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The F100 Engine Purchasing and Supply Chain Management Demonstration

Findings from Air Force Spend Analyses

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Cover photo: U.S. Air Force photo by Staff Sgt. Robert Zoellner

Summary

Purchasing and supply chain management (PSCM) offers the Air Force a means to make better use of its resources in general and to improve several of its logistics processes specifically. Conducting a spend analysis is one of the first steps in implementing PSCM practices. A spend analysis that documents what is purchased, how much is spent, and where goods and services are purchased can help an enterprise to identify specific performance, quality, and cost goals in relationships with providers and can suggest where time and resources should be focused to achieve those goals.

In fiscal year (FY) 2002, the Air Force chose engine parts as an area for examining the feasibility of employing best practices for purchasing and supply management initiatives. Oklahoma City Air Logistics Center (OC-ALC), which is responsible for supporting Air Force engines, then selected the F100 engine as its platform for a PSM demonstration. RAND was asked to assist OC-ALC in conducting a spend analysis on F100 engines, which led to a spend analysis of jet engine bearings, a critical component for jet engine maintenance.

The F100 engine has remained in inventory longer than originally planned and powers more Air Force jet aircraft than any other engine. Because maintaining the F100 and other jet engines constitutes such a large part of Air Force operations, any improvements in purchasing and supply management of jet engines would lead to noticeable improvements in equipment cost and performance throughout the service.

A spend analysis involves an iterative, four-step process—extracting data from the best sources, integrating and validating the data to ensure their accuracy and completeness, cleansing data to eliminate discrepancies in the data, and analyzing the data—with the process repeated as data are improved or as new issues are identified for analysis (see pp. 9–10).

At the time of the Air Force's PSM demonstration, there was no single source of data for the OC-ALC's spend analysis.[1] Instead, data were integrated from a variety of sources. For the spend analysis conducted by RAND, Air Force data from the following sources were used:

- Contract Action Reporting System (J001)
- Acquisition and Due-in System (J041)
- Contract Depot Maintenance and Cost System (G072D)
- Automated Budget Compilation System (ABCS) (D075)
- Item Manager Wholesale Requisition Process (D035A)
- Bill of Materials (BOM) (D200F)
- Contracting Business Intelligence System (CBIS)
- Acquisition Method Code Screening System (J090A).

Because the Defense Logistics Agency (DLA) also purchases goods and services for the F100 engine, we also used data from the following DLA data sets:

- Active Contract File
- Requisition File.

RAND examined Air Force and DLA data for FY 1999–2002. Air Force spending on F100 items during the years studied varied between $439 million and $670 million per year (see p. 27). Our analysis of data indicates that items, i.e., spare parts and repair serv-

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[1] The Strategic Sourcing Analysis Tool, which the Air Force developed to implement PSCM, brings together information required for spend analyses from many legacy data systems. This study predates the development of this tool.

ices that can be linked to a National Stock Number (NSN), constitute most of Air Force F100 spending (see p. 28). The bulk of other Air Force purchases for this engine, primarily for acquisition and testing of new F100 equipment, could not be linked to an NSN.

Of the F100 items that the Air Force purchased, most were for sustainment of engines (see p. 31). Purchases by Air Logistics Centers (ALCs), which purchase nearly all sustainment items associated with an NSN, were primarily for spare parts. Most ALC F100 contract repair dollars were for a Pratt & Whitney Total Systems Support (TSS) contract for the F100-PW-229 engine, and much of the remaining F100 repair dollars were for contracts to help bridge a workload transition from the San Antonio ALC to the Oklahoma City ALC. This meant that only a small portion of ALC F100 repair purchases could be considered a prospective target for PSCM improvements. Many of these repair purchases were through sole-source contracts, and even "competitive" contracts were almost uniformly limited to qualified sources.

Air Force F100 expenditures were significantly greater than DLA F100 expenditures, which averaged about $102 million a year (see pp. 28 and 40). (This dollar figure likely is an overestimate given the difficulties of isolating DLA F100 spending.) However, Air Force F100 expenditures were concentrated in fewer contracts and NSNs. Although their patterns of concentration of spending among certain numbers of contracts and NSNs differed, both the Air Force and DLA had large portions of their F100 item spend concentrated among a small number of supplier firms (see pp. 40–42). The concentration of spending among top producers suggests that some opportunities to improve PSCM processes with these suppliers exist, including consolidating the number of contracts with those suppliers or exploring other ways to take advantage of their level of spending to gain leverage with top suppliers.

To drive down management costs, both the Air Force and DLA may wish to reduce their total number of suppliers where there are redundant sources of supply, especially for those suppliers with whom they spend relatively few dollars. Such contraction of the supply base, and in the number of required contracts, would (1) free up contract-

ing personnel to become more familiar with the industries with which they work, including best practices in those industries; (2) enable logistics organizations to devote more time to developing strategic relationships with their key suppliers and working on continuous supply-chain improvements; and (3) reduce transaction costs. Both the Air Force and DLA may also wish to consider potential improvements through collaboration, with the agency that purchases more items from a common supplier—typically the Air Force for F100 items—leading the effort to improve PSCM practices.

The results of the RAND analysis demonstrate how a spend analysis for a weapon system can lead to targeting specific items for additional analyses and PSCM initiatives. As stated above, the choices for items that would be the basis of a contract featuring PSCM improvements were limited. A contract with Pratt & Whitney was close to completion at the start of the demonstration and a collaborative effort was under way with DLA to form a strategic supplier alliance with Honeywell International. Jet engine bearings were chosen from among the items that might be appropriate for PSCM initiatives (see pp. 43–44). The Air Force spends millions of dollars on bearings annually and past supply-chain problems with this group of items have adversely affected readiness.

While Air Force purchases of F100 items exceeded DLA's F100 purchases, DLA's purchases of jet engine bearings, which averaged $18.5 million annually, were more than twice the amount of the Air Force's purchases of bearings, which averaged $8.7 million a year (see p. 46). DLA spending was concentrated in spare consumable bearings, whereas Air Force spending was concentrated in more expensive fracture- and safety-critical bearings. Air Force spending for jet engine bearings was also more concentrated in sole-source items (see pp. 48–49).

The Air Force and DLA shared many common suppliers for F100 items, and they shared many common suppliers for jet engine bearings (see p. 54). Among most of these suppliers, DLA spent more for bearings than did the Air Force, but among some of the suppliers, the Air Force had higher total expenditures for all goods and services. While DLA spent more with several bearings suppliers than did the

Air Force, the Air Force or another service had a higher overall average annual spend for goods and services with every bearings supplier. Efforts to increase leverage with suppliers may best be led by the service that spends the most money with those suppliers. Such strategic efforts would not preclude an individual service from having contracts with suppliers that address its specific needs.

Air Force data from the sources listed earlier in this summary can help to identify opportunities for PSCM improvements for both large and relatively small but critically important items. As the Air Force gains more experience in conducting spend analyses, it will undoubtedly uncover further means for getting the most from its resources.