed with the outside solution.

Meanwhile, a company operating in a less regulated area will gain efficiency by using external resource integration and will have the opportunity to develop new standards with the solution provider (Salonen & Jaakkola, 2015). In addition, Kampstra et al. (2006) noted that the reality of supply chain collaboration is much less than desired and attributed it to competition, uncommon IT infrastructure, conflicting business cultures, lack of trust, and time needed for integration with customers and suppliers. Last, the potential disadvantages or concerns of outsourcing include information security, loss of in-house skill set, and vendor lock.

B. OUTSOURCING TO A LOGISTICS SERVICE PROVIDER

The reason why logistics is primed for outsourcing is that it is a support service that is necessary, but it requires significant capital and operational expenditures to acquire and maintain a logistics infrastructure, including transportation vehicles, warehouses, distribution centers, information technology (IT) systems, and personnel. Outsourcing converts these assets and liabilities from fixed to variable costs, improving cash flow for investments in core activities.

The expansion of internet capability and capacity, domination of e-commerce, and globalization have resulted in increased competition among logistics companies. Traditional transportation management and warehouse companies distinguish themselves with low cost and speedy delivery, evolving into 3PLs. A 3PL is an outsourced provider managing transportation and distribution activities, with focus on warehousing, inbound and outbound transportation, and freight forwarding. The benefit of outsourcing to a single 3PL is that it limits cost savings to just the logistics portion of the supply chain (Rushton & Walker, 2007).

While the positive benefits and effectiveness of outsourcing to a 3PL have been well documented, the decision to outsource to a 4PL depends on several factors, including the company's short- and long-term business strategy, available capital, and the willingness to give up some control of the supply chain, including valuable data (Rushton & Walker, 2007). One of the key differences between GSA 4PL and a commercial 4PL is the former's ability as a coordinator to meet socioeconomic mandates that aim to provide opportunities to targeted entities along the supply chain. Additionally, for situations when

GSA 4PL contract out to commercial 4PLPs, it takes the responsibility of enforcing federal statutes and regulations on behalf of the military customer, relieving the receiving unit from the administrative burden.

Outsourcing to a 4PLP allows for greater profits through synchronization and collaboration in planning, implementation, execution, and optimization of the supply chain. As a non-asset entity, a 4PLP leverages consultancy expertise and enterprise-level IT systems to manage multiple 3PL providers to execute the logistical elements of the supply chain. The 4PLP outsources on behalf of the customer to a 3PL provider that can offer the best value and is in alignment with the customer's business strategy.

Additional 4PL functions include strategic, transportation, and capacity planning and inventory and information management (Skjøtt-Larsen et al., 2007). Given the comprehensive specialized services offered by logistics companies, especially the high investments in expensive IT systems, it would be difficult for a company to achieve the same level of efficiency and economy of scale and competitive edge. Therefore, it is reasonable to state that aside from established transnational corporations with multibillion-dollar market capitalization and control of their supply chain, it would be advantageous for a company to outsource their logistics needs by partnering with a specialist, which could also enhance their overall business

Considering outsourcing practices, Skender et al. (2017) discussed the uniqueness of the 4PL outsourcing model. Figure 3 presents the key attributes, service offerings, relationships, and pricing models of varying forms of logistics outsourcing. An LSP provides the most basic level of service for an organization. It involves the transaction of a commodity or commodities and is focused on cost reduction. 3PL offers enhanced capabilities. Returning to the florist example in Table 1, instead of an LSP merely delivering flowers to the greenhouse, 3PL would involve something like a fulfillment company using its fleet of trucks to wrap and pack flowers before transporting them from the greenhouse to a local store. The use of 3PL would be under contract. A lead logistics provider serves as a single point of contact for logistics. It is a contractual relationship. Fourth-party logistics is in a partner-based strategic relationship that works with customers to provide advanced services. As stated by the authors, "In developing a

logistical partnership, 4PLs bring these relationships to an enhanced level with higher integration and involvement of various partners" (Skender et al., 2017, p. 99).

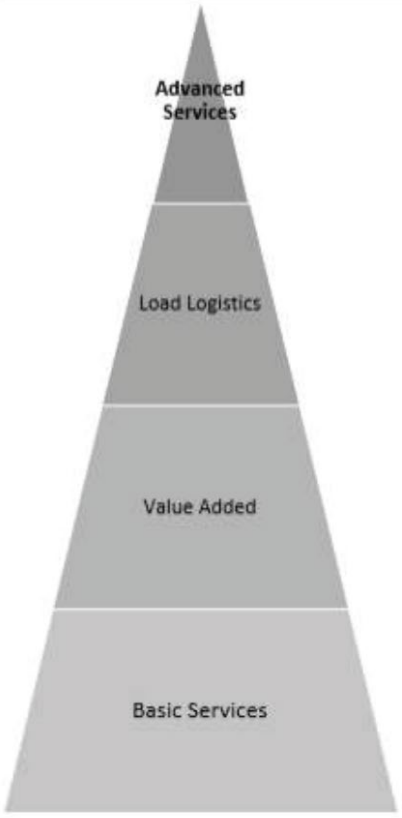
Relationship and pricing models	Service offerings	Logistics Outsourcing	Key Attributes
Partnership Value based		**Fourth-Party Logistics Provider (4PL)**	**Strategic relationship Broad supply chain expertise Knowledge and information based Shared risk and reward Advanced technology capability Adaptive, flexibile, collaborative**
Contractual Risk sharing		Lead Logistics Provider (LLP)	Project management/contract management Single point of contact 3PL technology integration
Contractual Fixed & variable		Third-Party Logistics Provider (3PL)	Enhanced capabilities Broader service offerings
Commodity Transaction		Logistics service provider (LSP)	Focused cost reduction Niche services

Figure 3. Logistics Outsourcing Attributes. Source: Schramm et al. (2019).

C. EVOLUTION OF 4PL

Skender et al. (2017) also discussed how 4PL evolved from 3PL. Figure 4 illustrates this evolution. Phase A depicts traditional 3PL, where various 3PL providers offer services to a client supply chain (physical movement of the parts themself).

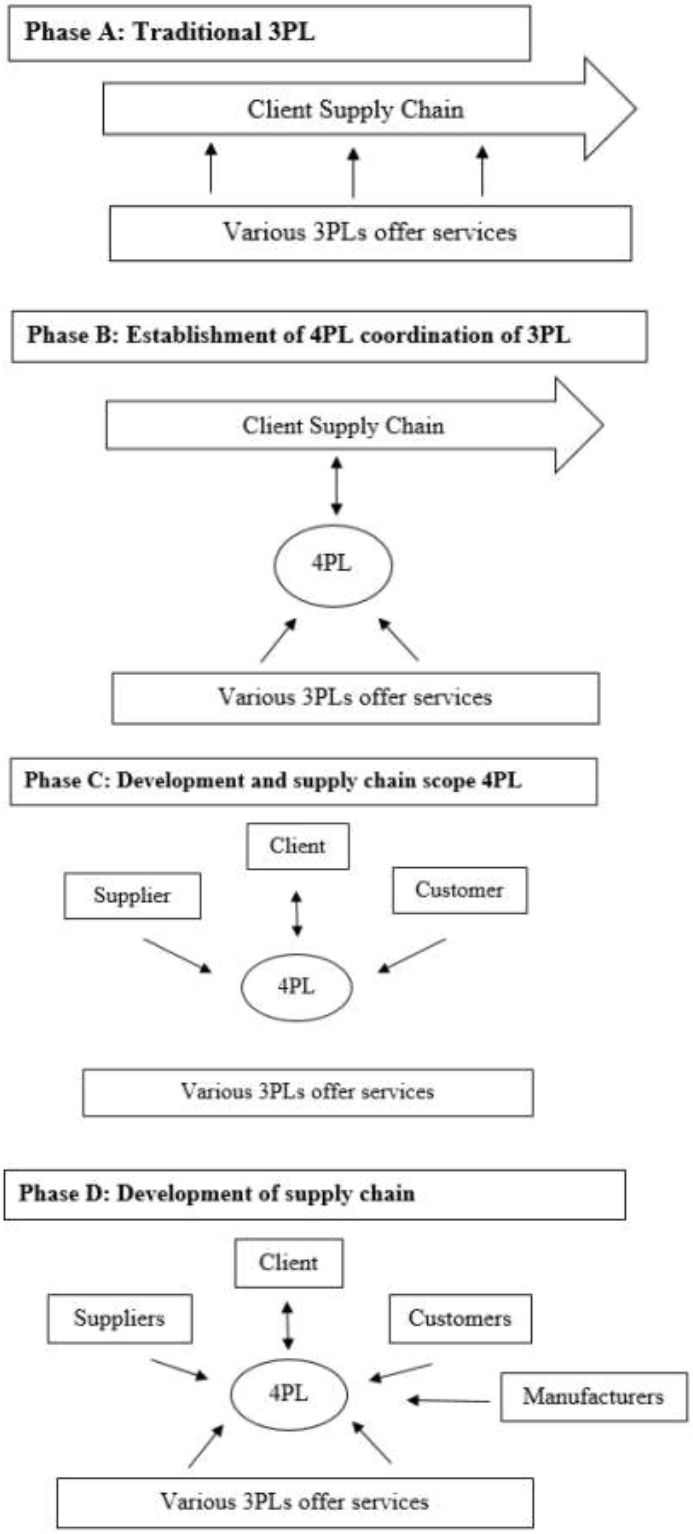


Figure 4. The Evolution of 4PL from 3PL. Source: Skender et al. (2017).

When 4PL is established in Phase B, the 4PLP acts as the mediator between 3PL services and the client supply chain. In Phase C, one can see that the system evolves to where the 4PLP receives input from customers, suppliers, and clients. Finally, once the supply chain is developed with 4PL in Phase D, the 4PLP receives inputs from various 3PL providers, suppliers, customers, and manufacturers and then handles all logistics practices on behalf of the client (Skender et al., 2017).

Skender et al. (2017) noted that although 4PL has been researched for a relatively long time, it remains underestimated. Skender et al. (2017) studied the role of the 4PL model in a contemporary supply chain and sought to analyze the advantages of outsourcing using 4PLPs in modern business. Through their theoretical research, the authors concluded that the "fourth party logistics provider is not incorporated enough into contemporary supply chain solutions, although a growing demand for it is evident" (Skender et al., 2017, p. 96). This is perhaps the reason that the GSA decided to add a 4PL program to its retail operation offerings.

However, the authors called for future research and investigation "to evaluate the impact of fourth-party logistics provider on a business performance distinguishing among industries" (Skender et al., 2017, p. 100). This call to assess performance depending on each industry is fundamental to the goal of this analysis: Is further 4PL implementation important for improvement in military logistics?

Referencing Skender et al. (2017), Table 4 presents a consolidated table that illustrates the wide variety of services 4PLPs provide. The span of these services highlights the innovative and comprehensive nature of 4PL. Skender et al. (2017) pointed out that some scholars believe logistics operators should evolve into becoming "one stop shops." However, the counter perspective is that 4PLPs can perform better when they can tailor their services to a customer's specific needs (Skender et al., 2017).

Table 4. Fourth-Party Logistics Provider Services

Service Type	Aspects of Service
Procurement strategy	• Supply chain management consultation • Project management
Storage, shipment, and delivery coordination	• Warehousing operations • Inventory management • Transportation
Customer support	• Handling routing problems • Managing claims and payments

D. COMMERCIAL LOGISTICS VERSUS DLA

As the DOD's combat support agency, the DLA excels at large-scale wartime, disaster relief, and contingency operation logistics—owing to near unlimited resources. The DLA is unlikely, however, to cost-effectively keep up with the evolution of logistics practices when it is applied to commercial, high-volume, repetitive items. The commercial logistics involved mostly apply to the delivery of items for peacetime maintenance and sustainment activities, which—while mundane—are critical for the DOD to maintain its level of readiness. As described by Rutner et al. (2012),

> The likely outcome is a DOD that continues to rest on its laurels and falls further and further behind its civilian logistics counterparts. However, … the U.S. military's logistics system is without equal. Therefore, if the basis of competition is other militaries, the DOD is well ahead. (p. 113)

The authors acknowledged that U.S. military logistics are more advanced than other militaries; however, they also contend that the military is a follower when compared to civilian organizations in the realm of effective logistical operations. As private industry continuously invests and advances logistics operations and technologies, the DOD appears not to be keeping up in this area.

Following the 2005 BRAC, DLA was assigned the responsibility for retail supply, storage, and distribution (SS&D) functions and industrial site support infrastructure. To meet supply demands, the DLA frequently partners with the GSA to supply commercially available non-production and recurring parts. Compared to DLA, the GSA has a narrower

portfolio focused on providing commercial products and services. This affords the GSA greater flexibility to serve as the test agent for proof-of-concept business initiatives and adopting commercial industry business processes, including 4PL, which it shares with the DLA. This process allows the DOD to bridge the gap in attaining commercial logistics advancement benefits.

E. CHAPTER SUMMARY

In this chapter, a literature review relating to 4PL was completed, including the benefits and disadvantages of outsourcing to 3PL and 4PL providers. We also evaluated the value proposition of 4PL on the military. We determined that 4PL was created from market forces to serve as an integrator to extract greater profit and value from the supply chain through effective integration and coordination. While the military excels at wartime and contingency logistics, it is unable to match 4PL in effectively executing mundane logistic activities for maintenance and sustainment operations to meet readiness levels. Chapter IV presents an examination of two case studies to determine the current state of 4PL usage and its future implications for the military.

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IV. ANALYSIS AND FINDINGS

In this chapter, we present our findings from our quantitative case study analysis of the GSA 4PL program performance at USMC ServMart and USCG Yard. The two entities provide an interesting dichotomy in size, business operation, and agency purpose for using 4PL. We examined the collected data to determine the realized benefits from using 4PL. Discussion and correspondence with a GSA Retail Operations leader who has been involved with the 4PL program since initiation provided insight on the history, current trends, and future program expansion. The analysis and findings provide answers to the research questions, expand the understanding of 4PL usage in the military services, and can inform other agencies interested in 4PL adoption.

A. GSA 4PL PROGRAM

In FY2020, there were 35 GSA 4PL supported store and issue points, located principally on military bases (shown in Figure 5). The GSA 4PL Program is *a complete integrator and manager of suppliers* (W. Crenshaw, email to author, May 24, 2021), with the following broadly listed responsibilities:

- Procurement of items
- Acquisition of vendor partners
- Distribution of information
- Coordination of daily operations
  - Financial integration
  - Stocking and customer service
  - Commodity management

The sample MOA between the GSA and Coast Guard Yard for the implementation of the GSA Retail Operations 4PL Supply Chain Solution, shown in the appendix, provides an example of the roles and typical responsibilities of the GSA and the customer.

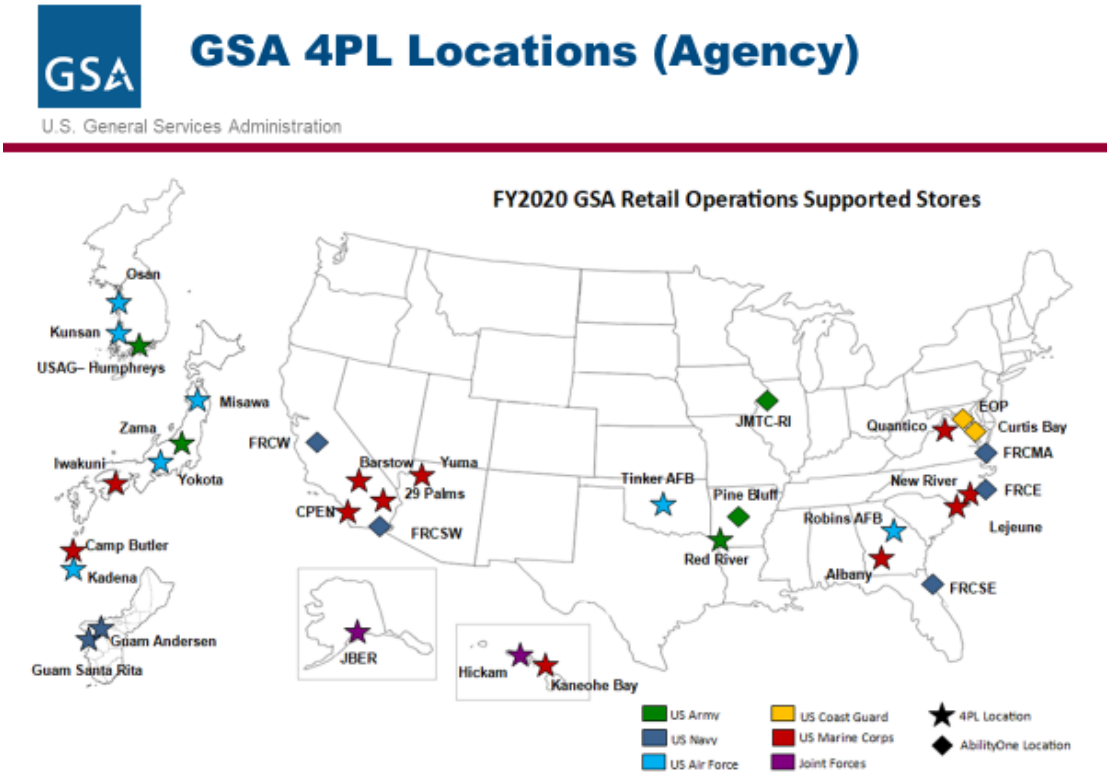


Figure 5. FY2020 GSA Retail Operations Supported Stores. Source: W. Crenshaw (email to author, May 24, 2021).

As a contracting method, the GSA 4PL program essentially uses blanket purchase agreements (BPAs) with 4PL special identification number (SIN) items under the GSA's Multiple Award Schedule (MAS) for product and service fulfillment. What makes 4PL different is in the coordination and integration of components that are collectively used in SCM. GSA 4PL require vendors to perform the following (GSA, 2021):

- Personnel and supply support for walk-in stores and/or supply issue points
- Product stocking and customer service
- Product research
- Provision of products that improve customer work processes
- Procurement of material that the customers need (both for on-hand and ship-to)
- Electronic data integration/onboarding with the GSA
- Addition of new products as the customer requires
- Data analytics and reporting

Fourth -party logistics SIN is a result of GSA MAS Solicitation Refresh 2 in June 2020, which was undertaken to address issues caused by multiple GSA schedules, including multiple variations of the same clause, and duplication of products (Federal Schedules, 2020). The GSA asserts that "having a dedicated SIN for 4PL solutions, will streamline acquisition processes and help GSA more effectively and efficiently meet the mission-critical needs of Federal agencies" (GSA, 2021). GSA 4PL is divided into two business or operational model categories, as described here:

> **vendor-owned/vendor-managed inventory services (VMI):** services such as resupply of designated items by the vendor through regularly scheduled reviews of on-site inventory counts, removal of damaged or outdated goods, and the restocking of inventory to predetermined levels at their specified locations and customer support.
>
> **vendor-owned/vendor-consigned inventory services (VCI):** services where products will be entrusted to the GSA and are under the control and custody of the GSA while they are stocked at 4PL locations. (GSA, n.d.-b)

The VMI and VCI business models are applicable to "various 4PL settings, which include but are not limited to Brick-and-Mortar Retail Storefronts; Tool Rooms and Issue Points; Virtual ServMarts; Satellite Locations; In-Store Referral Ordering; Direct Delivery; and Online Catalogs" (GSA, 2021). The VMI category applies to CONUS ServMarts and the Coast Guard Yard. As of May 2021, there are five vendors awarded to the 4PL SIN, including LC Industries, MSC Industrial Supply, Office Depot, OSC Solutions, and W. W. Grainger. OSC Solutions is the only small business, and the other four companies have an "other than small business" indicator (GSA, n.d.-b).

B. 4PL IN THE UNITED STATES MARINE CORPS

The GSA reported that the USMC shifted from base-level logistics to an enterprise-wide approach when it adopted the 4PL model. "The GSA 4PL model (partnership between USMC and GSA) supports the Marine Corps goals of an expanded range of products/services, standardization, and synchronization, while providing Marines with an improved shopping experience and enhanced customer service" (GSA, n.d.-d, p. 2). This model not only met these goals but also lowered costs, reduced the number of IT systems being used from 22 to one, and improved data visibility where it

was isolated before. Stores were able to see inventory/availability of products across all locations instead of having completely independent systems.

It was in the late 1990s that the USMC began exploring options to partner with industry and apply effective business strategy for the procurement of common commercial products. This exploration led to the establishment of the USMC ServMart, where "all Marine Corps activities would rely on Marine Corps ServMarts for common commercial items to support the Marine Corps mission" (GSA, n.d.-d, p. 1). By the early 2000s, USMC partnered with the GSA to move its GRSC from base-level management, where one base would oversee managing supply for a specific area, to enterprise-level management, executed by an external supply chain manager: the GSA and its 4PL model. Under the old GRSC operations,

> retail stores sold GSA-owned industrial products and office supplies that were warehoused at GSA depots. Because GSA owned the products, the agency was responsible for all the carrying costs. As a result, if inventory didn't sell, it cost taxpayer dollars and used government and military resources. (GSA, 2017, p. 1)

The main issue with the GRSC was cost. According to the GSA, under the GRSC, the USMC spent more than $66 million a year to operate ServMarts. After 4PL solutions were introduced, the operational cost for operating ServMarts in 2017 plummeted to less than $5 million (Folz, 2017).

The first goal of the 4PL enterprise concept is to achieve an expanded range of products and services. The 4PL concept strives to bring Marines and units a "wide range of dependable, high-quality products, when and where they need it" (GSA, n.d.-d, p. 2). This relieved regional contracting offices from the burden of managing routine contracts and "reduces the use of the Navy Working Capital fund for financing of inventory" (GSA, n.d.-d, p. 2). Marine Corps Base Hawaii (MCBH) published the *USMC ServMart Guide* in December 2017. The guide explains that the products available through the ServMart are common commercial products: "i.e., items and products sold typically through local commercial off-the-shelf channels, distributed in large quantities, and not procured via local USMC contracting methods" (USMC ServMart, 2017). See Table 5 for examples of the types of material carried in ServMart stores.

Table 5. USMC ServMart Material Examples. Adapted from USMC ServMart (2017, pp. 8–10).

Office Products	
Electronic Item Support	- Telephone support equipment - Copiers - Shredders - Scanners
Office Supplies	- Copier Paper - Ink toners and cartridges - Calendars - Pens - Binders - Staplers - Household batteries - CD, DVDs
IT Peripherals	- Internal and external hard drives - Internal and external CD-ROMs - Internal and external DVD Drives - USB power supplies
Commercial Industrial Products	
Cleaning Products	- Brooms - Mops - Cleaning chemicals - Wax - Hazardous materials (special approval required)
Food Service Supplies	- Napkins - Paper plates - Kitchen utensils - Plates - Trays - Rubber gloves
Safety and Apparel	- First aid kits - Coveralls - Safety glasses - Safety vests - Eye wash stations
Tools and Hardware	- Ratchets - Wrenches - Screwdrivers
Paints and Chemicals	- Paints - Stains - Adhesives - Solvents - Commercially packaged petroleum, oils, and lubricants (POLs) used to maintain machinery

Some of these products—like shredders, computer monitors, and printers—must meet specific requirements and have special approval. For example, computer monitors and printers must specifically have approval from both the S-6 staff member and base supply (USMC ServMart, 2017). All instruction and requirements for each type of material are specified in the ServMart handbook. The items in Table 5 are examples, but the table is not at all comprehensive of the over 400,000 products available through ServMart.

The second goal of the 4PL enterprise concept is to standardize the process for obtaining supplies and services. A study conducted by CENSEO concluded that leveraging the GSA would help achieve greater efficiency and product offerings throughout the USMC supply chain enterprise. According to the *Marine Corps Base Hawaii USMC ServMart Guide*, this process is referred to as the requisition process (USMC ServMart, 2017). For MCBH units, ServMart access cards are required for requisitions. Units can apply for these cards through a standard application. Once an access card is granted, authorized personnel are then able to conveniently come into the store to obtain desired products (USMC ServMart, 2017). However, prior to requisitioning, shoppers are required to create a shopping list that must be approved by the fiscal officer (USMC ServMart, 2017). Though the process of obtaining supplies and services is standardized, individual ServMarts are still able to provide local customization in coordination with the GSA. Online/remote ordering is available to those with approved access also.

The third goal of the USMC 4PL concept is synchronization. Prior to the 4PL initiative, there were 11 ServMart stores worldwide, each running on independent systems. The initiative then synchronized these systems into a single IT system that supports each individual location as well as "recruiting stations, reserve units, and units engaged in combat around the world via the USMC ServMart Internet ordering capability" (GSA,
n.d.-d, p. 2).

The fourth goal of the USMC 4PL concept is to provide a new shopping experience for Marines. The GSA reports that under the Navy Working Capital Fund, it

was difficult to bring new and improved products into ServMarts. Further, the selection that was available was often unsatisfying to customers. When 4PL vendors handle inventory, products can be introduced faster and are more tailored to the specific needs of the customer base. "Approving Officials must monitor items being purchased to ensure items meet mission requirements" (GSA, n.d.-d, p. 3). Once the hundreds of thousands of products are vetted, they are easily accessible in GSA's catalogs. "GSA created a walk-in-walk-out and referral process for store customers, including a customer support section supported by vendors to answer specific questions on products and other service issues" (GSA, n.d.-d, p. 3).

The last goal of the USMC 4PL strategy is to improve customer service. Federal agencies are required to uphold specific customer standards under the Federal Customer Service Enhancement Act of 2008. The USMC partnership with the GSA prioritizes setting this high standard for quality customer service both in stores and online.

Another goal for the USMC partnership with the GSA is to improve operational readiness. The GSA created the USMC "Virtual ServMart" that can support Marines and units all around the world. There are currently over 400,000 products available for purchase on Virtual ServMart. Billing is handled interdepartmentally, and orders process almost as quickly as orders in physical ServMart stores. Delivery within the continental United States occurs within 2 to 7 business days.

Historically, it would be common for a deploying unit to leave without many of the items needed for its deployment. ServMarts on their own operated under a USMC-funded inventory and were unable to stock or have "reach back" capabilities to support deploying units. However, 4PL vendors have reach back capabilities to identify new requirements and have those requirements met by the deployment deadline. According to the GSA, 4PL vendors continue to

> successfully support the Marine Forces surge and sustainment requirements, with breadth and depth of product, and supplier capabilities; demonstrate the ability to process emergency orders with minimum lead time; demonstrate the ability [to] ensure uninterrupted products and services for the Marine Corps Customers; [and] provide on-site, in-store staff necessary to meet . . . Marine Corps requirements in providing the highest level of customer service. (GSA, n.d.-d, p. 4)

Figure 6 shows the benefits the USMC gained from working with the GSA.

Key Successes for the Marine Corps Enterprise

Before the GSA/USMC 4PL partnership, the 24 installations with a ServMart/Base Store, had varying arrangements for contract vehicles, working capital, and processes for obtaining commercial supplies. Through the work of GSA's enterprise management effort, the Marine has achieved the following benefits:

1) 8 of 11 CONUS ServMarts operating under a single enterprise concept (GSA in negotiations with AbilityOne to transition the remaining installations);
2) Added 3 new stores (New River, Kaneohe Bay and Iwakuni)
3) The 2 OCONUS ServMarts (Camp Butler and Iwakuni) will transition to the 4PL model during FY16
4) Reduced Marine Corps labor cost (vendors support their own inventory);
5) Reduced Marine Corps inventory cost (vendor managed inventory);
6) Reduced labor and fees associated with the utilization of government purchasing cards as sales lost to commercial retailers are regained (all Marine Corps activities directed to use the ServMarts);
7) Reduced costs associated with antiquated legacy supply systems as they are replaced with GSA systems (retired 4 Marine Corps legacy IT systems);
8) Relieved the burden on Marine Corps Regional Contracting Offices for the management of these routine, time-consuming contracts (Regional Contracting Offices are coordinating with supported ServMarts prior to putting additional items/products on contract);
9) Single IT system improving audit readiness and internal controls
10) Compliance with Buy American Act {Trade Act | Agreement Act}
11) Seamless support to deployed units with {supply block and delivery}

Figure 6. Successes for the GSA/USMC 4PL Partnership. Source: GSA (n.d.-d, p. 4).

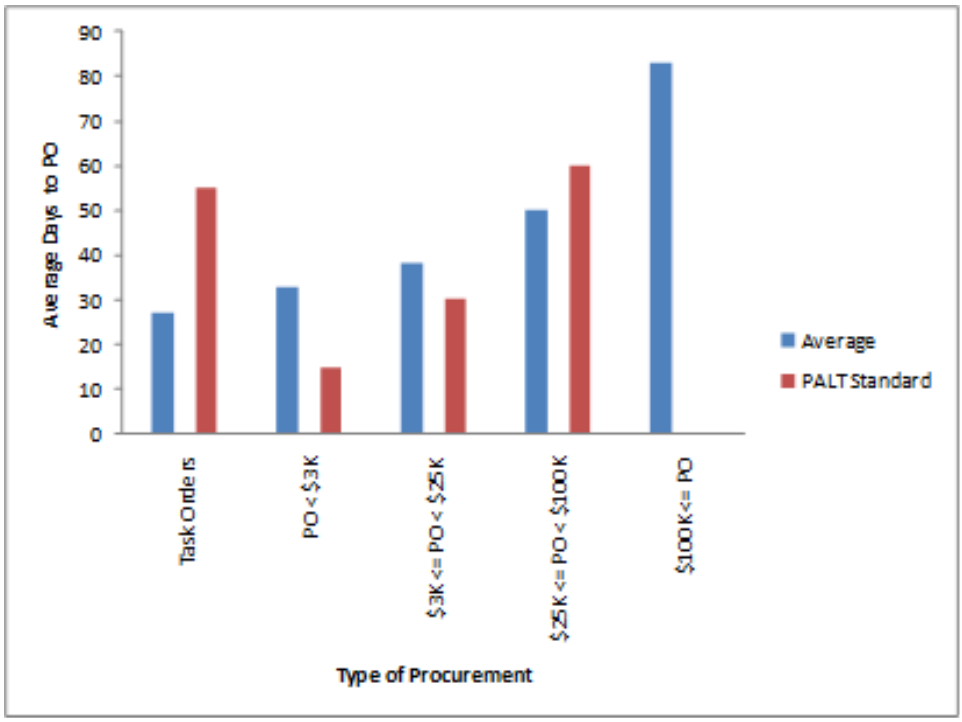
C. 4PL IN THE UNITED STATES COAST GUARD

The United States Coast Guard (USCG) Yard (or "Yard" for short) is a 113-acre federal installation, established in 1899, spanning from the southern end of Baltimore City to northern Anne Arundel County, Maryland. It is one of five remaining public shipyards in the United States, with the other four operated by the Department of the Navy. The Yard is the Department of Homeland Security's largest industrial complex and is the support base for more than 2,000 full-time employees (U.S. Coast Guard [USCG], 2019). While the Yard has a history of building vessels, its primary purpose today is in designing, maintaining, repairing, and modernizing USCG cutters and boats, along with servicing vessels from the Navy, Army, National Oceanic and Atmospheric Administration (NOAA), state and local government, and foreign military.

In 2011, the Yard began to explore ways to improve their business flow pertaining to the procurement of supplies and materials using simplified acquisition procedures (SAP) under the Federal Acquisition Regulation (FAR, Part 13). The primary issue was the inadequate flow rate or throughput of purchase orders, caused by long procurement cycle times or procurement action lead time (PALT)—the number of calendar days between issuance of a funded and approved order to its award. The capability gap in delivering supplies and materials to meet schedule demands for the maintenance and repair of cutters and boats decreased in both material availability (Am) and operational availability (Ao). At this time, the Yard was aware of the GSA 4PL program but decided to address the issues internally by evaluating the use of different contract vehicles.

In FY2010, the micro-purchase threshold for supplies was $3,500, and the simplified acquisition threshold (SAT) was $150,000 for DOD and civilian agencies (e.g., GSA and DHS); by FY2019, the limits were increased to $10,000 and $250,000, respectively. The average PALT during this time for micro-purchases was 33 days, and SAP purchases ranging from $3,500 to $25,000 took 38 days. The Yard's goal was to achieve a PALT standard of 15 days for micro-purchases and 30 days for SAP purchases below $25,000. Figure 7 displays the FY2010 average processing time required for different dollar thresholds. For orders greater than $100,000, there is no PALT standard due to variation in procurement complexity

The Yard's chief engineer and business manager, Eric Linton, served as the project leader in making improvements to the procurement process. As a Lean Six Sigma professional completing his black belt certification, Linton applied Six Sigma standardization practices and Lean methodologies to the project. The endeavor was categorized as a strategic project with high business value but faced implementation challenges and required a long-term commitment beyond a year.



Note: Task order = orders against an existing contract (i.e., indefinite-delivery contracts, BPA), PO = purchase orders.

Figure 7. PALT in FY2010. Source: E. Linton (email to author, May 4, 2021).

The project was executed using the LSS five-phase method: define, measure, analyze, improve, and control (DMAIC). Figure 8 is the project charter created during the define phase. The charter identifies the project sponsor and process owner, defines the problem statement, and presents the business impact (case), goal statement, project scope, project plan, and team composition.

The contracting and procurement division (CPD), staffed by contracting officers and specialists, was responsible for making the purchases. CPD is a shared services division of the USCG Surface Forces Logistics Center (SFLC). CPD is divided into branches and processes both formal contracts (valued above the SAT) and SAP orders. The CPD group that processes SAP orders at the YARD is staffed by four full-time equivalent employees and two contracted support employees.

Project Charter

Project Name:	Reduce Procurement Cycle Time	Project Start Date:	March 21, 2011	Status Date:	
Shop or area:	CPD3	Team Leader:	Eric Linton		
Project Sponsor(s)	Sue Wiedmann	Process Owner	Barbara Kulkinski		

Business Impact

This project will reduce costs and procurement cycle time. In FY10 CPD3 placed 1,144 Purchase Orders less than $25K and the average value was $4,481. The Yard spends about $5.1M per year for consumable/commodity items. If these requirements can be consolidated then the Yard's procurement workload may be reduced by 400-500 Purchase Orders per year. If the CPD3 workload is reduced significantly then CPD3 will reliably order micro purchases in less than 15 days and SAPs < $25K in less than 30 days.

Opportunity or Problem Statement

The Simplified Acquisition Process is overwhelmed by a large number of small acquisitions (in FY 2010 1,273 orders were placed). The Procurement Action Lead Times for micro and SAP procurements needs to be reduced from 33 days (FY 2010 micro) and 38 days (FY 2010 SAP < $25K not including task orders) to at least 15 days for micros and 30 days for SAPs. In addition, the micro process and the SAP have a large amount of variation; a reduction in variation will minimize the need to expedite orders.

Goal Statement

The goal of this project is to reduce the Procurement Action Lead Time (PALT) measures to at least the point where they meet published process performance standards. 15 days for micro purchases (less than $3,000) and 30 days for Simplified Acquisition Process (SAP)s less than $25K.

Project Scope

In Scope:	Out of Scope:
Retail Inventory Items that are assigned a color code of R. This color code is associated with low value, consumable shop stock items.	Changes to micro or SAP business processes required by the FAR or the SFLC COCO. Bill of Materials and Project Coded inventory items.

Project Plan

Define	Measure	Analyze	Improve	Control
Charter & SIPOC 23 May	Monthly PALT (Completed)	Develop recurring material requirements. Estimate cost, market research. VSA Existing/New. Estimate Savings 10 June	Requirements contract accepted by CPD. Possbly a new (simpler) method for funding procurements. 30 Jun	Contract administration. TBD

Team Selection

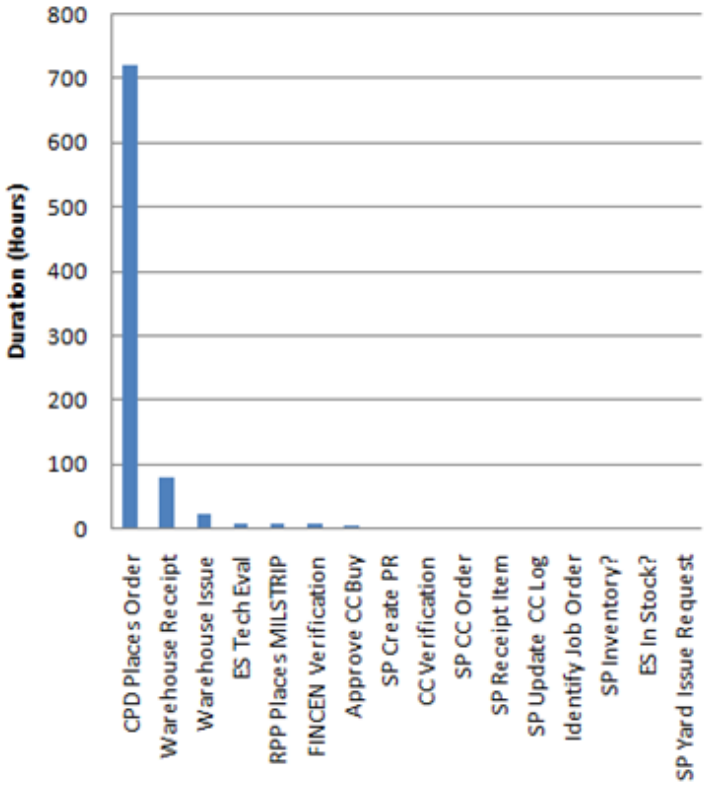
Name	Role	% Time	Name	Role	% Time
Melvin Dash	Shop Planner	8 hrs			
Tim Bond	Shop Planner	8 hrs			
Tony Gloriso	Shop Planner	8 hrs			
Lou Brammer	Shop Planner	8 hrs			
Don Harrison	Shop Planner	8 hrs			
Mike Virtue	Shop Planner	8 hrs			
Jeff Welling	Shop Planner	8 hrs			
Gary Ludwig	Shop Planner	8 hrs			
Tammy Forward	Contracting Specialist	40 hrs			

Figure 8. Project Charter to Procurement Cycle Time Reduction Project. Source: E. Linton (email to author, May 4, 2021).

The measure phase focused on FY2010 data and began with a process mapping of the procurement process from request to receipt of part. The collected data revealed that the Yard spent approximately $5.1 million a year for consumable or commodity items, and the average value of each order was $4,481. The items included office and cleaning

supplies, tools (vacuums, inserts, spray guns, job lights, ducts, hoses, tarps, needle guns, paintbrushes, drill bits, etc.), safety equipment (helmets, safety glasses, boots, gloves, respirators, etc.), and materials (paint, electrical cables, welding rods, etc.).

In the analysis phase, the process steps in the procurement value stream—from order placement to request of material or supply—was presented in a Pareto chart. The graph in Figure 9 clearly shows that CPD order placement had the longest processing time.



NOTE: ES = equipment specialist, CC = credit card or government purchase card, FINCEN = finance center, RPP = requisition processing point, SP = shop planner.

Figure 9. Pareto Analysis for Procurement Value Stream. Source: E. Linton (email to author, May 4, 2021).

Two details need to be addressed. First, the graph is counting the duration in hours for each process rather than the number of defects. This makes hours the undesirable factor rather than the processes. However, the considerable CPD hours could just be the nature of the CPD ordering process requiring more effort than other processes.

Second, it is not apparent how the other processes are negatively impacted by the long CPD order placement hours or could be improved or worsened by a reduction of hours.

Intuitively, the CPD ordering process is the bottleneck if it is a defect; however, rather than adding or redirecting resources to the bottleneck, such as hiring more contracting specialists, the solution is to reduce the number of CPD orders, which could be accomplished by outsourcing part of the procurement process to a 4PLP. The inability to see the true cause of the problem is perhaps one reason that some organizations are hesitant to adopt 4PL.

The degree and sources of variability in the SAP procurement contributing to the PALT was examined using a cause-and-effect diagram, and the processing time was examined for a probability distribution. The causes were identified to be workload, contracting strategy, staffing, and cost accounting. The Yard has several sources for providing supplies, materials, and equipment; these include bill of materials (BM), retail inventory, wholesale inventory, and shop stock. The procurement process to use is dependent on the type of work, project funding, and schedule and performance constraints. To complicate matters even more, there are interdependencies between the processes that result in redundancy of parts and amplification of variations and risks. Table 6 lists the Yard procurement processes prior to 4PL implementation.

The reasons for the disparate supply processes are the Yard's funding structure, the need to support the fleet and shipyard projects at the Yard, and the need to meet urgent (emergency) demands. The Yard's CPD branch is involved with each of the processes and was overwhelmed by the enormous number of transactions. The situation was exacerbated by the establishment of the SFLC at the end of FY2009, which consolidated customers under the CPD branch that supported the Yard and eliminated two CPD FTE positions.

Table 6. Procurement Processes Before 4PL

Process	Description	Source
Retail Inventory	- Used to supply parts to support Yard operations. - Supply parts used in completing projects or maintaining shipyard equipment. - To source BM items that support specific programs. - Provide parts that support Yard product lines—such as ordnance, engine, and buoy overhauls—may be placed in retail inventory. Assigned a project code by retail inventory. - Supply parts that support Yard equipment such as tower cranes, the shiplift, etc. - Provide other items that are needed on a recurring basis, such as shop consumables, personal protective equipment, paints, oils, steel, piping, etc.	- Commercial - MILSTRIP (DLA)
Wholesale Inventory	- Maintained by the Surface Forces Logistics Center (SFLC) to support fleet operations and maintenance. - An agency inventory and a mandatory source for Yard requisitions. - Supply parts needed to maintain machinery installed on cutters and boats, and some consumable materials that are specified in SFLC maintenance procedures - Used as Government furnished property (GFP)	- Commercial - MILSTRIP
Bill of Material	- A materials list created from drawings developed by Yard engineering. - High development cost. - Limited to use on repetitive projects and for long lead time materials that must be staged to avoid production delays	- Commercial - MILSTRIP - Retail Inventory - Wholesale Inventory - Shop Stock
Shop Stock	- Charged to overhead—may be used by any project. - Impractical to cost or charge shop stock use to a specific project or work order due to its value. - Consumable and low value items that are used on a frequent basis in daily maintenance operations or construction of a finished product - Gaskets, screws, washers, paint sundries, electrical hardware, welding rods, fasteners, cleaning supplies, penetrating oils, cutting fluids, greases, etc. - May not exceed a 6-month supply based on demand.	- Commercial - MILSTRIP - Retail Inventory

In FY2010, CPD placed 1,273 purchase orders (POs) and had a 7-month backlog in November 2010. Figure 10 illustrates the SFLC impact on the increase in POs. The analysis also revealed that most of the CPD purchases were of low value. For example, in

FY2010, 51% of POs were below $3,000 and 1,144 POs, or 90%, were below $25,000. The allocation of POs based on value is displayed in Figure 11. Additionally, of the 1,441,254 retail inventory items stored in the SFLC ALD warehouse, with a combined value $15.7 million, 97% of the items are worth less than $500, and the average item value is $8.19.

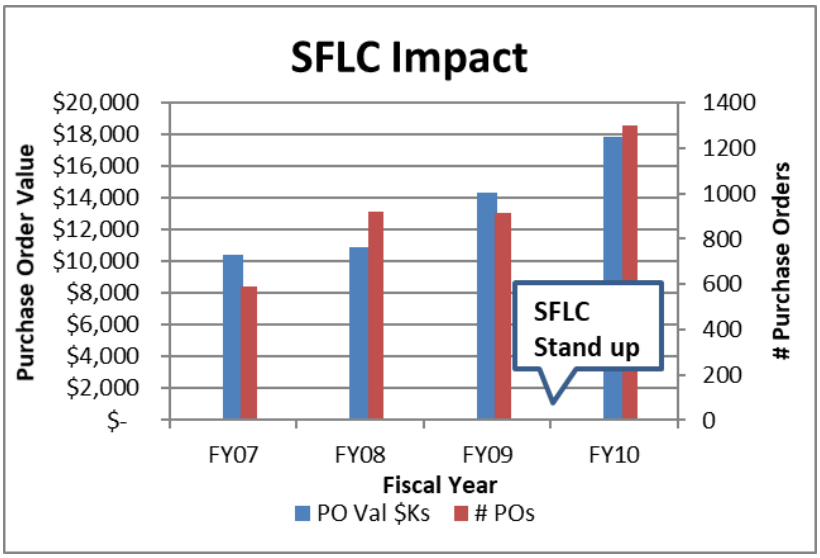


Figure 10. Impact on Purchase Order Value and Quantity Following Transition to SFLC. Source: E. Linton (email to author, May 4, 2021).

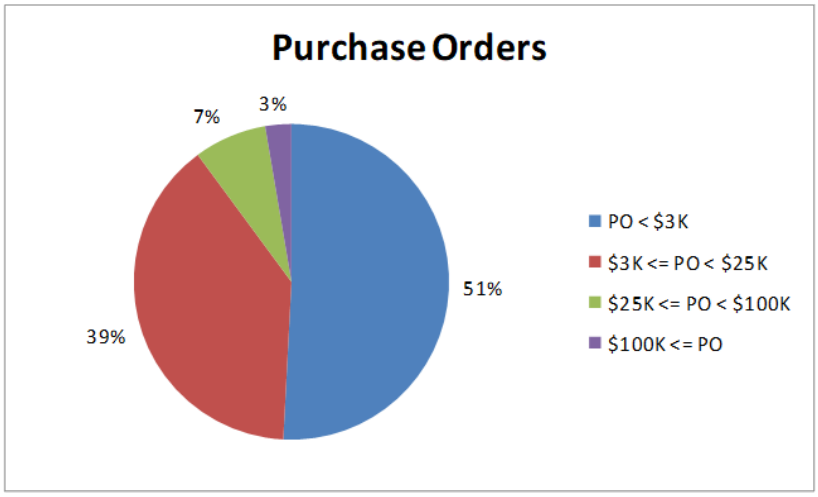


Figure 11. Cost Allocation of Purchase Orders in FY2010. Source: E. Linton (email to author, May 4, 2021).

Figure 12 indicates that micro-purchase PALT, grouped by month, follows a normal distribution—with a mean of 44 days and a standard deviation of 17.6 days. SAP procurements less than $25,000 have a discrete stochastic process, with a mean of 76 days and a standard deviation of 48 days, as shown in Figure 13.

The Yard determined that the SAP procurement process was out of statistical process control from special cause variation and identified the assignable cause to the BM process and "emergency" procurements. The purpose of the BM process is to procure, stage, and deliver material to Yard shops (divided into trades and specialties). Staging of materials could take from 2 months to over a year to complete and may consist of hundreds of individual items. Prompt funding from customers and careful scheduling helps to ensure materials arrive before the start of a project.

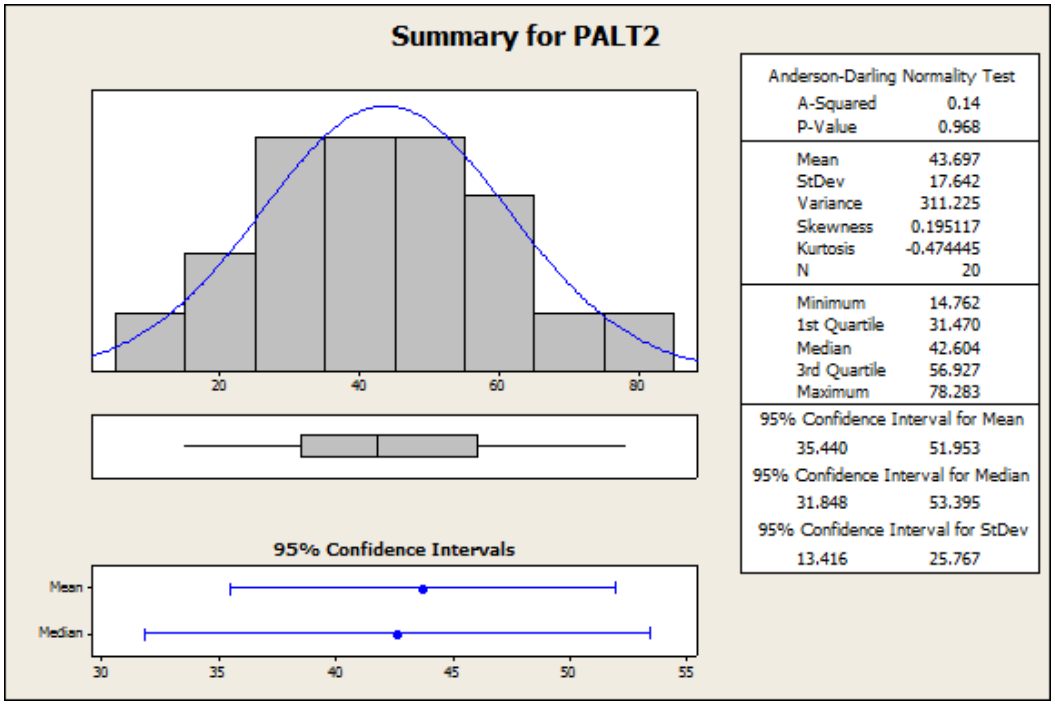


Figure 12. Micro-Purchase PALT Displaying a Normal Distribution. Source: E. Linton (email to author, May 4, 2021).

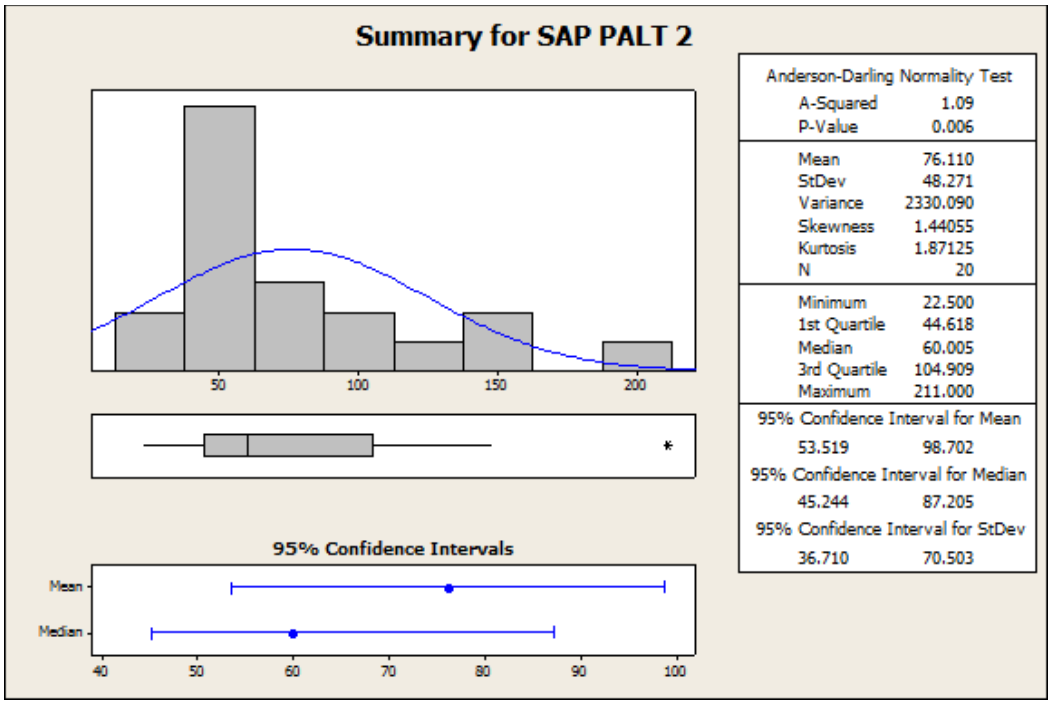


Figure 13. SAP PALT. Source: E. Linton (email to author, May 4, 2021).

The BM process contributes appreciably to the number of CPD for several reasons. An inordinate number of procurement requests arrive at one time, requiring individualized purchase requests, inundating CPD, and creating a backlog for other purchases. Next, instead of building the BM material list based on engineering drawings for each shipboard system, the BM process was changed to generate a material list by using the contract line item number (CLIN) from the project specification document. This resulted in the wasted time and effort of ordering unnecessary material since a single system can have multiple CLINs. Additionally, not accounting for materials that were sold in units of issue greater than required contributed to further waste.

Last, the Naval Engineering and Electronics Supply Support System (NESSS) software used to create procurement requests lacks value features to optimize purchases and accurately track inventory. NESSS was designed for Military Standard Requisitioning and Issue Procedures (MILSTRIP) orders and is unable to logically group orders based on supplier and units of issue, which is the reason why most procurement requests are less than $3,000—the micro-purchase limit. The prioritization of MILSTRIP orders and mandatory technical review of purchase requests further increases the processing time for commercial orders. Another NESSS shortcoming is that, in querying

the on-hand quantity of an inventoried part, NESSS is unable to provide a status report that identifies which BM project the inventory is assigned to. The only way to verify that the part is assigned is by tediously querying each individual line item on the BM. Additionally, the BM data does not identify the Yard shop that has requested the item. For example, hardware requested by the pipe shop could be incorrectly delivered to the electric shop.

A summary of FY2010 BM processing time for micro-purchases in days is shown in Table 7. The 15-day PALT is indicated in Step 3 for the standard column. Steps without actual performance data were given estimated times. In their findings, the Yard emphasized and cautioned the use of averages since it masks the variations. As displayed in the table, the average total processing time was 97 days, an 11.49% increase from the standard, but to receive 90% of the items required 135 days, or an increase of 55.17%. The difference is due to the variation, mainly from the BM process. The number of days to process a micro-purchase further illustrates the variation or spread (see Figure 14).

Table 7. BM Processing Times for Micro-Purchases. Adapted from E. Linton (email to author, May 4 ,2021).

Process Step	Standard (Days)	Average Process Time (Days)	90% Process Time (Days)	99% Process Time (Days)
1. Create eBM[1]*	15	15	15	15
2. Create BM / Stock Record*	10	10	10	10
3. Place Micro-Purchase Order	15	33	65	90
4. Vendor Delivers*	30	30	30	30
5. Receive Item	10	3	6	17
6. Request Item*	2	2	2	2
7. Issue Item	3	2	5	15
8. Shop Receives Item*	2	2	2	2
Total Micro-Purchase Time	**87**	**97**	**135**	**181**

*No actual performance data, estimated times given.

[1] eBM stands for electronic BM, a computer entry for each contract line item number.

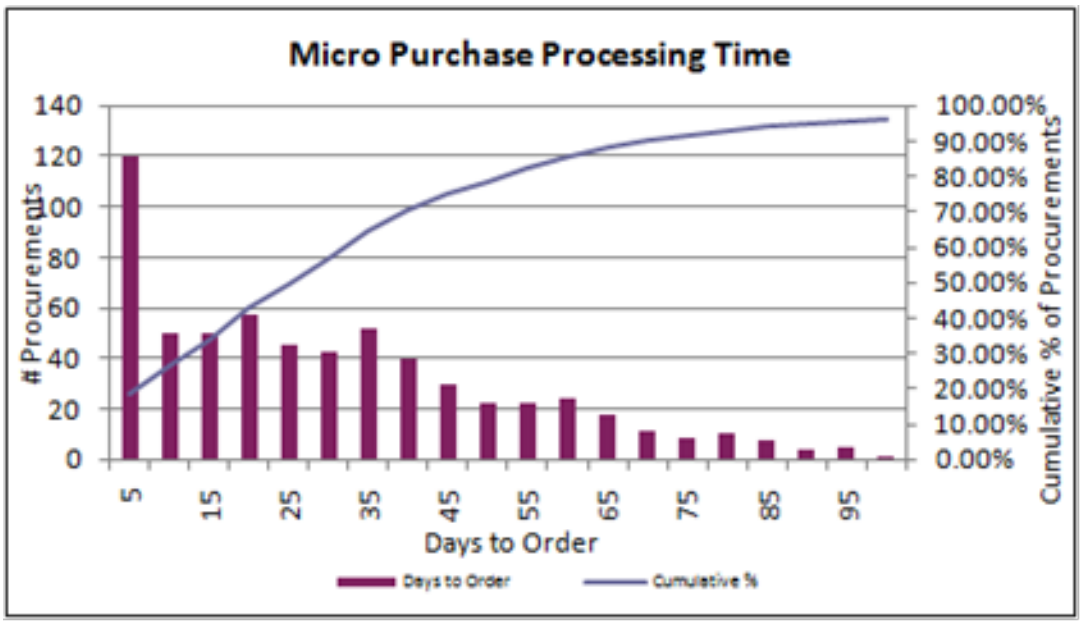


Figure 14. Processing Time in Days for Micro-Purchases. Source: E. Linton (email to author, May 4, 2021).

While it is certainly true that BM is the primary source of special cause variation, Figure 14 illustrates that only 36% of orders met the required 15-day PALT standard. Therefore, the system was also experiencing common cause variability, which supports the postulate that the substantial number of hours is due to the nature of the CPD ordering process. As a result, the variations cannot be removed through operating procedures or by shifting internal resources to the bottleneck. Rather, new methodologies, most likely involving external resources and capabilities, will be needed to change the procurement system.

Regarding the need for new methodologies, Stadtler (2015) described the limitations of Enterprise Resource Planning (ERP) systems in modeling planning tasks, including bill of material processing and touted the use of advanced planning systems (APS) software—referred to as advanced planning and scheduling by industry—to supplement ERP in planning tasks. Stadtler asserted that the traditional BM process cannot account for bottleneck capacities and lot-sizing and does not support SCM. APS can be used to model supply chain functions and optimize management processes through efficient use of materials and resources, strategic planning, and detailed scheduling to enhance decision-making.

From the analysis, the Yard determined that long-term requirement contracts were required to reduce the number of CPD transactions and increase the throughput of POs. While this is not a revolutionary finding, the documented steps taken to define, measure, and analyze the data collected were essential in making the argument for the organizational change to outsource a portion of the procurement processes.

One important discovery was that the process of charging consumables to individual projects contributed to the number of orders and to the procurement of unnecessary inventory due to larger-than-required units of issue. Inventory costs are substantial, and the Yard estimated that seven warehouse personnel were required to support Yard inventory at the SFLC warehouse, an inventory control point (ICP) under the purview of the Asset Logistics Division (ALD). The seven employees cost approximately $670,000 per year (assuming an average salary at the GS-9 level). This equates to a 5% increase in material costs, or a $0.96 increase in the Yard labor rate. Additionally, of the 1,441,254 retail inventory items with a value totaling $15.7 million stored in the SFLC ALD warehouse, $5.7 million are BM items and $3.7 million are shop stock items, which is a source for BMs. Ninety-seven percent of the items are worth less than $500, while the average item value is $8.19 (E. Linton, email to author, May 4, 2021).

A solution to reduce inventory was to charge shop stock to the Yard overhead account instead of to individual projects, and every project contributes to the budget for consumable items. It is essential to point out that while the Yard receives some congressional appropriations for certain facility construction and maintenance projects, its operation and maintenance costs are covered by an industrial capital fund established by 14 U.S.C. § 939 (Accounting for Industrial Work, 2018). Operating as a nonprofit, the Yard's revenue is generated from sale of services and is used to offset expenses, with the goal to break even (USCG, 2019). The overhead percentage is priced into the labor rate and is periodically adjusted to avoid overcharging customers. Another benefit in charging against overhead is that funding for consumables will not be schedule driven by the projects, avoiding delay risks due to funding allocation, and reducing variations by preventing a large influx of orders arriving at one time.

To demonstrate improvements in the procurement process, the Yard created a pilot project for procuring bottled welding and cutting gases using a requirements contract. A requirements contract is defined under FAR 16.503 (2021) and is a type of indefinite-delivery contract in which the procurement of supplies or services is with one contractor during a specified contract period (FAR 16.5, 2021). The delivery of bottled gas was contracted as a service supply and can be further defined as a task-order contract using FAR 16.501-1. Prior to the contract, the Yard had to contend with delivery time delays, the high costs of maintaining a hazardous material inventory, and ineffective inventory management—requiring emergency procurements to meet demand.

Realized benefits from the pilot project included reducing transportation costs and delivery time by having bottled gas delivered directly to a specified location instead of the warehouse. The Yard maintained a minimum stock level, helping to eliminate uncertainty and improve the ability to meet surge demands. Through the use of market research, the Yard selected a competitive single source to secure stable pricing for the specified contract period. Long-term contracts helped to foster a relationship and commitment with the contractor, resulting in tailoring of services to best meet the needs of the Yard. To further reduce CPD administration time, the contracting officer authorized trained personnel (shop planners) to place calls against the requirements contract, which the Yard referred to as a "task order process." On average, gas was delivered in 1.2 days, an extraordinary improvement over the average micro-purchase PALT, which averaged 50 days to place an order (E. Linton, email to author, May 4, 2021).

Following the implementation of the pilot project, the Yard proceeded to accomplish two performance objectives. The first was to expand the use of requirements contracts for supplies to eliminate the need for hundreds of micro-purchase and SAP procurements. The second objective was to minimize the on-hand inventory and reduce carrying and management costs. SCM offered process solutions to accomplish both objectives, and the Yard conducted market research for a single commercial source with SCM services.

The planned contract requirement was for 99% supply availability and delivery in 3 days or less. The contractor was to establish and refine the shop stock reorder point to match shop usage. To further reduce CPD administration time, the contracting officer authorized trained personnel (shop planners) to place calls against the requirements contract, which the Yard referred to as a "task order process" (E. Linton, email to author, May 4, 2021). Rollout was carried out incrementally on a shop basis. The Yard estimated that if all consumables were removed from retail inventory, the reduction of CPD staff and inventory management after accounting for supply chain service costs would result in an annual savings of $700,000 to $1.5 million. The CPD workload was expected to be reduced by 44%, or a reduction of approximately 500 procurement requests each year (E. Linton, email to author, May 4, 2021).

The Yard evaluated programs from both commercial and government supply and service providers that could meet the Yard's performance objectives and provide inventory control using SCM practices. These options included the DLA Prime Vendor Program, AbilityOne Support, Blanket Purchase Agreement (BPA), and the GSA Retail 4PL program. The Yard was notified by DLA that their demand volume was insufficient at the time, and AbilityOne had limited products and services to meet the Yard's needs.

Earlier in 2013, the Yard conducted a site visit to Tinker Air Force Base and witnessed their procurement process of using BPAs to accomplish the objectives of reduced procurement orders, quicker order throughput, and reduced inventory. One BPA was to an 8(a) company (a small business administration certified small disadvantaged business) to supply low-cost commodities. The Yard determined that setting multiple BPAs required a sizeable amount of effort to setup and lacked the organic specialty knowledge in handling the contracting complexity, meeting FAR and other legal requirements. Notably, at the time Tinker was also using the GSA 4PL program specifically for the requisition of specialty tools used in aircraft maintenance (E. Linton, personal communication, October 20, 2021).

The GSA's Schedule BPA programs, such as maintenance repair facility supplies (MRFS) under the Federal Strategic Sourcing Initiative (FSSI), offer many of the common products (hardware, tools, paints, adhesives, cleaners, etc.) used at the Yard. Other benefits

include warranties trade agreement compliance, AbilityOne preference, and meeting socioeconomic goals. However, the GSA Schedule BPA programs still require a level of administrative effort that the Yard wanted to reduce, such as adhering to FAR 8.405-3, or surveying at least three schedule contractors, and seeking price reductions prior to creating a GSA Schedule BPA. Its standard CONUS delivery of 6 business days and 3- to 4-day expedited delivery for an additional cost restricts just-in-time (JIT) inventory management (GSA, 2019b). The minimum ordering threshold and additional fees were additional negative factors that the Yard considered. Furthermore, ordering off a standard schedule limits the tailoring and adding of parts and materials for a specific agency.

Ultimately, the Yard decided that the GSA Retail Operations 4PL program provided the best value to meet the Yard's performance objectives and its goal of inventory reduction. By this time, GSA had over 5 years of experience in providing 4PL services, and the Yard wanted to leverage GSA's expertise, industry knowledge, IT infrastructure, competitive bargaining power, and interagency payment options. One of the key features of the GSA 4PL program is that it is a requisition rather than an acquisition. As defined on GSA's website:

> A requisition is a transaction between two federal agencies. For example, any agency, civilian or military, which purchases an item from GSA Global Supply is executing a requisition. Even though GSA Global Supply may rely on a commercial vendor to store or ship that item, the transaction is between the purchasing agency (e.g. USDA, Navy, etc.) and GSA.
>
> An acquisition is conducted between the purchasing agency and a commercial supplier. This is true whether the vendor holds a GSA Schedule contract or is an open market supplier. The name of the commercial entity will appear on the buyer's purchase card bill. (GSA, n.d.-e)

The requisition process streamlines the accounting, payment, and reconciliation process for the Yard.

1. GSA 4PL Implementation

A MOA was drafted, and it was reviewed by USCG leadership, legal and contracting departments, and the union representing Yard workers. In total, it took just over 1 year for the MOA to be approved and signed. A GSA 4PL kickoff meeting was held in

October 2016. A new MOA was signed in May 2021, and a copy is shown in the appendix. The USCG Yard 4PL logo is shown in Figure 15.

Figure 15. USCG Yard and GSA 4PL Logo. Source: E. Linton (personal communication, June 17, 2021).

The key terms include a 99% supply available for items maintained as industrial stock—called shop stock by the Yard. Items that are not shop stock are to be delivered in less than 5 days and will have at least a 90% supply availability. Additionally, GSA provides recommendations for inventory handling and logistics management. The USCG is under no obligation to use the program or to make minimum purchases within a specified period.

Ordering is performed on the GSA-maintained Yard 4PL web-based store portal site, which contains the items from the Yard catalog. The features on the portal are like those experienced on commercial e-commerce websites, with order history and status. The portal also contains workflow documents to meet approval traceability requirements under the Chief Financial Officer Act of 1990 (CFO Act) audits. The Yard business manager noted that the Yard have had no compliance audit discrepancies since 4PL implementation (E. Linton, personal communication, October 20, 2021). Notably, the 4PL requisition process does not absolve the Yard from complying with mandatory source requirements. For example, items will be first sourced from agency inventory, and excess will be sourced from other agencies, such as UNICOR and AbilityOne.

One of the most valuable tools offered by the GSA 4PL IT infrastructure is in its data analytics platform called data to decisions (D2D). The user interface is in the form of a web portal that pulls from a database containing all the procurement transaction data

between the 4PL client and its vendors since program initiation, including inventory costs and stock usage rates. The Yard can build customized reports using metrics—including sales dollars, number of orders, and quantity dating back to program initiation.

The system also tracks whether the item is a shop stock, and which shop it belongs to, assisting with the core strategy of reducing retail inventory and ensuring accurate direct delivery. The D2D system enhanced the Yard's inventory and order management, which it previously could not do with NESSS and standard spreadsheets. There are currently four GSA Retail Operations D2D 4PL dashboards: GSA Retail Operations Enterprise; Garrison Retail Supply Chain (GRSC) U.S. Marine Corps; U.S. Navy Commander, Fleet Readiness Center (COMFRC); and U.S. Coast Guard Yard Curtis Bay. A user interface of the Curtis Bay Interactive Dashboard is shown in Figure 16.

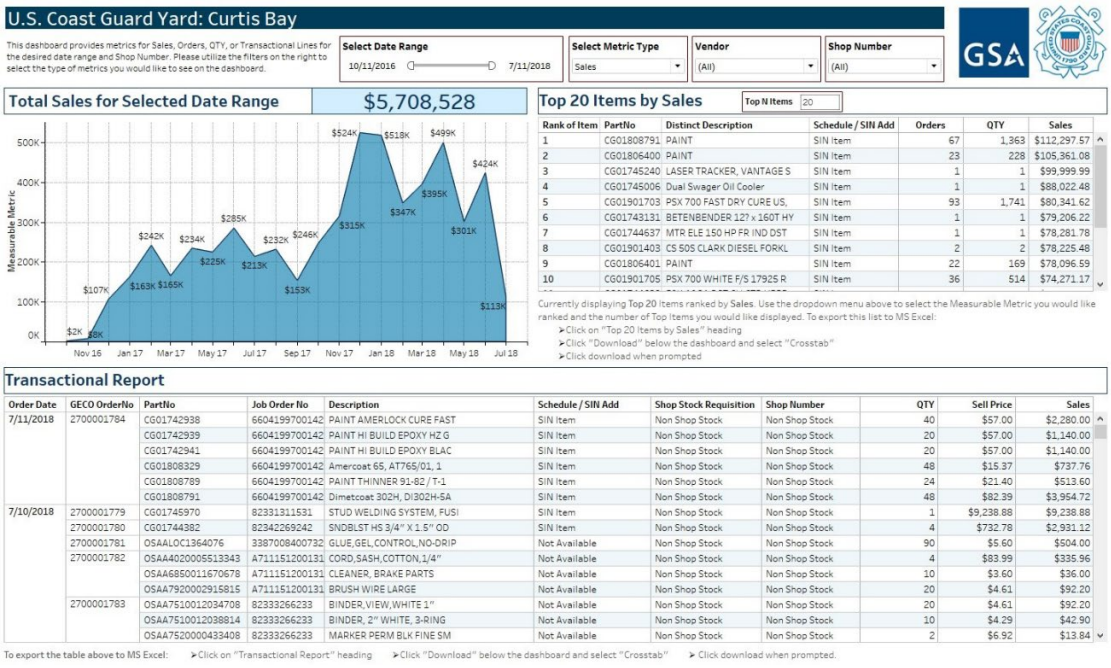


Figure 16. U.S. Coast Guard Yard Curtis Bay 4PL Dashboard. Source: GSA (n.d.-a).

The primary 4PL vendor maintains a staff onsite at the Yard to manage the program, which enhances coordination and responsiveness to issues. The additional staffing adds to the vendor's operation cost and results in a higher sales target from its customer than GSA. According to the Yard's business manager (E. Linton, personal

communication, October 19, 2021) their primary 4PL vendor needed sales of at least $5 million per year to maintain profitability. Therefore, the Yard's target annual sales are for $5.5 million. In June 2021, the sales amount at the Yard was only $4.2 million, and the lower figure was partly attributed to the impact of COVID-19. GSA maintains two persons at the Yard, and their cost is accounted for in their surcharge.

Figure 17 shows the process of adding items to the 4PL program. In keeping with the performance objective of reducing inventory, each item is checked to see if it exists in retail inventory. If it does, the retail branch will be notified to stop replenishing the item, and the item will be drawn down from inventory until depleted before being added to the 4PL catalog. If the item is a shop stock, then a 4PL storage location will be considered and high and low stock limits will be established.

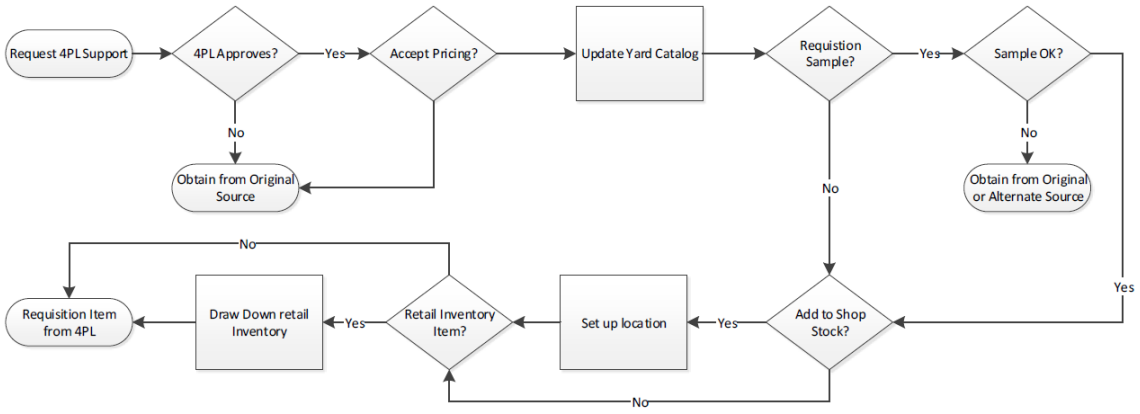


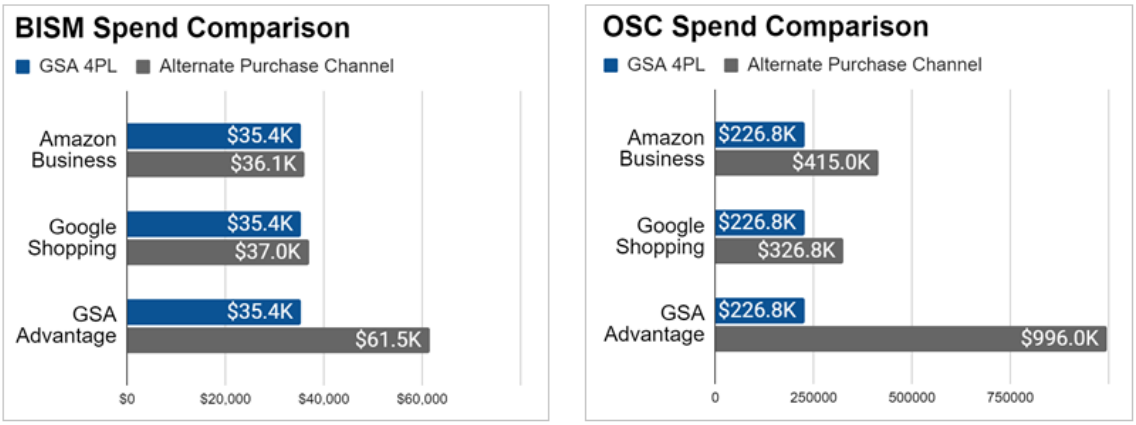
Figure 17. Adding a 4PL Item Flowchart. Source: U.S. Coast Guard Yard (2019).

Along with supplying shop stock and BMs, GSA 4PL also supplies production and maintenance equipment. The Yard has procured from GSA 4PL forklifts, dust collectors, plate rollers, and a laser cutter machine costing over $1 million.

While the MOA does not mention competitive or reasonable pricing from vendors, customers should factor in GSA's selection vendors that offer an overall value in pricing, while ensuring compliance with FAR, Trade Agreements Act, Buy America Act, small business goals, and other applicable regulations. For their Naval Postgraduate School thesis study, Canter and Gomez (2017) concluded from their comparative analysis that most items offered on GSA Advantage were less expensive than items offered on

Amazon Business. Furthermore, the Yard claims that their own data suggests that GSA prices are 5%–10% lower than prevailing market price (E. Linton, email to author, July 29, 2021).

Figure 18 displays FY2020 price comparisons between GSA 4PL, consisting of BISM (AbilityOne vendor) on the left and OSC Solutions (Yard's primary vendor) on the right, to three alternate price channels: Amazon Business as an e-commerce competitor, Google Shopping as an online open marketplace competitor, and GSA Advantage as a federal requisition channel competitor.



Note: Graphs created by GSA Federal Acquisition Service, Office of General Supplies & Services Retail Operations and provided to the Yard.

Figure 18. Spend Comparison Between GSA 4PL Vendors and Alternate Purchase Channels. Source: E. Linton, personal communication, June 17, 2021.

According to Will Rayam, a GSA 4PL program management team member (email to author, October 19, 2021), the graphs were created by GSA and each graph compares the top 50 selling items from the 4PL vendor to each of the three channels. Items not available in the channels were replaced by the next high demand item until 50 was reached. GSA Advantage's minimum order quantity is the reason the price is higher than GSA 4PL for the items selected.

Confidence in GSA providing lower pricing aside, the Yard's 4PL procurement process includes an evaluation for price reasonableness. The first cost factor to realize is that the GSA has a cost recovery rate of around 12% that is periodically adjusted depending on their overhead cost (E. Linton, email to author, July 29, 2021). Based on

this figure, the Yard has determined that the 4PL service adds approximately 23% to the procurement cost (E. Linton, email to author, July 29, 2021). Combined with the focus of using 4PL to reduce the number of micro-purchases and increase the CPD's availability to execute complex procurements, the Yard developed a flowchart to determine price reasonableness (see Figure 19).

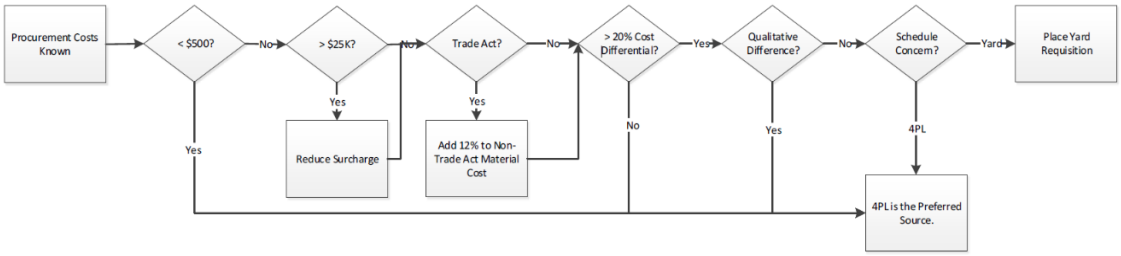


Figure 19. Determining Price Reasonableness Flowchart. Source: U.S. Coast Guard Yard (2019).

For requisitions below $500—recall that 97% of the items in retail inventory are worth less than $500—4PL is the preferred source. For items above $500, "4PL costs should not exceed previous Yard procurement costs by 20%. Unless there is a Trade-Act, qualitative or schedule reason to exceed a 20% cost differential" (U.S. Coast Guard Yard, 2019). Coincidentally, the 20% value plus the Yard's own shop stock surcharge of approximately 2.5% (E. Linton, email to author, July 29, 2021) equates to the 23% 4PL procurement cost. However, the Yard's explanation is that the cost may be too high by factoring in the procurement and inventory process. Items above $25,000 receive a GSA surcharge discount.

Fourth-party logistics items are Trade Agreements Act compliant; therefore, when comparing non–Trade Act items, the Yard adds 12% to the price for determining reasonableness of cost. Notably, the 12% factor is specific to the Yard, as the standard factor is 30% for small business concerns (FAR 25.105, 2021). Other factors include considerations for mandatory source, shipping costs, unit of issue and size of order, verifying for most recent price, qualitative differences between the 4PL item and Yard procure item, and schedule requirements. Non-4PL items are requisitioned using MILSTRIP, purchase cards, and procurement requests.

Invoice receipt and government-to-government payment transfer is a seamless process. A GSA invoice is sent to the Yard twice a month through the Intergovernmental Payment and Collection System (IPAC). Once the billing is certified, the USCG Finance Center pays the invoice. The Yard notifies GSA 4PL on issues with damaged, defective, or incorrect items. Items requiring return or IPAC credit are handled by GSA 4PL.

2. 4PL Program Results

As shown in Figure 20, in 4 years, over $23 million in sales has been processed by the 4PL program. The program initiated with $2 million in sales and quickly increased to $8 million by FY2019 as items were requisitioned. The subsequent decrease is reflective of the system reaching a steady state and the impacts of COVID-19. As of FY2021, there are 4,700 items in the 4PL catalog. For FY2020, the SAP PALT was at 7.7 days (E. Linton, email to author, May 4, 2021), or 74% less than the 30 days requirement. The sizable reduction was accomplished by using 4PL to procure the large number of micro-purchases. With fewer procurement orders, CPD was able to increase its throughput and efficiency for SAP purchases and more complex formal contracts above $25,000. The 4PL vendor monitors shop stock inventory and makes recommendation for replenishment, contributing for JIT deliveries and limiting on hand supply to no more than 6 months.

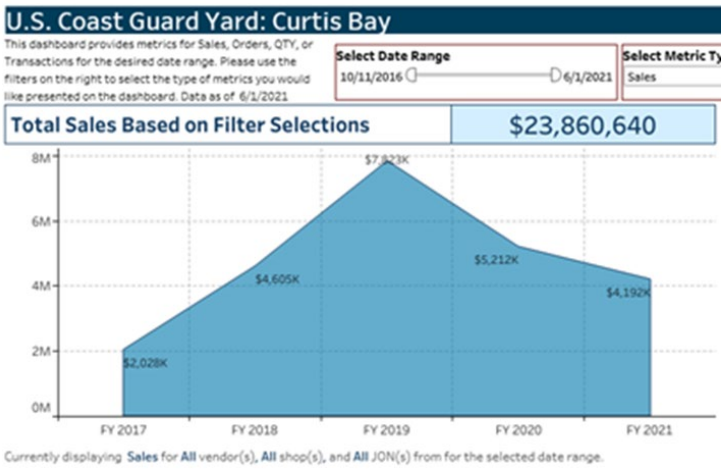
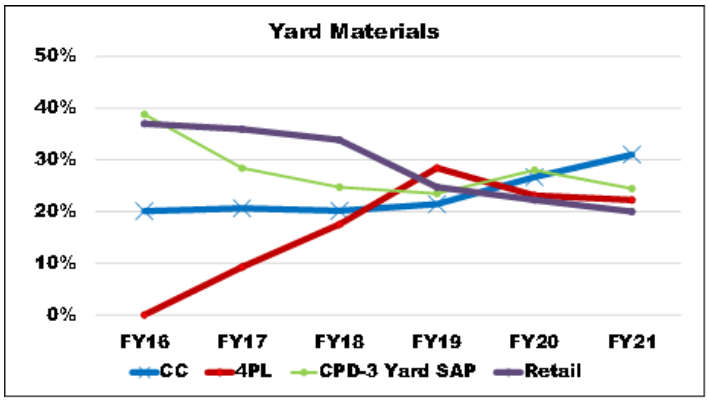


Figure 20. Total Sales from 10/11/2016 to 6/1/2021. Source: E. Linton (email to author, May 4, 2021).

Figure 21 illustrates the growth of 4PL items and reduction of retail inventory. The rise in purchase card (CC) procurements—also referred to as a government purchase card by the Yard—in the graph is due to the threshold increases.



Note: CC = credit card; the Yard uses the term interchangeably with government purchase card.

Figure 21. Yard Material Categories. Source: E. Linton (personal communication, June 17, 2021).

Additionally, the charging of shop stock to overhead rather than individual projects reduced redundant orders and accumulation of inventory. Figure 22 shows that total recurring inventory has been reduced by 39% since 2017.

Figure 22. Reduction of Yard Inventory. Source: E. Linton (email to author, May 4, 2021).

The considerable reduction in inventory allowed for the removal of two FTE retail management staff in 2016, equating to a savings of $200,000 a year. Overall, the retail staff was reduced from 14 in 2011 to 10 in 2021. The ability of 4PL to surge capability to meet emergency demands further contributes to avoiding fixed staff and contractor support costs. The Yard reported a realized annual real cost reduction of $500,000.

Other positive secondary effects of less inventory are the elimination of disposal costs of hazardous materials (hazmat) and curtailing the waste stream. The 4PL system identifies and tracks hazmat and maintains an authorized chemical list (ACL) on the Yard 4PL portal site. Paint (marine coating) is a high-volume hazmat material[2] that experiences periodic supply chain issues but also has a short shelf life of 1 year. As an example, in December 2016, $50,000 of expired marine coatings needed to be disposed of.

Figure 23 shows item delivery time in days from February to May 2020. The graph indicates that 80% of items are delivered in 5 days, which is 10% less than what is stated in the MOA. During an April 2021 supply chain status brief, the Yard highlighted COVID, tariffs, and weather (hurricane) impacted backordered items including Tyvek suits, paint brushes, gloves, paint, metal products, fasteners, and electrical cable. The Yard maintained that 4PL was reliable with a 90% delivery of all requisitions in fewer than 8 days (E. Linton, email to author, May 4, 2021).

[2] The Yard obtains $1–2 million of paint each year from 4PL.

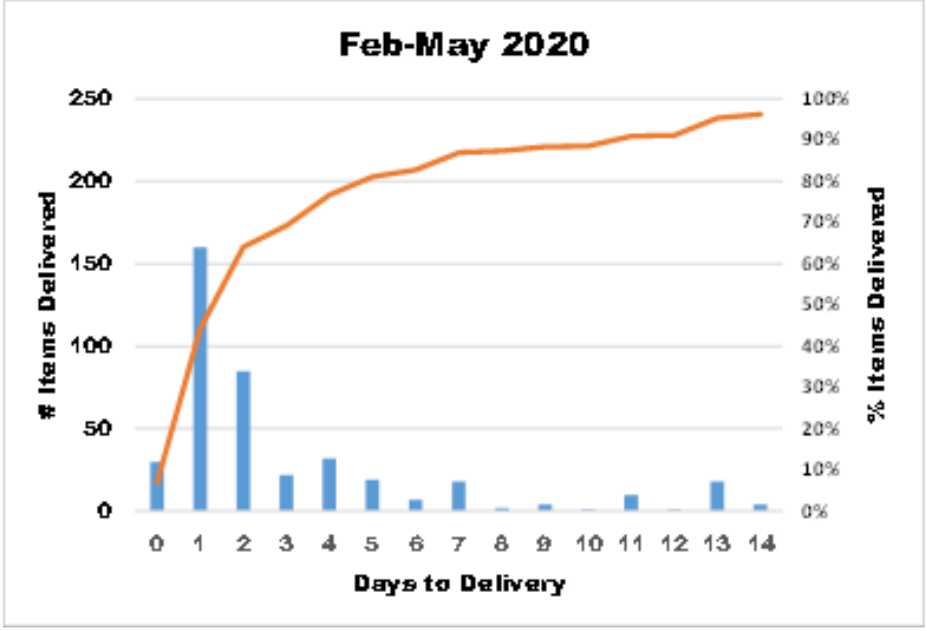
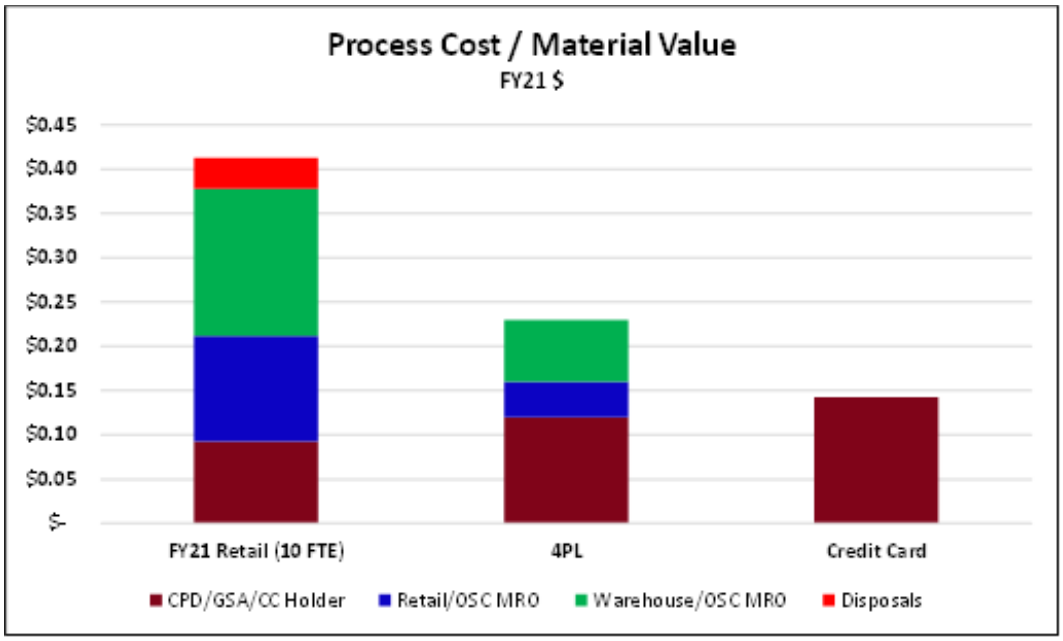


Figure 23. Number of Days to Delivery. Source: E. Linton (email to author, May 4, 2021).

The 4PL vendors notifies the Yard when an item cannot meet the 5-day requirement and recommends a revised order lead time. For example, when a hurricane impacted production for a paint manufacturer, the 4PL vendor notified the Yard to plan for a 30-day paint lead time. The Yard is tolerant and understanding of delivery performance deviations because they value the ability to plan and adjust around issues such as COVID-19 and other disruptions in the supply chain, rather than strict adherence to delivery performance metrics (E. Linton, personal communication, October 19, 2021).

In further analyzing the cost savings presented by 4PL, the Yard estimated the process cost per material value. Material value reflected purchases from October 2020 to May 2021. Credit card (CC) purchases are micro-purchases used for emergency procurements, for remote jobsite projects—called road shows—and for procurement of parts awaiting 4PL catalog addition. The authorized buyer must attempt to procure from mandatory sources before seeking a commercial source. Figure 24 shows that 4PL costs $0.23 per material value and approximately 44% less than retail inventory.



NOTE: "OSC" is the 4PL vendor and MRO stands for maintenance, repair, and operations.

Figure 24. Process Cost per Material Value. Source: E. Linton (personal communication, June 17, 2021).

The Yard business manager provided clear indication that the unit is very satisfied with its decision to outsource a portion of the procurement process to GSA 4PL (E. Linton, personal communication, May 12, 2021). While the Yard is staffed with a dedicated and talented group of contracting and procurement professionals, the vast number of procurements, the growing size and cost of maintaining inventory, and the variations in demand proved overwhelming and negatively impacted the Yard's core business of ship renovation. The Yard explored various options, including using multiple BPAs, but some were limited in scope while others proved too complex to execute. Ultimately, GSA 4PL offered a comprehensive solution that included product fulfillment, inventory handling, and logistics management.

Evaluation of GSA 4PL's SCM service reveal that it is in alignment with the two main pillars of integration and coordination from Stadtler's (2015) House of SCM (shown in Figure 2). For integration, GSA 4PL provides its leadership in contracting and procurements expertise in screening and selecting the commercial vendors that are best suited to meet the requirements of the Yard. The MOA between the GSA and Yard is an

alignment of strategy, and the partnership and commitment between the Yard and the vendors builds trust.

The GSA's most valuable coordination offerings is in the Yard 4PL store portal and the Curtis Bay Interactive Dashboard—a data analytics platform—IT tools that would not have been economically feasible for the Yard to develop and maintain organically. The information derived from the collected data allows for advanced planning and forecasting for better decision-making. Lastly, the Yard's supply desk guide reflects various process orientation changes that aligns with the 4PL program.

The partnership, coordination, and integration between GSA, the vendors, and the Yard are essential in weathering the ongoing major supply chain disruptions due to the global pandemic. The recent MOA includes support for the CG Aviation Logistics Center located in Elizabeth City, NC, expanding 4PL requisition resources to CG aircrafts. Additional 4PL support encompass the 22 geographically dispersed SLFC industrial operations divisions (IOD), responsible for recurring depot level maintenance supporting cutters and boats, and weapons systems. The units can requisition from the expanding Yard 4PL catalog, while working with 4PL vendors to tailor services to match their specific needs. The Yard's statement that "the 4PL Program successfully meets CG Yard's supply requirements and is providing financial & operational value to the CG" (E. Linton, personal communication, June 17, 2021) is a positive affirmation of its support for the GSA 4PL program.

3. 4PL Program Challenges

One of the challenges to the 4PL program is in the long lead time it takes for vendors to add items to the Yard 4PL catalog. The average add time is 58 days. This is attributed to the Yard being the only shipyard using 4PL; therefore, some of the items are unique to the industry (E. Linton, personal communication, October 19, 2021). For example, marine coating or paint and marine grade electrical components have limited manufacturers and require longer research time.

Another challenge tied to the shipyard industry is the demand for steel and other metals. Due to the volatility of metal prices and the limited purchasing power of the 4PL

vendors for metal commodities, forward pricing for metal raw material becomes prohibitively expensive. Conceding that 4PL cannot provide competitive pricing on metals, the Yard has begun researching large metal distributors and pursuing the use of purchase orders under SAP.

The metrics provided by GSA's D2D analytics platform need to be enhanced to provide better service value. The current metrics, which include sales dollars, number of orders, and quantity of orders, are inadequate for generating detailed business reports for analysis. The Yard continues to use its own spreadsheets to build customized reports, which is time consuming and inefficient.

D. INSIGHTS ON 4PL FROM A GSA LEADER

To fully ascertain the GSA 4PL processes, current trends, and future developments of the program, we spoke with William Crenshaw, GSA operations manager for Retail Operations. In his current role, Crenshaw oversees training, implementation, operation, and planning of all GSA Retail Operations programs, including 4PL. He has been with GSA for over 15 years and was involved with the original development of the 4PL program.

The personal discussions with Crenshaw helped direct our research focus, most notably on the historical events that led GSA to create the 4PL program. From our discussion, we ascertained that the 4PL program is performing well for GSA, and there are plans to add 65 more store locations in the next 5 years. In FY2020, there were 35 GSA 4PL store locations, and the program was staffed with a 32-person team. Financially, GSA does not add any mark-ups but charges a recovery rate of approximately 12% to offset agency expenses. A requisition sale of at least $4 million is expected to make a sound business case for GSA to support a 4PL location (W. Crenshaw, personal communication, May 26, 2021). However, the individual 4PL vendor could have a higher sales target, especially if they maintain staff onsite.

A MOA is the standard contract used, and the duration is normally for 5 years consistent with FAR 17.204 (2021) regarding special contracting methods. We were interested in knowing the average time it took for a customer to set up a 4PL program and

begin requisitions. We learned that on average, it takes 6 months to stock common items, and to allow time for the vendor to understand how the agency does business and to achieve a good process rhythm. In addition, referral orders (direct delivery from vendor to the customer) can begin immediately after a MOA is signed (W. Crenshaw, personal communication, May 26, 2021).

We were interested in knowing if there were any benefits to adding GSA 4PL to the mandatory source list. From our discussion with Crenshaw, we concluded that the purpose of the GSA 4PL program was not to be a do-it-all service, but rather as an alternative competitive marketplace procurement resource. Our view is consistent with the information provided on the GSA website, which defers agencies to interpret FAR Part 8 (2021) on their own, in response to the question to whether GSA 4PL is a mandatory source (GSA, n.d.-d). The Yard interprets 4PL as a GSA stock program, which is considered a mandatory government source (FAR 8.002, 2001). As part of the GSA MAS, the 4PL program is subject to FAR 8.4 (2021). However, LC Industries, a 4PL vendor, is part of the AbilityOne program and is therefore a mandatory source. The overlaps in regulations partly contribute to the different interpretations.

Lastly, we wanted to find out about the obstacles preventing adoption of GSA 4PL. We learned that the number one issue preventing 4PL adoption is the disparate financial systems of each agency that are incompatible with GSA, making financial integration a challenge. Benefiting from their long partnership, the GSA and Marine Corps ServMarts are financially integrated, with much of the transaction processes automated using a common system. The Navy ERP is integrated with GSA for industrial products and services; the Army Depots require manual interactions, and the Air Force uses a manual gateway to obligate funds. The Coast Guard does not have financial integration with GSA and requires a multistep process to pay its IPAC invoices (W. Crenshaw, personal communication, May 26, 2021). Having financial integration will further increase the efficiency and effectiveness of the 4PL program.

We discovered that some agencies, particularly ones with a large procurement staff, prefer to use government purchase cards for their speed and are hesitant to explore other requisition-based opportunities. Sometimes the refusal to transition to GSA 4PL

could simply be personality driven. Other reasons include agencies wanting only a specialty set of items—such as tools—making it difficult to achieve the $4 million GSA viable business case amount. Crenshaw spoke of an agency that was about to sign a MOA but had to back out due to budget cuts (W. Crenshaw, personal communication, May 26, 2021).

Crenshaw's experience and active role in the 4PL program provided tremendous insight and understanding of the processes. Fourth-party logistics is rapidly gaining awareness from positive word of mouth and industry day presentations. The program is actively working on adding additional 4PL SIN vendors to provide a wider range of products and services to its customers. The plan to add 65 more locations in the next 5 years is an indication that numerous agencies already recognize the benefits of outsourcing a portion of their procurement processes to attain logistics and supply chain management expertise.

E. CHAPTER SUMMARY

This chapter began with a summary of the GSA 4PL program and its core purpose. This was followed by a qualitative research methodology using two case studies to analyze the GSA 4PL program performance within the USMC and USCG. The GSA 4PL program serves as a complete end-to-end SCM process where GSA Retail Operations acts as an integrator and manager of suppliers.

Within the USMC ServMart, the GSA sought to accomplish five goals: achieve an expanded range of products and services, standardize the process for obtaining supplies and services, synchronize IT systems, provide a new shopping experience for Marines, and improve customer service. The GSA was able to reach all these goals while cutting costs and improving service to the USMC.

The USCG Yard utilized the DMAIC methodology to bring about two business improvement goals. The first was to increase procurement throughput by lowering PALT, and the other was to minimize on-hand inventory and reduce carrying and management costs. By partnering with GSA 4PL, the goals became strategic objectives, and since 2016 the Yard successfully increased procurement flow rate and drastically lowered

PALT. On-hand inventory decreased, and process costs per material were reduced. Overall, the Yard was very satisfied with the decision to outsource a portion of the procurement process to GSA 4PL.

We presented limitations of the 4PL program and desired improvements from a business manager's perspective. Lastly, discussions with a GSA leader on the agency's 4PL program offered a firsthand account on the administrative processes, challenges to adoption, and current trends and future developments.

V. CONCLUSION AND RECOMMENDATIONS

In previous chapters, the literature review provided the reasons for outsourcing and information on the development of 4PL. Discussion with a GSA leader provided information on the history of GSA 4PL development, current trends, and plans for future expansion. We used the current government-to-government partnerships between GSA 4PL and both the USMC ServMart and USCG Yard as case studies to determine the effectiveness of procurement outsourcing. In this chapter, we analyzed, and the data and information collected to answer the research questions. Overall, we discovered that GSA 4PL has been able to reduce cost, improve procurement performance, and enhance customer value for the USMC and USCG. We then present a research conclusion and end with recommendations for inquiry or further study.

A. ANSWERS TO RESEARCH QUESTIONS

This section presents the results to the six research questions that were developed to guide and support the purpose of the study: to analyze and report on the use of GSA's 4PL program by the USMC ServMart and USCG Yard.

a. What are the benefits of outsourcing to a 4PLP?

We answered this question by first conducting a literature review of why organizations decide to outsource. The two primary reasons are to reduce cost and improve performance. In a growing resource-constrained operating environment, outsourcing allows organizations to focus their limited resources on their core competencies. Logistics is primed for outsourcing because it is a support service that is necessary but that requires considerable capital and operational expenditures. Along with transportation vehicles, warehouses, and distribution centers, a robust IT infrastructure with data analytic capabilities is needed in any competitive logistics environment, but this is expensive and complex to establish and maintain internally. Outsourcing converts the logistic assets and liabilities from fixed to variable costs, improving cash flow for investments in core activities. Additionally, outsourcing offers the potential of forming

long-term partnerships to align strategic and operational strategies to improve performance and value.

Second, we examined the purpose and evolution of 4PL from 3PL. Whereas 3PL focuses on the logistics, transportation, and warehouse operation elements of the supply chain, 4PL provides strategic supply chain management and encompasses logistic management provided by 3PLs. A 4PLP serves as a single interface, integrating and coordinating the resources and capabilities of each product and service provider to maximize the benefits to the supply chain. Coordination is achieved by leveraging technology to gather, process, and transfer information encompassing sales, distribution, procurement, and customer support data, allowing organizations to make informed planning decisions. Real-time data updates provide for JIT deliveries, allowing for scalability to match variations in demand and reduction of on-hand inventory. Integration is accomplished by forming partnerships and developing relationships between organizations engaged in network activities across the supply chain. Through integration and coordination, the 4PLP aims to tailor the services and products to match the needs of the customer. Overall, outsourcing to 4PLP reduces cost, improves performance, and adds customer value by optimizing the complete supply chain.

b. Why do some military services decide to partner with the GSA to implement a 4PL solution?

While some agencies and units such as the USMC ServMart and Navy Commander Fleet Readiness Centers (COMFRC) were directed to switch to GSA 4PL, there are no regulations prohibiting a federal agency from using a commercial 4PL provider. The seeding of GSA 4PL can be traced back to the 2005 BRAC decision and the primary goal of prioritizing military value. The DLA was assigned the responsibility for retail supply, storage, and distribution (SS&D) functions and industrial site support infrastructure. For ServMarts, the transfer to GSA 4PL occurred in 2007. For COMFRC, the DLA selected the GSA to provide commercially available nonproduction commodities on its behalf in 2015.

For agencies not mandated to use GSA 4PL, the program offers multiple inherent benefits over commercial 4PL providers. The first benefit is the familiarity of doing

business with the GSA. As a mandatory source for specific categories, most agencies already have a working relationship with the GSA, particularly with the schedule system. Second, the GSA ensures compliance with FAR, Trade Agreements Act, Buy America Act, small business goals, and other applicable regulations. Third, the GSA strives for competitive marketplace prices and offers transparent pricing, such as its surcharge rates. Fourth, agencies are not obligated to order from GSA 4PL, nor is there a specified minimum order or dollar requirement within a contract period, which is distinct from most indefinite-delivery contract terms and conditions. Last, requisition allows for simple and secure government-to-government transfer of funds, using established systems such as IPACS.

c. What are the factors limiting adoption of GSA 4PL?

Potential customers might want parts that are not offered by 4PL SIN. The program is limited to office supplies; tools; hardware; and maintenance, repair, and operations (MRO) supplies, although items are continuously being added. According to the GSA Retail Operations manager, an annual requisition sale of at least $4 million is expected to make a good business case for the GSA to support a 4PL location. Therefore, units with total annual sales below $4 million, or units wanting to order only specific items, might be excluded from the program. Having a long lead time for a 4PL vendor to research and add uncommon parts and equipment to an agency's catalog is unacceptable to most, along with a 6-month average to build a catalog to meet baseline operation demands.

The GSA applies a surcharge to each item to fund its operations, which might make the cost unreasonable. The Yard has determined that the surcharge adds approximately 23% to their procurement cost. Since the surcharge is dependent on item cost—the surcharge rate decreases as item cost increases—an agency might have a different rate. To account for price reasonableness, the Yard developed an internal process to evaluate if the 4PL requisition cost is 20% greater than other procurement options. If the item is greater than 20%, then the 4PL cost may be too high; however, the Yard will further consider qualitative differences and schedule requirements.

Depending on the agency's interpretation of FAR Part 8, GSA 4PL might not be qualified as a mandatory source, limiting its usage for some. The GSA website refers agencies to interpret FAR Part 8 (2021) in response to the question of whether GSA 4PL is a mandatory source; the website also states that the focus of the GSA is to provide competitive marketplace alternatives (GSA, n.d.-d). The Yard interprets 4PL as a GSA stock program, which is considered a mandatory government source under FAR 8.002 (2021). As part of the GSA MAS, the 4PL program is subject to FAR 8.4 (2021); however, one of the 4PL SIN vendors is part of the AbilityOne program and, therefore, qualifies as a mandatory source. The overlaps in regulations partly contribute to the different interpretations.

Last, according to the GSA operations manager, the number factor limiting adoption of GSA 4PL is incompatible financial systems or the need for financial integration. Some agencies, such as the USCG, do not have complete financial integration and require a multistep process to pay IPAC invoices. Financial integration will further increase the efficiency and effectiveness of the 4PL program. Some fortunate agencies with a large procurement staff might prefer government purchase cards instead.

d. How is the GSA 4PL program implemented?

GSA 4PL consists of individual BPAs using 4PL SINs, which are products under the GSA MSA. MOA is the preferred contract vehicle to establish the roles, responsibilities, and duties to be carried out by the customer and the GSA in implementing the GSA retail operations 4PL program. The duration of the MOA is normally for 5 years, which is consistent with interagency agreements and FAR 17.204 (2021). The Yard renewed their MOA in May 2021, and a copy is shown in the appendix.

Implementing 4PL is a major organizational change initiative that some agencies simply do not want to commit themselves to. On average, it takes 6 months to stock common items and for the vendor to understand how the agency does business and to achieve a good process rhythm. The time duration could be a limiting factor, despite the fact that referral orders (direct delivery from vendor to the customer) are available immediately after MOA signing. Successful business change processes require effective

communication, coordination, and support from senior management. There should also be well-designed training to ensure competency.

For the Yard 4PL adoption change process, there was a well-publicized and defined rollout period, beginning with the smallest shop and the least number of items for purchase. There was unwavering support from the USCG leadership team and the workers union, which created a shared vision. Trainings were conducted and coupled with actual applications. The initiative began with the shop with the smallest number of items, because it had the highest probability of success and would be crucial in building confidence and gaining commitment. Select individuals from the first and subsequent shops then served as change agents to expand the process until all shops adopted the program.

e. What are the results of the GSA 4PL partnerships between the USMC and USCG?

Under the GSA, the USMC was able to reduce labor costs, inventory costs, fees associated with government purchase cards, and costs associated with legacy supply systems. Annual costs for operating USMC ServMarts dropped from $66 million to $5 million after 4PL solutions were implemented. The ServMart was also able to move to a single IT system, which increases efficiency. The USMC is very satisfied with its partnership with GSA 4PL solutions. GSA 4PL solutions better serves the warfighter with noticeable improvement in the ability of the ServMarts to support deployed units.

The Yard had previously utilized the DMAIC methodology to bring about two business improvement goals organically. The process serendipitously provided invaluable data that served as a baseline to measure the effectiveness of the 4PL program. In the 4 years following 4PL program adoption, the program has processed over $23 million in sales. As of FY2021, there are 4,700 items in the 4PL catalog. For FY2020, the SAP PALT was at 7.7 days, or 74% less than the 30 days requirement. With fewer procurement orders, CPD was able to increase its throughput and efficiency for SAP purchases and more complex formal contracts above $25,000. Shop stock inventory decreased by using 4PL's JIT deliveries and by limiting on-hand supply to no more than 6 months. Total recurring inventory has been reduced by 39% since 2017. The

considerable reduction in inventory allowed for the removal of two FTE retail management staff in 2016, equating to a savings of $200,000 a year. Overall, the retail staff was reduced from 14 in 2011 to 10 in 2021. The ability of 4PL to surge capability to meet emergency demands further contributes to avoiding fixed staff and contractor support costs. The Yard reported a realized annual real cost reduction of $500,000.

By all indications, the Yard is very satisfied with its decision to outsource a portion of the procurement process to GSA 4PL. The Yard stated, "The 4PL Program successfully meets CG Yard's supply requirements and is providing financial & operational value to the CG" (E. Linton, personal communication, June 17, 2021). Ultimately, GSA 4PL offered a comprehensive solution that included product fulfillment, inventory handling, and logistics management.

f. What are the implications for the military logistics workforce?

A positive implication that GSA 4PL provides to the military logistics workforce is time for procurement specialists to focus on more consequential areas of work. GSA 4PL significantly reduced the number of low-cost procurements for which specialists are responsible. Authorizing a 4PLP to handle these low-cost procurements frees up time for procurement specialists to focus on more complicated contracts. Real-time data updates provide for JIT deliveries, allowing for scalability to match variations in demand. This reduces the need for emergency purchases and contributes to a decrease in on-hand inventory, resulting in less inventory management. Additionally, a database repository simplifies reordering and tracking and provides for secure storing of all financial and accounting information for auditing purposes.

A negative implication of outsourcing 4PL is that while 4PL contributed to achieving JIT deliveries and reduced inventory, these efficiencies can have unintended negative consequences. For example, the global COVID-19 pandemic has been accompanied by disruptions in the supply chain. Organizations that have adopted JIT deliveries with minimum on-hand inventories experienced disruptions to their business, as logistic activities stalled. While COVID-19 is sometimes viewed as a black swan event that is difficult to plan for, it is probable that increasingly frequent disruptions such as hurricanes and natural disasters warrant contingency operation planning. It can be more

difficult to have control over contingency operation planning when some aspects of logistics operations are outsourced to 4PLs. Maintaining seasonal inventories, like some commercial industries do, and leveraging advancements in predictive analytics to plan inventory levels could be a viable solution.

B. CONCLUSION

A 4PLP serves as a single interface, integrating and coordinating the resources and capabilities of each product and service provider to maximize the benefits to the supply chain. An agency outsourcing to GSA 4PL—a product fulfillment service—has the potential to reduce its fixed costs and alleviate the administrative burdens of ordering, delivering, and storing products. Customer value is enhanced by ensuring compliance with acquisition regulations, competitive marketplace pricing, and a robust IT infrastructure with a data analytics platform that provides order history and customizable item reports.

While GSA 4PL offers competitive pricing, agencies should continuously monitor for price reasonableness and be cognizant of the GSA's surcharge based on item cost. Whether GSA 4PL is considered a mandatory source is currently subject to interpretation due to overlaps in FAR. This ambiguity contributes to hesitancy toward adopting and using 4PL; however, incompatible financial resources is the primary reason why some agencies are not using 4PL as a procurement resource. Other challenges include long lead time to add items to the agency catalog, and high forward pricing cost for certain commodities. Currently, there are only five 4PL GSA vendors, and the program is limited to office supplies, tools, hardware, and MRO supplies, although items are continuously being added.

Despite these limitations, GSA 4PL is gaining attention and rapidly expanding, with plans for 65 more store locations in the next 5 years, adding to the current 35. In its FY2018 market report, the Coalition for Government Procurement—a nonprofit association representing commercial companies selling products and services in the federal market—cited data from the federal procurement data system, reporting that 2018 assisted acquisition obligations from GSA 4PL totaled $134 million, an increase of 59.93% from the previous year (Coalition for Government Procurement, 2019). The

USMC ServMarts have been using GSA 4PL since 2007, and the USCG Yard has been using it since 2014. Both agencies have realized substantial cost savings and procurement process improvements and are very satisfied with the program. This study will aid military services considering the use of GSA 4PL to augment their procurement processes.

C. RECOMMENDATIONS

This study analyzed how 4PL has performed in the USMC and USCG. Our findings revealed that a significant barrier to adoption is financial system incompatibility. Financial integration is necessary to achieve an efficient and effective use of 4PL solutions. We recommend future studies that analyze the current structure of financial systems within each service, how they are incompatible with 4PL solutions, and how they could change to utilize 4PL.

The Yard case study provided a unique and detailed coverage of their 4PL implementation journey, from the initial decision to outsource a portion of their procurement process to selecting GSA as a 4PL provider, including records of their current sustainment and operation practices. Of value is the Yard's use of the DMAIC methodology to gather and analyze data that were later used to evaluate the effectiveness of the GSA 4PL program. Business managers who are considering outsourcing to a 4PL provider would benefit from learning about the Yard's experiences, perhaps adapting it for their organization's use.

This study was limited to analyzing 4PL from the perspective of GSA as the provider, and the USMC and USCG as customers. Future works should inquire from the 4PL vendors themselves to determine their perspectives on working with the military services. Qualitative research using customized interview questions to gather data from other military and public agencies utilizing 4PL allows for further in-depth analysis. Additionally, we recommend a comparative analysis approach assessing GSA and commercial 4PL providers to broaden knowledge on the benefits, limitations, and risks of 4PL outsourcing.

APPENDIX. MEMORANDUM OF AGREEMENT

The following is the MOA (E. Linton, email to author, July 29, 2021) renewing the cooperation between GSA Retail Operations 4PL and Coast Guard Yard. The document illustrates the roles and responsibilities and terms and conditions of a 4PL partnership.

MEMORANDUM OF AGREEMENT

BETWEEN

GENERAL SERVICES ADMINISTRATION (GSA)
FEDERAL ACQUISITION SERVICE (FAS)
OFFICE OF GENERAL SUPPLY & SERVICES (GSS)
RETAIL OPERATIONS (RO)

AND

UNITED STATES COAST GUARD (USCG) YARD

May 1 2021

MEMORANDUM OF AGREEMENT (MOA)

General Terms & Conditions

1. Overview

This Memorandum of Agreement (hereinafter "MOA") describes the terms and conditions that govern the cooperation between the United States Coast Guard (USCG) Yard, located at Baltimore MD hereinafter "Yard" and General Services, Federal Acquisition Service, Office of General Supplies and Services, Retail Operations (GSA/FAS/GSS/RO) hereinafter "GSA" to collaborate in implementing GSA's Retail Operations Fourth Party Logistics Supply Chain Solution (4PL) in lieu of the current Yard supply operations.

This agreement includes support for the Coast Guard Aviation Logistics Center and the Surface Forces Logistics Center Industrial Operations Division.

2. Purpose

The purpose of this MOA is to set forth the specific roles, responsibilities, duties to be carried out by the Yard and the GSA in implementing the GSA Retail Operations 4PL Supply Chain Solution.

3. Authority

The parties' authority to enter into this interagency agreement is:

[X] Acquisition Services Fund (40 USC § 321)

[X] Property Act (40 USC § 501-502)

These statutory authorities are independent of the Economy Act and therefore, the Economy Act does not apply to this agreement.

4. Scope

In executing this document, both parties agree to perform the roles and responsibilities outlined in Section 6 below and agree to the terms by which each party will reimburse the other for support and services provided via interagency transfer of goods and funds.

5. Period of Agreement

The terms and conditions described in the MOA become effective when signed by authorized officials of both agencies and remain effective until terminated upon agreement of both parties, unless amended in accordance with Section 11 or terminated in accordance with Section 12.

6. Roles & Responsibilities of GSA & Yard

MEMORANDUM OF AGREEMENT (MOA)

The effective management and use of interagency agreements is a shared responsibility of the Yard and GSA. The parties hereby agree to the following roles and responsibilities.

GSA Roles and Responsibilities:

1) Provide 4th Party Logistics Service (4PL).
   - Provide commodities, stock items supplied and readily accessible through GSA channels of supply.
   - Maintain records to maintain Yard CFO Act compliance.
   - Keep track of inventory costs and stock usage rates.
   - When appropriate implement or recommend improvements relating to inventory handling and logistics management.

2) Provide a GSA liaison.
   - Responsible for coordinating the needs of the Yard and GSA so that both parties can meet their goals.
   - Resolve any disputes that may occur during the course of the project.
   - Contact point for the Yard and Coast Guard representatives.

3) Provide the following levels of 4PL service to the Yard:
   - 99% Supply Availability for items maintained as Industrial Stock. Industrial Stock items are items that are maintained in Shop areas for shop use.
   - Delivery of items that are not shop stock in 5 days or less. This includes items that are a commodity provided by GSA that are not maintained as Industrial Stock. Supply Availability for these types of items will be at least 90%.
   - Backorder items will be delivered in 30 days or less. A backorder item is either an Industrial Stock or GSA commodity that is not available as described above.
   - If performance measures are not achieved, then appropriate remedial action will be agreed to.

4) Provide information technology and operational support required to support the 4PL program Point of Sales and financial integration systems.

Yard Roles and Responsibilities:

1) Support GSA in the development of requirements in the implementation of 4PL information technology.

2) Provide a Yard Liaison
   - Responsible for coordinating the needs of the Yard and GSA so that both parties can meet their goals.
   - Resolve any disputes that may occur during the course of the project.
   - Contact point for GSA representatives.

3) Provide work space for GSA to stage materials and an office trailer. If agreed to, Government offices may be provided to GSA.

4) Approve 4PL requirements, acknowledge receipt of materials, and support the invoice process.

   - The Yard will identify Industrial Stock requirements. GSA may identify the need to replenish Industrial Stock, but the Yard will approve all requirements prior to material being provided.

     For example: The Yard has a requirement to maintain bolts in a shop. GSA surveys stock levels and notifies the Yard the bolt stock is low. If the Yard approves replenishment, then GSA provides the bolts needed to bring stock up to the appropriate level.

   - The Yard will identify requirements using processes identified by GSA.

   - The Yard will acknowledge receipt of items in accordance with GSA procedures.

   - The Yard will approve item invoices in accordance with GSA procedures.

5) Establish a control process to ensure that only authorized personnel place requisitions.

6) Maximize use of the 4PL program as mutually agreed to.

7) Timely fund GSA operations for Yard 4PL support in accordance with the schedule agreed to by both parties.

8) Assign a financial point of contact who is a "certifying official".

7. Points of Contact

USCG Yard Liaison

Eric Linton
USCG Yard
2401 Hawkins Point Rd, Baltimore, MD
21226-1794
410-636-3996
Eric.M.Linton@uscg.mil

GSA Point of Contact

Will Rayam
Retail Operations, Contracting Officer Representative
1800 F St NW, Washington DC 20405
703-655-7935
Will.Rayam@gsa.gov

GSA Retail Operations

William Crenshaw

Retail Operations, Operations Director
Jacksonville, NC 28546
910-750-2615
William.Crenshaw@gsa.gov

8. Billing & Payment

The Yard will reimburse GSA for cost for support and services provided under this MOA, including any purchases made from GSA by the Intra-Governmental Payment and Collection (IPAC) System. If mutually agreed to, other reimbursement methods may be used.

9. Blanket Purchase Agreement and/or Order Termination, Disputes and Protests

If a Blanket Purchase Agreement (BPA) is issued by GSA pursuant to this MOA and a dispute or protest arises from specifications, solicitation, award, performance of the BPA and/or order, appropriate action will be taken by GSA in accordance with the terms of the BPA and applicable laws and regulations. GSA will be responsible for all costs associated with disputes and/or protests that stem from errors in performing the responsibilities assigned to GSA. If conditions warrant, this MOA may be terminated by either party as set forth in Section 12 below. Upon agreement of the MOA termination, GSA will cancel any BPAs and/or Orders issued pursuant to this MOA in accordance with the terms of the BPAs and applicable laws and regulations.

10. Review of MOA

The parties agree to review jointly the terms and conditions set forth in the MOA at least annually during the period of this agreement as identified in Section 5. Appropriate changes will be made by amendment to this agreement executed in accordance with Section 11. The parties further agree to review performance under this MOA to determine if expectations are being met and document a summary of their assessment. The responsible reviewing official at each agency shall sign and date the assessment.

The performance assessment will consider, at a minimum, the quality of each party's overall execution of responsibilities assigned under this MOA, including each party's responsiveness to requests made by the other party. Information will be evaluated by both parties.

11. Amendments

Any amendments to the terms and conditions set forth in the MOA shall be made in writing and signed by both GSA and the Yard.

12. MOA Termination

This MOA may be terminated upon ninety (90) calendar days written notice by either party. If the MOA is terminated, the agencies shall specify the terms of the termination, including costs attributable to each party and the disposition of pending actions.

Upon termination of this MOA, GSA will continue to provide support and service to the Yard, for a mutually agreed upon timeframe, but no less than 90 calendar days, to facilitate management transition.

13. Interpretation of MOA

If GSA and the Yard are unable to agree about a material aspect of MOA, the parties agree to engage in an effort to reach mutual agreement in the proper interpretation of this MOA, including amendment of this MOA, as necessary, by escalating the dispute within their respective organizations. If a dispute related to funding remains unresolved for more than ninety (90) calendar days after the parties have engaged in an escalation of the dispute, the parties agree to refer the matter to their respective Agency Chief Financial Officers with a recommendation that the parties submit the dispute to the CFO Council Intragovernmental Dispute Resolution Committee for review in accordance with Section VII of Attachment 1 to the Treasury Financial Manual, Volume 1, Bulletin No. 2007-03, Intragovernmental Transactions, Subject: Intragovernmental Business Rules, or subsequent guidance.

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