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Management of U.S. Air Force Aircraft Contractor Logistics Support Arrangements

Summary of Findings and Recommendations



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Preface

Between fiscal years (FYs) 1996 and 2017, U.S. Air Force (USAF) spending on contractor logistics support (CLS) grew from 6 percent to 21 percent of aircraft operating and support costs. Although CLS constitutes one of the fastest-growing elements of aircraft operating and support costs, USAF leadership has had limited visibility into the drivers of those costs, leading to uncertainty about what the Air Force can do to manage the growth.

To gain a better understanding of the drivers of CLS cost growth and better manage future logistic support spending, USAF senior leadership asked RAND Project AIR FORCE (PAF) to investigate factors that have led to the historical growth in spending on CLS for aircraft and recommend changes to current policy and practices to promote better sustainment outcomes.

The research reported here was commissioned by the USAF and conducted within the Resource Management Program of RAND Project AIR FORCE as part of an FY 2018 project titled Understanding Growth in Contractor Logistics Support Costs.

This report describes essential findings and recommendations resulting from PAF's assessment, which was completed in September of 2018. It should be of interest to policymakers and others concerned with CLS cost and affordability issues. A companion report provides more in-depth discussion of project methodology, expanded discussion of case studies, and other information of interest to specialists, stakeholders, and experts:

- Light, Thomas, Dwayne M. Butler, Michael Boito, Vikram Kilambi, Kristin J. Leuschner, Sheng Tao Li, Abby Schendt, and Sunny D. Bhatt, *Management of USAF Aircraft Contractor Logistics Support Arrangements*, Santa Monica, Calif.: RAND Corporation, 2018, Not available to the general public.

This effort builds on PAF research documented in the following report, which was conducted approximately a decade earlier:

- Boito, Michael, Cynthia R. Cook, and John Graser, *Contractor Logistics Support in the U.S. Air Force*, Santa Monica, Calif.: RAND Corporation, MG-779-AF, 2009. As of May 25, 2018:
<https://www.rand.org/pubs/monographs/MG779.html>

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Summary

Issue

Between fiscal years (FYs) 1996 and 2017, U.S. Air Force (USAF) spending on contractor logistics support (CLS) grew from 6 percent to 21 percent of aircraft operating and support costs. Although CLS constitutes one of the fastest-growing elements of aircraft operating and support costs, USAF leadership has had limited visibility into the drivers of those costs, leading to uncertainty about what the Air Force can do to manage the growth and whether such arrangements are cost-effective relative to organic support.

Approach

PAF analyzed cost data for CLS and organically maintained fleets, reviewed product support business case analyses (PS-BCAs), synthesized findings from reports published by the U.S. Government Accountability Office and Department of Defense (DoD) Inspector General on CLS, and interviewed subject-matter experts from throughout DoD.

Conclusions

- Since the mid-to-late 1990s, the USAF has opted to use CLS to support most new fleets, explaining much of the growth in CLS costs. These choices were consistent with DoD acquisition guidance from 1996 through 2003 favoring the use of the outsourcing of logistics support for new weapon systems.
- After controlling for fleet mix, size, and flying activity, rates of cost growth for organically and CLS-maintained aircraft are similar, averaging around 4 percent per year more than economy-wide inflation (as measured by the Gross Domestic Product deflator) from 1996 to 2017.
- CLS was found to be more costly than organic support arrangements in seven of nine PS-BCAs we reviewed.¹ Many PS-BCAs also noted, however, that CLS is likely to offer higher performance and/or lower risk than organic support arrangements.
- Lack of technical data and suitable competitors, as well as limited tools to create incentives for efficiency and innovation, limits the Air Force's ability to control costs on large CLS contracts.

¹ Our review of PS-BCAs found that, on average, CLS arrangements are 13 percent more costly than organic support arrangements for the same workload. However, there is considerable variability across studies, and we cannot reject the hypothesis that organic and contractor support arrangements cost the same based on standard statistical tests.

Recommendations

- Formally track and disseminate lessons learned and best practices related to CLS.
- Consider transitioning some CLS arrangements to multiple-year contracts.
- Provide additional training focused on managing CLS contracts.
- Provide resources to stand up an independent, organic capability to conduct PS-BCAs.
- Establish a process for deciding the timing and extent of PS-BCAs.
- Ensure the integration of processes to manage and evaluate public-private partnerships with weapon system product support.

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We also thank numerous colleagues at the RAND Corporation who assisted in various aspects of this analysis, including Patrick Mills, Frank Camm, Tim Conley, John Drew, Paul Emslie, Stephen Joplin, Phillip Carter, Gary Massey, Obaid Younossi, and Elvira Loreda. Mark Arena and Daniel Norton formally reviewed the report and provided many constructive comments and suggestions.

1. Introduction

The U.S. Air Force (USAF) has a number of choices when considering how best to sustain its weapon systems and components. Sustainment activities can be performed by the USAF or other government entities using organic facilities and personnel. Alternatively, the USAF can pay contractors to perform certain sustainment activities using contractor logistics support (CLS) or other contractor sustainment support arrangements.¹ In practice, the USAF employs a mix of organic and contracted approaches to sustain nearly every aircraft it owns.

Since the 1990s, the USAF has increasingly relied on CLS for sustainment activities such as SCM of parts, depot repair of reparable parts, depot overhaul of airframes and engines, and SE. USAF spending on CLS increased more than eightfold between fiscal year (FY) 1996 and FY 2017 in then-year (TY) dollars.² In comparison, during the same period, non-CLS logistics costs experienced only a twofold increase. The increased use of CLS, which started in the 1990s, was in part driven by the expectation that CLS would generate long-run cost savings over organic support alternatives.

In the future, the use of CLS arrangements is expected to remain significant and is likely to grow, especially if new fleets such as the F-35 rely heavily on contractors for logistics support. However, various senior USAF and U.S. Department of Defense (DoD) leadership have recently asserted that CLS arrangements are too costly and that the same work could be performed for less organically, reflecting a shift in perspectives relative to the past.³

Study Goals and Approach

To gain a better understanding of the drivers of CLS cost growth and options for reducing costs, USAF senior leadership asked RAND Project AIR FORCE (PAF) to investigate factors that have led to the growth in spending on CLS for aircraft and recommend changes to current

¹ We used the same definition of CLS as is used in the Air Force Total Ownership Cost (AFTOC) database: CLS refers to activities funded in Element of Expense Investment Code (EEIC) 578. It is primarily contractor-provided depot maintenance, the supply chain management (SCM) of repair parts and depot-level reparable, and sustaining engineering (SE). CLS includes a lesser amount of unit-level maintenance, the operation and maintenance of training simulators, and other activities. Our research focused on the largest CLS contracts, as measured by annual spending.

² Although CLS constitutes one of the fastest-growing elements of aircraft operating and support (O&S) costs, until recently, CLS cost reporting aggregated costs across activities for each weapon system, limiting visibility about the drivers of rising CLS costs and leading to uncertainty about what the Air Force can do to manage the growth. This situation started to change in FY 2013, when the Air Force Cost Analysis Agency (AFCAA) began to track CLS at a finer level of detail. Since FY 2013, CLS costs are reported in AFTOC by O&S elements such as depot-level reparable, aircraft overhaul, engine overhaul, etc.

³ See, for example, Lexington Institute, “Op-Ed: DoD Continues Undeclared War Against Private Sector Sustainment,” August 4, 2010; Steve Trimble, “U.S. Air Force Wants to Take Back Sustainment from Industry,” *Inside MRO*, April 3, 2019.

policy and practices to promote better sustainment outcomes, such as lower costs or increased availability of weapon systems.

This report summarizes key findings and recommendations from PAF research in three areas. First, we explore the drivers of USAF aircraft CLS costs over time and attempt to explain the dramatic growth in CLS spending over the past two decades. Second, we examine differences in the cost and performance of organic and CLS arrangements for USAF aircraft systems. Third, we identify general issues that affect the affordability, performance, and management of CLS arrangements and recommend changes that have potential to improve aircraft CLS arrangements in the future.

Our approach for addressing these issues included the following steps:

- review of policy and other documents describing the motivation and assumptions leading to a shift away from organic support to CLS beginning in the 1990s
- analysis of cost data for CLS and organically maintained fleets
- review of product support business case analyses (PS-BCAs)
- synthesis of findings from reports published by the U.S. Government Accountability Office (GAO) and DoD Inspector General (IG) on CLS
- interviews with stakeholders and subject-matter experts (SMEs) from throughout DoD.

This study builds on Boito, Cook, and Graser,⁴ which assessed USAF CLS cost and other issues. Because that study was conducted almost a decade ago, more-detailed data on CLS arrangements have become available, and perspectives on the use of CLS have changed, leading to greater scrutiny of their benefits and costs.

A companion report, unavailable to the general public, provides more-detailed supporting data and analysis on all the topics covered here.

⁴ Michael Boito, Cynthia Cook, and John Graser, *Contractor Logistics Support in the U.S. Air Force*, Santa Monica, Calif.: RAND Corporation, MG-779-AF, 2009.

2. Drivers of U.S. Air Force Aircraft CLS Costs over Time

We begin with some background relevant to increased spending on CLS, including the breakdown of CLS spending across major USAF aircraft programs, activities covered by CLS arrangements, and regulations governing the use of CLS. We conclude this section by discussing specific factors driving the increase in CLS costs.

Background

The reduction in defense spending during the 1990s signaled a shift in focus from procurement to sustainment among the major defense original equipment manufacturers (OEMs). With fewer acquisitions, the OEMs have adjusted their business model to emphasize sustainment support within the portfolio of products and services that they provide to DoD. This shift is associated with the OEMs' realization that exerting greater "rights to the intellectual property of the software, design, and embedded innovations in major platforms guarantees decades of competition-free work at relatively high profit margins."⁵

The activities conducted under aircraft CLS contracts vary significantly across weapon systems. Within the broad definition of CLS used by AFTOC, aircraft with the largest CLS funding are covered by contracts that provide for multiple elements of support at the weapon-system level, including engine and aircraft overhauls, repair of reparable parts and depot-level reparables, SCM of consumable and repair parts, SE, program management and other support functions, and unit-level maintenance.⁶

The USAF maintains some capabilities to perform all these activities organically but contracts out when a commercial source can perform the work more cost-effectively or is deemed to provide lower risk or better performance. In some cases, activities may need to be contracted out because the government lacks the technical data or data rights required to perform the activities.

In many cases, we observed CLS arrangements that incorporate public-private partnerships (PPPs). A PPP represents a collaboration between DoD and nonfederal entities to "leverage the expertise, resources, and incentives of the other to achieve mutually agreed goals."⁷ PPPs for product support activities include *work share* agreements, in which workload is shared between the contractor and the organic activity; *direct sales* arrangements, in which an Air Logistics Center (ALC) enters into a business relationship with a commercial entity for the sale of depot maintenance articles or services; and *lease* agreements, which allow a commercial entity to have access to government facilities or equipment. DoD and Air Force instructions require any

⁵ Trimble, 2019.

⁶ Aircraft platforms associated with lower levels of CLS spending tend to cover a more restricted set of activities, and the CLS arrangement may apply only to a particular system or component on the aircraft.

⁷ See Office of the Assistant Secretary of Defense (Logistics and Materiel Readiness), *Public-Private Partnering for Product Support Guidebook*, May 4, 2018, p. 5.

decision to use a PPP to be supported by an analysis of the costs and benefits and other attributes of PPPs.

Regulations Affecting the Use of CLS

Increased use of CLS is related to shifts in DoD policy during the 1990s. In March 1996, OSD issued DoD Directive 5000.1, *Defense Acquisition*.⁸ DoD Regulation 5000.2-R directed two key policy changes affecting CLS: the outsourcing of product support and competition for support.⁹ In particular, the regulation directed maximum use of CLS for new and modified systems:

- Support concepts for new and modified systems shall maximize the use of contractor provided, long-term, total life-cycle logistics support that combines depot-level maintenance along with wholesale and selected retail materiel management functions.
- The PM [program manager] shall provide for long-term access to data required for competitive sourcing of systems support.¹⁰

Subsequent DoD policy documents and revisions of DoD 5000.2-R through its last issuance in April 2002 reaffirmed these two essential principles regarding outsourcing of product support.

There are some constraints on the use of contract support. Most important are legal restrictions on DoD contracting and a legal requirement for core organic depot maintenance:

- Under the “core rule,” DoD is required to retain an organic capability for the depot-level maintenance and repair of “mission-essential” weapon systems and equipment in case of national emergencies.¹¹ Although the law specifies that the *core capability* must be government-owned and operated, DoD is left to determine what constitutes the *core capability*, and the law does not specify a dollar amount or percentage threshold of total depot maintenance capacity that must be *core*.¹²
- The *50/50 rule* requires the services to limit contract depot maintenance to one-half of their funding for depot workload each year.¹³

Although the constraints created by the 50/50 rule are real, other factors also affect the decision whether or not to use CLS for depot maintenance. First, many elements of product support in CLS contracts fall outside the scope of depot maintenance (e.g., SE, simulator operations, program management, technical data and publications, training, unit-level

⁸ DoD Directive 5000.1, *Defense Acquisition*, March 1996.

⁹ DoD Regulation 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs*, March 15, 1996.

¹⁰ DoD Regulation 5000.2-R, 1996.

¹¹ U.S. Code, Title 10, Section 2464, Core logistics capabilities.

¹² 10 U.S.C. 2464.

¹³ U.S. Code, Title 10, Section 2466, Limitations on the performance of depot-level maintenance of materiel.

maintenance support) and are not affected by the law. Second, the ability of DoD financial systems to track funding to the entity performing depot work has historically been questionable. Organic depots can subcontract work to private vendors, and, conversely, CLS contractors can contract with organic depots. Compounding the difficulty of measuring accurately the amount of depot maintenance work performed by CLS, the section of law allowing PPPs (described earlier in this section) at DoD depots excludes from the 50/50 rule any funding of contractors working at organic depots under a PPP arrangement.¹⁴

Over time, DoD changed its guidance with regard to the use of CLS. In May 2003, DoD issued a revised 5000 series directive and instruction that canceled the previous guidance in DoD 5000.2-R. The guidance in the new DoDI 5000.2 for sustainment did not express a preference for organic or contractor support but only required program managers to continually review their sustainment strategy and ensure it be performance-oriented.¹⁵ DoD policy regarding product support as of late 2018 requires that it be performance-based and allows that it can be organic, CLS, or a mix.¹⁶

CLS Spending Trends Need to Be Viewed in Light of Increased USAF Reliance on CLS Arrangements

As part of this project, we sought to identify specific factors that contributed to increased spending on aircraft CLS arrangements. To do this, we collected and analyzed AFTOC data from FY 1996 to FY 2017 to relate CLS spending over time to changes in the USAF's aircraft fleet mix, fleet sizes, and flying activity by mission design series (MDS).

Between FY 1996 and FY 2017, the number of aircraft primarily maintained under CLS arrangements grew from fewer than 700 to approximately 2,200 aircraft. Over this same period, we observed a decline in the USAF's organically supported fleet size and greater reliance on CLS arrangements to perform maintenance for new aircraft entering the USAF's fleet.

Controlling for Growing Reliance on CLS over Time, Rates of Cost Growth for Organically and CLS-Maintained Aircraft Are Similar

To further investigate this issue, we developed a statistical model that relates changes in spending on logistics activities (both organic and contractor) over time to changes in fleet size, fleet mix, and flying activity. Changes in a weapon system's logistics costs over time that cannot

¹⁴ The section of law that allows PPPs is U.S. Code, Title 10, Section 2474, Centers of Industrial and Technical Excellence: designation; public-private partnerships. Public Law 107-107, National Defense Authorization Act for FY 2002, December 28, 2001, added a provision to exclude funding of contractors from the 50/50 calculation for certain years, and Public Law 109-364, John Warner National Defense Authorization Act for Fiscal Year 2007, October 17, 2006, made the exclusion applicable to all years.

¹⁵ DoD Instruction 5000.2, *Operation of the Defense Acquisition System*, May 12, 2003, p. 15.

¹⁶ DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, January 7, 2015. Incorporating Change 3, August 10, 2017.

be attributed to these factors are commonly referred to as *cost growth*. The model allows us to estimate and compare rates of logistics cost growth for organically and CLS-maintained USAF fleets.

We find that logistics costs grew at approximately 4 percent per year in excess of economy-wide inflation (as measured by the GDP deflator), after controlling for fleet size, mix, and flying activity, over the FY 1996 to 2017 time frame for *both* organically and CLS-maintained aircraft. This suggests that many of the factors causing logistics cost growth for organically supported fleets are also affecting aircraft maintained primarily under CLS arrangements. The growth in logistics costs (for both organically and CLS-maintained aircraft) threatens to crowd out funding for other priorities if it persists into the future.

3. Affordability and Performance of Organic and CLS Arrangements for USAF Aircraft Systems

After the shift toward increased use of CLS began, various senior USAF and DoD leadership have at times asserted that CLS arrangements are too costly and that the same work could be performed for less organically.¹⁷ In this section, we address how the choice of CLS or organic maintenance concepts compare in terms of their affordability and performance.

To address this question, we reviewed assessments of CLS and organic maintenance concepts contained in PS-BCAs conducted for a variety of USAF aircraft systems. PS-BCAs are intended to aid product support managers with decisionmaking by identifying and comparing alternative contractor and organic support arrangements in terms of mission and business impacts, risks, and sensitivities affecting warfighter capabilities and affordability.¹⁸

Evidence from PS-BCAs on CLS and Organic Support Arrangements

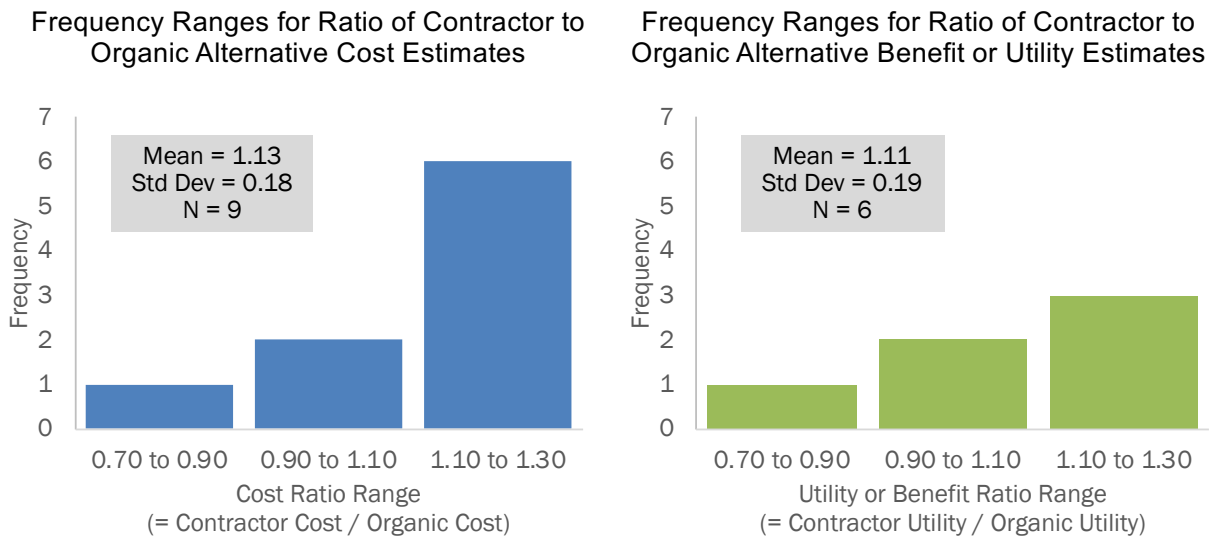
The PS-BCAs we reviewed cover some of the USAF's largest and most important programs and include C-17, F-22, F-35, KC-46, MQ-1/9, Joint Surveillance Target Attack Radar System (JSTARS) Recapitalization (Recap), Airborne Warning and Control System (AWACS) Block 40/45, Presidential Aircraft Recapitalization (PAR), and the Joint Primary Aircraft Training System (JPATS) program. Some programs are still in the development or production phase (e.g., JSTARS Recap, AWACS Block 40/45, PAR, KC-46, F-35 programs), and others are well into sustainment (e.g., F-22, C-17, MQ-1/9, and JPATS).

For each PS-BCA, we calculated the ratio of the contractor alternative cost estimate to the organic alternative cost estimate. A ratio value greater (less) than 1.0 indicates that the contractor alternative cost estimate is greater (less) than the organic alternative cost estimate. When the ratio equals 1.0, the contractor and organic cost estimates are equal. Many PS-BCAs also quantify the *utility* or *benefit* of each support arrangement considered. Similar to what we did for cost, we calculate the utility or benefit ratio of the contractor to organic alternatives when possible. Figure 3.1 shows the distribution of cost and utility or benefit ratios observed across studies.

¹⁷ See, for example, Lexington Institute, 2010.

¹⁸ Air Force Manual 65-510, *Business Case Analysis Procedures*, September 22, 2008, and Air Force Instruction 65-509, *Business Case Analysis*, September 19, 2008, provide information on conducting PS-BCAs. Guidance on how to conduct a PS-BCA is provided in Air Force Pamphlet 63-123, *Product Support Business Case Analysis*, June 1, 2017, and DoD's *DOD Product Support Business Case Analysis Guidebook*, Washington, D.C., 2011.

Figure 3.1. Distribution of Ratio of Contractor to Organic Alternative Cost and Utility or Benefits Estimates from PS-BCAs



SOURCE: Based on RAND Corporation review of PS-BCAs.

NOTE: Contractor and organic alternatives used in ratios estimates are based on the alternatives that utilize contractor or organic support most to highlight differences. When multiple applicable contractor or organic estimates are available, alternatives estimates are averaged together.

CLS was found to be more costly than organic support arrangements in seven of nine PS-BCAs we reviewed. The estimates from the PS-BCAs suggest that contractor support arrangements are, on average, about 13 percent more costly but also offer higher utility or benefits. There is, however, large variation in estimates of contractor and organic support arrangements.¹⁹ Further analysis of the PS-BCAs suggests that the smallest cost premium is for depot maintenance and supply chain activities, and larger premiums are required for contractor-provided systems engineering, product support integration, and product support management activities.

Although CLS arrangements appear to cost more than organic support arrangements, they also are deemed by PS-BCAs to be offering higher *utility* (i.e., higher performance, lower risk) when compared with organic support.²⁰ This perception was reiterated by staff we spoke with from the C-17 and F-22 Program Offices. Our review of PS-BCAs and the broader literature, as well as discussions with SMEs, provided insight into factors that are driving differences in the cost and performance of organic support and CLS arrangements. We summarize these factors in Table 3.1.

¹⁹ Because of the variation in cost estimate findings across PS-BCAs, we cannot draw any statistically based conclusions on the differences in affordability of contractor and organic support arrangements. Specifically, we cannot reject the null hypothesis that the ratio of contractor to organic cost estimate is 1.0.

²⁰ *Utility* includes measures of logistics performance, such as aircraft availability.

Table 3.1. Factors Affecting the Cost and Performance of Contractor and Organic Support Arrangements

Factors Favoring CLS	Factors Favoring Organic Support
<ul style="list-style-type: none"> • Greater ability to attract skilled/qualified workforce • Greater technical knowledge of manufacturing and repair processes • Ability to employ performance-based logistics (PBL) incentive arrangements • Lower overall performance risk • Lack of government data rights/lower tech data costs • Ability to employ infrastructure, tooling, and personnel employed during production and interim contractor support (ICS) • Greater integration and control of product support functions due to centralized authority • Defense industrial base concerns 	<ul style="list-style-type: none"> • Avoid contractor “overhead” and “fee” charges • Greater cost transparency • 50/50 and core considerations • Greater funding flexibility, e.g., no “must pay” CLS bills • Ability to leverage existing organic infrastructure, processes, and people at marginal cost • Difficulties aligning contractor incentives with long-run USAF affordability and readiness goals • Avoidance of costly and time-consuming contract negotiations • Issues integrating contractor data into USAF maintenance, supply, and logistics systems • Greater ability to exploit bundled buys and government market power through Defense Logistics Agency (DLA) and USAF enterprise procurement strategies

PS-BCAs commonly assert that pass-through overhead charges and fees on contractor-managed workloads cause organic support arrangements to be less costly than contractor support arrangements.²¹ These fees can apply to work conducted by government employees at the ALCs under work-share or direct sales agreements if the contractor is managing the work. Fees in the range of 10 to 15 percent are common. Contractor labor is also often noted to cost more per full time equivalent (FTE) relative to government civilian workers employed at the ALCs.

PS-BCAs tend to conclude that contractor arrangements (when conducted with the OEM instead of third parties) are likely to perform better, as measured by a variety of performance metrics. This stems in part from an ability to contract specifically for performance via PBL arrangements, which provide financial incentives/penalties for exceeding or falling short of specified targets. Similar incentive arrangements are not possible under organic support arrangements. Additionally, the OEM has technical expertise for system engineering, vendor relationships, and weapon system and component repair/maintenance activities that the government sometimes does not, simply because of the OEM’s development, production, and interim contractor support activities.

Furthermore, the cost of procuring technical data and data rights from the OEM or its subcontractors can also be avoided under CLS arrangements. Infrastructure, tooling, and personnel employed by the OEM during production and ICS can also be leveraged if sustainment continues with the weapon system OEM. Some stakeholders and SMEs also noted the benefits of

²¹ Note, however, that these assumptions conflict somewhat with evidence provided by the Congressional Budget Office (see Congressional Budget Office, “Costs of Submarine Maintenance at Public and Private Shipyards,” April 2019). This report finds that contractor rates are lower than government rates for Navy submarine sustainment work.

CLS because of greater integration and control of product support functions under centralized authority. Finally, CLS workloads can bolster the defense industry base by maintaining certain critical commercial companies and capabilities.

We note that recommendations from PS-BCAs are sometimes not accepted or pursued by the Air Force. These observations led us to suggest some changes to the PS-BCA process, which we discuss later when we present our recommendations.

4. Issues that Affect the Affordability and Performance of Organic and CLS Arrangements for USAF Aircraft Systems

Throughout most of the 1990s, privatization and outsourcing were believed to provide an effective way to reduce government cost in an environment of declining defense spending. However, in the course of reviewing the literature, researching details of various CLS arrangements, and talking with SMEs, our team identified a variety of factors that affect the USAF's ability to manage CLS arrangements and obtain the best value.²²

We found that the main challenge for the USAF in managing CLS contracts centers around ensuring reasonable costs in a sole-source environment. A number of issues have inhibited the USAF's ability to manage and pursue the best value from its CLS arrangements, including lack of technical data, limited cost transparency, limited incentives for efficiency and innovation under current contracting approaches, workforce training and development shortfalls, issues documenting and sharing lessons learned and best practices, and cultural issues and perspective among DoD leadership and managers. In this chapter, we discuss expectations regarding cost savings from CLS, requirements needed to generate savings, and challenges in meeting these requirements.

Increased Use of Contractor Logistics Support Was Driven by the Expectation of Cost Savings

Much of the shift toward contractor arrangements was motivated by a belief that CLS would be more affordable than organic support. Following the end of the Cold War and throughout most of the 1990s, privatization and outsourcing were seen as an effective way of reducing cost in an environment of declining defense spending. For example, the *Report of the Defense Science Board Task Force on Outsourcing and Privatization* (1996) estimated that DoD could save 30 to 40 percent of the cost of organically performed support functions through outsourcing.²³ The support function with the largest number of DoD personnel was intermediate and depot-level maintenance and repair, with 215,000 personnel performing those activities in 1994. The task force argued that, to achieve full savings, government must shed its capability to perform the outsourced support functions.

The DSB report recommended use of CLS for new weapon systems, outsourcing of most sustainment engineering for aircraft and other weapon systems, and increased use of PBL.²⁴ The

²² To understand the breadth of factors affecting CLS arrangements, we reviewed GAO and DoD IG reports dealing with CLS. Furthermore, we interviewed SMEs from a variety of USAF and DoD stakeholder communities to obtain their perspectives and insights. Our field research activity also included interviews with staff from the C-17 and the F-22 Program Offices.

²³ Defense Science Board (DSB), *Report of the Defense Science Board Task Force on Outsourcing and Privatization*, Washington, D.C., August 1996.

²⁴ DSB, 1996, pp. 59–60. PBL emphasizes logistics outcomes using incentives and metrics.

DSB also recommended contracts of five to ten years in duration that are overseen by a cadre of experts who have a collaborative relationship with vendors,²⁵ as well as greater use of SCM techniques such as prime vendor contracts and direct vendor delivery.²⁶

The increased use of CLS for USAF systems was expected to produce cost savings primarily from competition among private vendors. Competition was expected to motivate vendors to reduce costs and improve performance by reengineering logistics processes, as had been demonstrated by outsourcing in the private sector and in instances when DoD competed commercial functions. To achieve the higher level of savings, it was also assumed that the government would remove excess organic capacity no longer needed to perform outsourced functions.

Table 4.1 lists key enablers of cost savings expected from a shift from organic support arrangements to CLS, as identified in the Commission on Roles and Missions and DSB reports, and notes which organizations have the greatest ability to influence each enabler.

Table 4.1. Requirements Identified in 1990s for Outsourcing to Generate Cost Savings

Enabler of Cost Savings	Organizations Most Able to Influence
1. Buy technical data early in acquisition to enable sustainment competition over weapon system lifecycle	Military departments
2. Remove arbitrary limits on organic and contract depot maintenance (e.g., 50/50 requirements)	Congress, Office of Management and Budget
3. Shed excess organic capacity as workload shifts to contractors	Congress, Office of the Secretary of Defense (OSD), military departments
4. Engage in more extensive training in creating, administering, and monitoring CLS contracts	OSD, Defense Acquisition University (DAU), military departments
5. Require more-detailed cost reporting from organic depots and contractors to support management of contractors and fair evaluation of alternative support arrangements	OSD, military departments
6. Utilize long-term contracts to provide incentives to re-engineer processes in the pursuit of efficiencies	Congress, OSD, military departments

SOURCES: Commission on Roles and Missions of the Armed Forces, *Directions for Defense: Report of the Commission on Roles and Missions of the Armed Forces*, Washington, D.C.: U.S. Government Printing Office, 1995; DSB, 1996.

Although the Commission on Roles and Missions and the DSB both emphasized competition and outsourcing as keys to cost savings, the Commission on Roles and Missions report acknowledged the costly nature of “turnkey” CLS contracts in which the contractor provides integrated support of multiple product support elements. In 2018, these contracts accounted for most Air Force CLS spending.

²⁵ DSB, 1996, pp. 19a, 19, 23a, 23, 56a, 66.

²⁶ DSB, 1996, p. 60.

Many of the Conditions Identified in the 1990s That Would Drive Savings from CLS Arrangements Are Not Present Today

Our review of the literature, research into details of various CLS arrangements, and discussions with SMEs led us to conclude that many of the requirements identified as necessary to drive savings from a shift to CLS arrangements are present only to a limited extent today. We summarize our observations regarding each of the conditions identified in Table 4.1 in the current context in Table 4.2.

Table 4.2. Progress on Requirements Identified in 1990s for Outsourcing to Generate Cost Savings

Enabler of Cost Savings	Current Status
1. Buy technical data early in acquisition to enable sustainment competition over weapon system life cycle	Seldom pursued
2. Remove arbitrary limits on organic and contract depot maintenance (e.g., 50/50 requirements)	Not done
3. Shed excess organic capacity as workload shifts to contractors	Some
4. Engage in more extensive training in creating, administering, and monitoring CLS contracts	Limited
5. Require more detailed cost reporting from organic depots and contractors to support management of contractors and fair evaluation of alternative support arrangements	Rarely available to analysts and decisionmakers
6. Use long-term contracts to provide incentives to reengineer processes in the pursuit of efficiencies	Rarely. Only on some component-level PBL arrangements funded through Air Force Working Capital Fund (AFWCF).

Regarding Table 4.2, we note the following:

- The Air Force does not have the technical data it needs to enable competition among potential providers of logistics support for many of its costliest aircraft programs supported by CLS. As a result, opportunities for competition to drive innovation and efficiencies are currently limited and may not be possible without costly investments to secure technical data.
- Constraints on organic and contractor depot maintenance activities (e.g., 50/50 and core requirements) have changed little in the past two decades. Congress has only slightly relaxed the laws restricting the outsourcing of logistics since the end of the Cold War. Core and 50/50 requirements place binding constraints on the USAF. As a result, PPPs have become an increasingly important part of most large CLS arrangements.
- There has been some shedding of organic capabilities, such as closing of two Air Force depots and a reduction in the ability to perform SE, but the legal requirements to retain a core capability for organic depot maintenance and to perform at least one-half the work organically coupled with legal and political constraints on shedding surplus logistics capacity have severely limited the ability to reduce sustainment costs as envisioned in the mid-1990s.

- We also believe that training of staff to create, administer, and monitor CLS contracts has not expanded sufficiently to accommodate the increasing reliance on CLS arrangements.
- The USAF continues to struggle with cost reporting issues, which have hampered its ability to compare the cost of performing logistic activities organically or by contractors. Detailed contractor and Air Force depot cost data are so closely held that we cannot say with certainty whether accounting systems exist to capture costs accurately enough to enable fair comparisons of public and private depot maintenance costs, including overhead costs. We do know that organic SCM costs include uniform surcharges that mask the actual cost of managing individual items or groups of commodities.
- Finally, long-term contracting arrangements that provide adequate incentives for contractors to reengineer processes and innovate are seldom pursued outside of component PBL arrangements that are funded through the AFWCF.

We discuss these and related challenges in more detail in the remainder of this section.

Technical Data Rights Issues Limit Product Support Options

Beginning in the 1990s, the USAF and other defense services began relying more on OEMs to provide lifetime sustainment services. Because organic sustainment and recompletions were not planned, program offices did not obtain the technical data necessary for those options.

The impediment in the USAF is almost always that it did not pay for delivery of technical data in the format it desires during the development phase. These decisions resulted in the USAF having few sustainment alternatives. Attempts to purchase the technical data needed to enable alternatives have been met with exorbitant price tags—essentially the OEM’s future income as the sole-source product support provider—or with outright refusal to sell.

In addition to limiting sustainment options, lack of technical data has resulted in difficulties meeting certain statutory logistic rules, including the 50/50 and the core logistical capabilities rule.²⁷ Because data deficiencies prevent many programs from performing organic maintenance, the USAF is increasingly turning to PPPs with OEMs as workarounds to satisfy these requirements. Under these partnerships, the OEMs typically supervise government employees at government facilities but do not transfer any technical data to the government.

For currently fielded systems, the problem can be partially mitigated by a better understanding of the nature and format of the technical data, which drive the cost of the technical data package. For future programs, this problem was addressed by legislation enacted in the FY 2018 National Defense Authorization Act.²⁸ Section 2439 of the Act, *Negotiation of price for technical data before development or production of major weapon systems*, requires DoD to negotiate a price for the delivery of technical data before selecting a contractor for the

²⁷ 10 U.S.C. 2464, 2466.

²⁸ Public Law 115-91, National Defense Authorization Act for Fiscal Year 2018, December 12, 2017.

development or production of a major weapon system when the government is still in a favorable negotiating position.²⁹

Lack of Cost Transparency Reduces the Government's Ability to Evaluate Sustainment Alternatives and Negotiate for Best Value

The USAF's limited visibility into CLS costs and how this hampers the management of CLS contracts is a recurring theme in literature and our field research. DoD has made progress in this area. The OSD Office of Cost Assessment and Program Evaluation has led an initiative to require more detailed cost reporting on new sustainment contracts, for example.

Nonetheless, challenges obtaining cost and programmatic data of sufficient detail to inform determinations of fair and reasonable prices during contract negotiations remains a problem for the USAF. These ongoing difficulties in obtaining insights into contractor costs for work performed for the government reflect the market power of CLS providers in the absence of competition. The law expects the government agency to require contractors to provide cost or pricing data for contracts over \$2 million. Cost or pricing data are information the parties would reasonably expect to have a significant effect on price negotiations. The law makes exceptions when the price is the result of competition between two or more viable bidders or for commercial items. The contractors, as sole-source providers, are able to refuse to provide information that will put them at a disadvantage in price negotiations.

The USAF and DoD Have Limited Tools for Creating Incentives for Efficiency and Innovation

Absent competition, the Air Force has weaker options to motivate contractors to control costs on CLS contracts. We discuss four tools typically employed to manage CLS costs. Each of these tools has limited effectiveness, and they are used to varying degrees to manage USAF CLS arrangements.

Contract Negotiation

The Air Force has some options in how it assigns and trains personnel involved in contract negotiations that affect the government's ability to obtain the best value from CLS providers. We heard from some stakeholders that the Air Force begins from a weak negotiating position on many of its big CLS contracts. For example, in our two case-study programs, the C-17 and F-22, the Air Force wrote justification and approval documents for other than full and open competition to award the CLS contracts on a sole-source basis. We also note that the Air Force is at a disadvantage in the training and experience of its negotiating teams compared to its industry counterparts and that the difficulty in achieving cost transparency previously discussed limits its ability to assess and negotiate the reasonableness of contract cost positions.

²⁹ Pub. L. 115-91, 2017, Section 2439.

Incentive and Award Fees

Program office officials from our case study programs described experimenting with various award or incentive fee arrangements and judged them effective in motivating desired behavior in at least some cases. More broadly, GAO assessed the use of contract incentives by DoD and found DoD has increased and improved its use of incentive fees since 2010. DoD officials expected contractors to underrun costs on most of the incentive fee contracts GAO reviewed in a 2017 report.³⁰ However, GAO also found that incentives do not always lead to better outcomes, and that DoD has not consistently assessed how the selection of a particular contract type or incentive arrangement has promoted the achievement of cost, schedule, or technical performance goals.

PS-BCAs

The PS-BCA process can reveal ideas for cost savings that the government can use in negotiations with the CLS contractor and can lead the incumbent CLS provider to offer cost-saving measures such as reductions in fees, more work-sharing with organic providers, etc., to entice the Air Force to keep the existing arrangement largely intact. The business case analysis (BCA) of C-17 product support in 2009 motivated such cost-saving measures.

However, a number of issues affect the usefulness of PS-BCAs. For example, PS-BCAs are narrowly focused on a single weapon system and lack enterprise-wide analysis of SCM, repair capabilities, or other functions that can be affected by weapon system sourcing decisions. We also note that courses of action in some PS-BCAs consider PPPs, but there is limited understanding and ability to assess the pros and cons of PPPs.

Multiyear or Multiple-Year Contracts

A fourth way to motivate cost control on CLS contracts is through appropriately structured long-term contracts. The basic principle is to use the possibility of increased profit to motivate contractor efforts to lower cost in the short run. Eventually, when the contract is next re-negotiated, the government will be able to begin negotiations at a lower cost point, driving eventual long-run savings for the program.

In practice, however, some challenges exist to implementing this approach. First, the law and the Federal Acquisition Regulation (FAR) limit the dollar value of multiyear services contracts, limiting the applicability without obtaining waivers for large CLS arrangements. Second, the government is often tempted to change the terms and conditions of the contract when it exercises the option for each year. The contractor must be able to trust its government counterpart to honor the terms and conditions of a multiple-year contract for its entirety, rather than “claw back” savings by renegotiating prices when exercising each option year. Third, large multiyear or multiple-year contracts can limit the Air Force’s funding flexibility by obligating the Air Force

³⁰ GAO, *Defense Contracting: DOD Needs Better Information on Incentive Outcomes*, GAO-17-291, July 2017.

to a predetermined level of spending over several years, making single-year contracts more attractive.

Additional Training Is Needed to Improve Management of Contractor Logistics Support

Our review of literature regarding DoD's experience with CLS and PBL over the last 20 years, and the field work we conducted for this project, indicate a need for further workforce training and development. Some SMEs we spoke with asserted that there are insufficient training opportunities available to support proper management of CLS and PBL arrangements. Issues raised included challenges in hiring and retaining well qualified workers, a general lack of engineering expertise within program offices, and ineffective processes for compiling and sharing lessons learned among workers over time and across programs.

To supplement our discussions with program office staff involved in managing CLS arrangements, we spoke with personnel in organizations that provide training and oversight in logistics contracting. They noted that PBL coursework is not mandatory for contracting officers in government, while it is for contracting personnel in industry. They also noted that lessons learned have demonstrated that government personnel lack skills in (1) identifying shared or mutual interests with industry, (2) identifying what is important for managing CLS arrangements and when to communicate to senior leadership, (3) understanding how industry works, and (4) assessing the costs of delivering various product support outcomes.

Deficiencies Exist with Documenting and Disseminating Lessons Learned

The GAO has called repeatedly for a systematic assessment by DoD of CLS. Officials we contacted in the offices of the Assistant Secretary of Defense for Logistics and Materiel Readiness and the Secretary of the Air Force, Air Force Acquisition (SAF/AQD) were not aware of any ongoing efforts to collect information on the effectiveness of DoD's contract maintenance practices. A specific aspect of CLS contracts that is also unaddressed analytically is PPPs. Given the lack of systematic determination of what works and what does not work in the Air Force for CLS/PBL, and the lack of required training in the subject for all but Air Force logisticians, it is axiomatic that the Air Force has a limited capability to learn lessons and share best practices. Among the personnel we spoke with, expertise was gained by experience on the job, most effectively via an experienced colleague or supervisor. This slow process of building a center of excellence while learning through experience and peer training requires a stable workforce. We also heard of limited and informal sharing of experiences and advice between System Program Offices (SPOs).

DoD Culture and Perspectives Contribute to Some CLS Challenges

We encountered, mainly in the field research, certain ideologies and cultural implications worthy of mentioning that could also be having an adverse effect on the management and execution of CLS arrangements. These include a focus on effectiveness over cost-efficiency,

which tends to drive decisionmaking toward costlier but less risky alternatives, and myopic perspectives that result in worse long-term outcomes. Air Force personnel, especially the uniformed service members, rotate between assignments as a matter of human resources management practice. This can sometimes lead to short-sighted managerial decisionmaking. We also note a general aversion and discomfort toward allowing contractors to earn above-normal profits in the short term, even if the profit incentives are likely to result in long-term savings outcomes for the government. As a result, there is limited willingness to use sizable incentives to promote certain contractor behavior.

5. Recommendations

Our findings lead to recommendations in a number of areas, which we discuss in this chapter.

Recommendation to Identify and Promote Best Practices

The USAF should formally track and disseminate lessons learned and best practices from CLS/PBL arrangements. The Defense Contract Management Agency and/or Defense Contract Audit Agency could assist in this effort, along with Air Force participants. This effort should seek to shed light on a variety of issues:

- the effectiveness of award fees and incentive fees in motivating performance
- approaches to contracting for labor effort, such as SE, that is not easily tied to logistics outcomes
- approaches to contracting for SCM
- the importance of a long-term period of performance
- when there is more than one provider of a service on a contract, comparisons of cost and performance
- assessments of cost and effectiveness of PPPs, including their success in inserting technology into Air Force depots.

In addition to a systematic collection and sharing of lessons learned in managing CLS contracts, we recommend the USAF consider the following recommendations.

Recommendation to Improve Contracting

Consider transitioning some CLS arrangements to multiple-year contracts funded through the AFWCF. The Air Force manages some commodity-level PBL contracts this way. The contracts would be requirements contracts, in which the contractor is guaranteed all the work that is generated for the contracted good or service, and could be long term but incrementally funded. The AFWCF would be reimbursed using estimated cost per flying hour factors in the same way organically sustained programs work for the flying hour program. The approach requires the Air Force to honor the terms and conditions of the multiple-year contract over its duration.

Contracting for discrete elements of product support using long-term PBL contracts funded in the working capital fund is an approach used successfully by the Navy, but rarely in the Air Force. This approach was advocated in 2016 by the then-director of the 448th SCM Wing:

Changing the Air Force SCM business model can only be accomplished through bold leadership and willingness for innovation. A business model that leverages the collective strengths of the organic and industry supply chains can be achieved through expanding the use of the AFWCF for SCM PBL strategies (versus appropriated funds) at the system or sub-system levels versus the current transactional or commodity level PBL approach. One reason that the Air Force may want to consider using the AFWCF as a source of funding for system/sub-system level SCM PBL contracts is that it gives the Air Force a credible exit

strategy if at some future time the contractor and the government cannot reach an agreement.³¹

Recommendation to Improve Workforce Training and Development

The USAF should develop additional training curriculum focused on managing CLS contracts and provide the training to personnel in SPOs that manage large CLS contracts and other personnel whose duties would benefit from the skills. The training we envision would reflect findings from our first recommendation, which would draw lessons primarily from and applicable to large Air Force CLS contracts. The training would be provided on-site at the SPO or other work site and would be tailored, at least in part, to the issues specific to each contract.

Recommendations to Improve PS-BCAs

We recommend that the Air Force stand up an independent, organic capability to conduct PS-BCAs. An organic capability to conduct PS-BCAs would ease data collection, facilitate consistent methodologies, retain lessons learned, and enable an enterprise perspective. This cadre would work in concert with participants from the program office and other organizations. It would collect and retain cost and performance data from across the Air Force enterprise and build a center of excellence for this capability. The organization should be located at a high level within the Air Force hierarchy, such as the office of the Assistant Secretary of the Air Force for Logistics and Product Support (SAF/AQD) or the Assistant Secretary of the Air Force for Financial Management and Comptroller (SAF/FM). Its creation should be accompanied by a revised Air Force Instruction 63-101 that specifies the organizations within the Air Force that are required to support PS-BCAs with subject-matter expertise and data. Ideally, the PS-BCA would be conducted in conjunction with the post-initial operational capability reviews and integrated logistics assessments required by law and regulations, and this procedure would be prescribed in a revised instruction.

The Air Force should also establish a process for deciding, possibly in conjunction with the Assistant Secretary of Defense for Sustainment, the extent of the analysis to be done. PS-BCAs are likely not required every five years if conditions have not changed since the last BCA. As noted in the *PSM Guidebook*,

Revalidating the BCA does not mean that the BCA must be completely redone every five years. If the BCA ground rules and assumptions and operating environment have not changed, no errors in the original BCA are uncovered, and the product support solution is performing well, no other action is required.³²

³¹ Frank R. Wasburn, Jr., and Joseph Mercurio, “What Is the Future of the Air Force Supply Chain?” *Exceptional Release*, No. 137, 2016, pp. 9–28.

³² DoD, *Product Support Manager Guidebook*, Washington, D.C., April 2016, p. 19.

The revised instruction should ensure the integration of the processes to manage and evaluate PPPs with weapon system product support.³³ The current Air Force process for managing and evaluating PPPs is dysfunctional in that it holds the Air Force Sustainment Center (AFSC) responsible for evaluating PPP performance even though individual SPOs usually fund and manage the contracts that use PPPs, and AFSC seldom has a copy of the contract or knowledge of its provisions. A revised formal instruction would allow the Air Force to align better with the intent explained in OSD’s *Public-Private Partnering for Product Support Guidebook* to consider PPPs for new programs “when preparing the Product Support BCA for performance-based logistics support; when [Depot Source of Repair] decisions are made; at Milestones B and C,” and for legacy systems at “initiation or renewal of PBL contracts, new technology insertion, changes in [Depot Source of Repair], or reviews required by law or regulation.”³⁴

Taken together, these recommendations have the potential to improve USAF decision making regarding product support.

³³ Our recommendations regarding PPPs are similar to those made by Floyd and Gorman (2013) to develop a flexible process for high-quality BCAs and update PS-BCA guidance to ensure consideration of PPPs in product support decisions, among other recommendations they made to improve partnering (Dave Floyd and Tom Gorman, “Public-Private Partnerships: The Key to Retaining Government and Industry Capabilities,” *Defense AT&L*, Vol. 42, No. 1, January–February 2013, pp. 32–35).

³⁴ Office of the Assistant Secretary of Defense (Logistics and Materiel Readiness), 2018, p. 15.

Abbreviations

AFCAA	Air Force Cost Analysis Agency
AFSC	Air Force Sustainment Center
AFTOC	Air Force Total Ownership Cost
AFWCF	Air Force Working Capital Fund
ALC	Air Logistics Center
AWACS	Airborne Warning and Control System
BCA	business case analysis
CLS	contractor logistics support
DAU	Defense Acquisition University
DLA	Defense Logistics Agency
DoD	U.S. Department of Defense
DSB	Defense Science Board
EEIC	Element of Expense Investment Code
FAR	Federal Acquisition Regulation
FTE	full time equivalent
FY	fiscal year
GAO	U.S. Government Accountability Office (previously General Accounting Office)
ICS	interim contractor support
IG	Inspector General
JPATS	Joint Primary Aircraft Training System
JSTARS	Joint Surveillance Target Attack Radar System
MDS	mission design series
OEM	original equipment manufacturers
O&S	operating and support
OSD	Office of the Secretary of Defense

PAF	RAND Project AIR FORCE
PAR	Presidential Airlift Recapitalization
PBL	performance-based logistics
PM	Program Manager
PPP	public private partnership
PS-BCA	product support business case analysis
SAF/AQD	Secretary of the Air Force, Air Force Acquisition
SAF/FM	Assistant Secretary of the Air Force for Financial Management and Comptroller
SCM	supply chain management
SE	sustaining engineering
SME	subject-matter expert
SPO	System Program Office
TY	then-year
USAF	U.S. Air Force

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DoD—*See* U.S. Department of Defense.

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Between fiscal years 1996 and 2017, U.S. Air Force (USAF) spending on contractor logistics support (CLS) grew from 6 percent to 21 percent of aircraft operating and support costs. Although CLS constitutes one of the fastest-growing elements of aircraft operating and support costs, USAF leadership has had limited visibility into the drivers of those costs, leading to uncertainty about what the Air Force can do to manage the growth and whether such arrangements are cost-effective relative to organic support. RAND Project AIR FORCE analyzed cost data for CLS and organically maintained fleets, reviewed product support business case analyses, synthesized findings from reports published by the U.S. Government Accountability Office and Department of Defense (DoD) Inspector General on CLS, and interviewed subject-matter experts within DoD.

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