

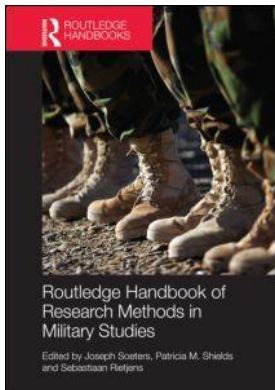
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8

RETRIEVING WHAT'S ALREADY THERE

Archival data for research in defense acquisition

Rene G. Rendon and Keith F. Snider

J.R. Fox (1974) *Arming America: How the U.S. Buys Weapons*. Cambridge, MA: Harvard University Press.

Arming America is a comprehensive analysis of how the USA acquires major weapons and other military systems for national defense. It provides a deep understanding of why defense acquisition seems so problematical, with many weapons programs experiencing cost overruns, schedule delays, and performance shortfalls. In explaining the sources and manifestations of these problems, *Arming America* covers a wide range of topics, including acquisition's stakeholders – Congress, industry, and the Department of Defense (DOD) – and the complex managerial, political, and legal environments in which they operate. Making sense of the often-convoluted relationships among these stakeholders in such an environment is daunting, but Ron Fox meets the challenge with a classic work that remains highly relevant in almost every important aspect.

Fox writes as the quintessential “pracademic,” having served in several DOD acquisition-related positions, most notably as the Assistant Secretary of the Army for procurement, while on leaves of absence from Harvard Business School. Drawing on his personal experiences in DOD, Fox also relies on a broad range of archived data sources, including Congressional reports and testimonies; reports from the General Accounting Office (GAO; now Government Accountability Office); DOD budgetary and cost data; internal DOD policies on acquisition; and defense industry data (e.g. Moody's, Standard and Poor's, and Forbes' data). Fox's skillful use of these data sources illustrates the variety of topics and methods that hold promise for research in defense acquisition.

While having the advantage of inside-the-Pentagon access to much acquisition data, Fox adroitly uses several publicly available data archives, including Congressional testimony, auditor reports, and industry databases. In recognizing his data's limitations, Fox employs straightforward and simple methodologies, and he avoids an overreliance on any one data source. For example, in his chapter comparing defense industry to private industry, Fox eschews hypothesis testing through statistical analysis of financial data in favor of a triangulated approach using several data sources. He prefers simple graphical and tabular comparisons of financial metrics such as debt/equity ratios and

bond ratings, and he reinforces these with tables and graphics of figures from DOD contract awards. He also incorporates relevant commentary from trade journals, government reports, and interviews of industry leaders. The result is a multi-faceted, nuanced, and compelling interpretive analysis, which contrasts markedly from the highly technical methods and cramped conclusions too often found in strictly quantitative studies.

Arming America is pragmatic rather than conceptual. Fox pursues richly contextual descriptions and explanations for how acquisition works (or doesn't work). He portrays a system characterized by participants with poorly aligned incentives and disincentives, and by features that both cause problems and resist reform. These features are evident in a range of issues, from strategic issues of DOD–Congressional relationships to tactical issues of vendor selection. Underlying these issues is the pervasive environment of uncertainty (thus risk) inherent in pursuing advanced weaponry for use in constantly evolving scenarios, whether terrorist-style attacks by Afghan insurgents or missile attacks from North Korea.

Arming America appeared 40 years ago, but its findings remain valid. Fox concluded that large-scale structural changes were necessary to address acquisition's fundamental problems, but he doubted that America had the political will to effect those changes. Time has proved him right. While many reforms have been attempted, little of substance has changed, and U.S. defense acquisition remains as troubled as ever.

Introduction

Among the functions of national governments, defense acquisition, the activities that provide equipment and services to armed forces for the conduct of military operations, attracts much scrutiny (Kausal 1999; 2000). Controversy is evident in seemingly perennial debates surrounding the rationales, strategies, and tactics for acquisition; consensus is elusive on many questions. For example, what is the proper military strategy for any nation, and what capabilities and resource investments are needed for success in any given strategy? What is the proper relationship between a nation's military forces and the industries that equip them? What is the proper contribution of defense industry to a nation's economy? How is a proper level of transparency and accountability achieved in this unique civil–military activity? Such a wide range of important policy and management issues makes defense acquisition a compelling topic for social science research.

What data are available to support such research, and how might they be used? This chapter documents and describes some of the principal sources of archival data and research techniques used to support defense acquisition research. The goal is to provide useful information for potential researchers on:

- types of data available
- sources of data
- issues with access to and use of the data
- illustrations of research methods, which draw on these data.

Background

Data types

Archival acquisition data may be structured or unstructured. Structured data are well defined and often organized in tabular form, which enables graphical, statistical (e.g. time

series), or other quantitative analysis. Most acquisition data, however, exist as unstructured information in text-heavy documents like contracts, narrative reports, and policy documents. These typically lend themselves to interpretive, critical, or other qualitative analyses, such as those found in *Arming America*. Quantitative methods that employ content analysis, textual analysis, and data mining using document search engines may also be useful (Zhao et al. 2010).

Data sources

At present, two major forces shape the demand for and generation of defense acquisition data. The first is a managerial emphasis: data on acquisition-related actions are collected, stored, and used by acquisition managers in order to accomplish those actions more efficiently. The second is a political-legal emphasis: data are collected and made available to officials and the public in order to promote values like accountability, probity, and transparency in acquisition processes. These two forces indicate the main sources of archival data.

The agencies that acquire products and services for the military usually maintain extensive document files of unstructured information on procurement actions, such as solicitations, bids and proposals, contract awards, modifications, and closeouts. Nowadays, acquisition agencies in most nations use paperless “e-procurement” systems to promote efficiency, equity, and transparency. The acquisition authority in Singapore’s Ministry of Defense (MOD) is typical in its use of a government-wide e-procurement system (GeBIZ) that is open to the general public. The MOD uses the system to post solicitations for defense contracts for public viewing, and prospective firms use the system to search for and submit bids on suitable work. Notices of contract awards are also usually publicized via these e-procurement systems (Singapore Government 2013).

Such data from acquisition agencies might then be obtained by a variety of means by a variety of entities and used for a variety of purposes, each of which may result in the generation of additional archival acquisition data. Here are some examples:

- An acquisition agency is required to provide to its higher authority a periodic report on contract actions, including summary statistics; these are then consolidated and publicized for all defense agencies or perhaps for the entire national administration.
- A defense agency reports its anticipated contract awards to the defense budgeting authority, which then uses those in preparing future defense budgets.
- An independent government audit agency is directed to investigate a contract action or series of actions and provide a report to defense leaders or to the national legislature.
- An agency publicly announces a major contract award, which then is reported on by news media or a private watchdog group.
- Influenced by any of the above, national leadership or the legislature promulgates acquisition-related laws, regulations, and other policy, which then become part of the archives of institutional acquisition data.

These scenarios indicate that the promising starting points for researchers to seek archival defense acquisition data are the data repositories of the entities mentioned above. Forty years ago, Fox relied on paper files from many such entities to write *Arming America*. Today, of course, most of those entities have searchable organizational web sites with links to pages with relevant data. In each of these scenarios, the data that are generated and archived will vary between structured or unstructured, depending on their purpose and use.

Data challenges

For a variety of reasons, little attention is given to scholarly research on defense acquisition (Albano et al. 2013; Snider and Rendon 2012), and so little data have been collected for that purpose. Researchers thus have the challenge to understand the purposes for which archival acquisition data are collected, how those purposes affect the quality and quantity of the data, and how to make their research questions and methods compatible with those data. To illustrate, Table 8.1 shows publicly available data on four of NATO's approximately 350 contracts awarded during the last half of 2012. While this type of information might serve a transparency purpose, it is clearly inadequate for examining many interesting research questions, such as whether NATO procurement processes allow for adequate competition among vendors in member states, or whether small and medium-sized enterprises have adequate opportunities to sell products and services to NATO.

Restrictions on access to acquisition data represents a second challenge. As expected with national security matters, sensitive data are classified, especially regarding new weapons capabilities, technologies, and employment, and thus available only to relatively few within the defense establishment. Further, the structural arrangements for government contracting often restrict access to data through the safeguards they provide for any sensitive vendor information. As a result, proprietary data ("trade secrets") and documents such as a firm's business plan, marketing strategy, and salary structure are accessible only by those acquisition officials who need them to judge whether the firm should receive a contract award. Thus, unless researchers obtain the same sort of insider access that Fox enjoyed in writing *Arming America*, they will find it difficult to obtain acquisition-related data that are not already publicly available.

Archival defense acquisition data in the USA

The remainder of the chapter focuses on archival data in the USA. While most other liberal democracies collect data and information with a view towards acquisition reform, no other nation has such extensive archival data as the USA. A primary reason is the high cost of collecting data and maintaining archives; the USA, with its large defense investments, can most readily afford to do so. No other nation is likely to have all of the types of archival data found in American sources; for example, no other country has a system comparable to the Federal Procurement Data System-Next Generation (FPDS-NG; discussed below). While many nations have some archival data (e.g. e-procurement systems; auditor reports), it is unlikely that any has types of archival data that are not also found in the USA.

As might be expected, availability of the Department of Defense's (DOD's) acquisition data ranges from unrestricted to highly restricted. The discussion here addresses only data that are

Table 8.1 Extract of NATO purchase orders during the period July–December 2012

Contractor	Country	Value (EUR)	Purpose
Aerazur - Zodiac Aerospace	France	109,640	Fixture, lighting
Aero Precision Industries Inc.	USA	264,332	Procurement of parts
Agilent Technologies	Italy	348,501	Supplies for fixed wing aircraft
Agusta Westland Ltd.	Great Britain	1,001,332	Supplies for helicopter

Source: NATO Support Agency (NATO 2013).

Note: The threshold value for reporting an award was EUR 76,800 in 2012.

publicly available and have searchable web sites that are easily found simply by entering the organization's name in any Internet search engine.

DOD makes vast amounts of data and information publicly available via the Defense Technical Information Center (DTIC), to which most institutional libraries have access. DTIC's products are searchable by its site search engine, as well as by web search tools such as Google Scholar. DTIC contains budget documents, DOD policies, reports and theses written by students at various DOD schools, and many other defense-related publications.

Structured data

Sources of archival structured data include program data and contract data (Table 8.2); these are both from government sources.

Program data

The Selected Acquisition Report (SAR) is DOD's principal report to Congress on cost, schedule, and performance information for a major acquisition program. A SAR provides up-to-date estimates on program status in relation to baseline estimates. A variance between the baseline and current estimate may be either favorable or unfavorable. SARs are submitted on an annual basis, with quarterly reports required for programs experiencing significant cost growth. While the SAR contains other-than-cost information, for example, unstructured narrative text descriptions of program events, progress, and plans, most of its data elements are related to cost. SARs provide total program cost estimates that account for a variety of activities, including research and development, procurement, military construction, and other acquisition-related operations and maintenance costs. Anticipated inflation rates are also taken into account. In addition, the SAR provides data on approved future levels of funding for each major acquisition program.

Table 8.2 Sources of structured data

Source of data	Examples of data	Example of research using the data
Selected Acquisition Report (SAR) http://www.acq.osd.mil/ara/am/sar/index.html	Program Narrative Highlights Program Acquisition Cost Program Cost Changes Program Funding Status	In Drezner et al. (1993) SAR cost data are used to quantify cost growth in acquisition programs and to identify factors affecting cost growth. Bolten et al. (2008) use SAR cost data for 35 major acquisition programs to identify sources of cost growth, which included errors in estimation and scheduling, government decisions, and financial matters.
Federal Procurement Data Systems-Next Generation (FPDS-NG) (www.fpds.gov)	Top 100 Contractors Report; Small Business Goaling Report	Lloyd (1988) uses FPDS data to analyze alternate dispute resolution in contract appeals.
Federal Business Opportunities (FEDBIZOPPS) (www.fbo.gov)	American Recovery and Reinvestment Act (economic stimulus) Reports	Benner et al. (2010) use FEDBIZOPPS data are used to analyze how much stimulus funding was budgeted for health intervention and comparative effectiveness research.

Because SARs are used to monitor program status, they emphasize changes from the previous SAR. Clearly, cost variances may occur for a variety of reasons; for example, costs will increase or decrease if the procurement quantity changes. The SAR categorizes cost variances according to several causes, including variances caused by inflation index changes, by changes in the procurement quantity, or by changes in the procured item's attributes. Most of the extant quantitative research that analyzes causes for the perennial problems in defense acquisition in the USA has focused on cost variances in acquisition programs and thus has employed archival SAR data. While Fox used some SAR data in *Arming America* (1974: 364–365), the RAND Corporation publications represent the most significant body of work of this type (see examples in Table 8.2).

While the level of detailed data that are captured in annual SARs enables rich possibilities for quantitative research, researchers must understand its limitations. Hough (1992) described several issues with SAR data, for example, varying interpretations across programs of how to define and present data elements. Further, reporting requirements occasionally change, for example, as in 2006 when Congress revised the requirement for programs to report variances from their original baselines in addition to any updated baselines (Schwartz 2010).

Contract data

The aforementioned FPDS-NG is the central repository for all federal government contracting actions, including DOD actions, above the micro-purchase threshold (currently \$3,000). The FPDS-NG provides summary data for contract awards by federal government executive agencies. It also provides archives of several standard annual reports, such as the *Top 100 Contractors Report* and the *Federal Procurement Report*, the data from which allow analysis of federal contracting according to geographical location, market segment, and other factors (FPDS-NG 2013).

FPDS-NG also contains archives of raw procurement data in extensible markup language for all federal procurement actions from 2004 to the present. While these archives represent a tremendous potential source of research data, the FPDS-NG web site cautions:

The [XML] archives are intended for use by users who have a great deal of experience with procurement data, XML technology, and large volumes of data. Use of the archive data without a complete understanding of the business processes, rules and regulations, and system information increases the risk of flawed analysis.

(FPDS-NG 2013)

Finally, Federal Business Opportunities (FEDBIZOPPS) is the official federal government electronic portal for contracting officers to publicize notices of proposed contract actions over \$25,000. FEDBIZOPPS is tailored for use by either buyers or vendors, but researchers who seek information on specific contracting actions would find it a potentially valuable resource. While much of its content is unstructured data (see below) in the form of solicitations and award notifications, FEDBIZOPPS also contains significant archival structured data on certain high-profile areas of acquisition, for example, contracts awarded as a result of the 2009 economic stimulus program (US Congress 2009).

Unstructured data

Next, various sources of unstructured data are discussed – both governmental and non-governmental (Table 8.3). Most of these sources conduct studies or investigations related to defense acquisition and provide reports summarizing their findings. As demonstrated by Fox in *Arming America*, they are excellent secondary sources for acquisition-related research.

Table 8.3 Sources of unstructured data

Source of data	Examples of data	Example of research using the data
Government Accountability Office (www.gao.gov)	High-Risk Series; Defense Acquisitions: Assessments of Selected Weapon Programs	Gansler (2011) uses secondary data from Assessments of Selected Weapon Programs to evaluate the performance of industry in managing acquisition programs and to recommend changes in government policy and practices to protect critical technologies.
	<i>Contract Management: Coast Guard's Deepwater Program Needs Increased Attention to Management and Contractor Oversight</i> , GAO-04-380, March 9, Washington, DC: Government Accountability Office	Brown et al. (2010) apply principal-agent theory to the case of the Coast Guard's controversial Deepwater project.
	Comptroller General Legal Decisions and Bid Protests	Maser and Thompson (2010) conduct statistical analysis of bid protest data to test various hypotheses (e.g. that small vendors are more likely than large to protest contract awards). Rogerson (1989) uses secondary data from the Comptroller General report on defense contractor profitability to test a theory that observed changes in firms' stock market value infers the size of the estimated profit from the awarded production contract.
Congressional Research Service (https://opencrs.com)	Chadwick, S.H. (2007) <i>Defense Acquisition: Overview, Issues, and Options for Congress</i> , CRS Report for Congress. Washington, DC: Congressional Research Service	Kratz and Buckingham (2010) use secondary data to analyze threat versus capability-based planning.
DOD Inspector General (DODIG) (http://www.dodig.mil/pubs/index.cfm)	Department of Defense Inspector General (2009). <i>Summary of DOD Office of Inspector General Audits of Acquisition and Contract Administration</i> , Report D-2009-2071, Washington, DC: Author	Rendon et al. (2012) use DODIG reports on contracting deficiencies to analyze services acquisition management practices across Army, Navy, and Air Force installations.
RAND Corporation (www.rand.org)	Chow, B., Silbergliitt, R., and Hiromoto, S. (2009) <i>Toward Affordable Systems-Portfolio Analysis and Management for Army Science and Technology Programs</i> , Monograph MG-761, Santa Monica, CA: RAND Corporation	Dacus (2012) uses secondary data to argue that DOD should implement simple metrics when assessing the technological maturity of defense acquisition programs.

Center for Strategic and International Studies (www.csis.org)	Center for Strategic and International Studies (CSIS) (2001) 'Technology and Security in the Twenty-First Century: U.S. Military Export Control Reform,' <i>A Report of the CSIS Military Export Control Project</i> , Washington, DC: CSIS, p. 4	Lavallee (2003) analyze European countries' difficulties in securing export control licenses from the U.S. Department of State.
Institute for Defense Analysis (www.ida.org)	Arnold, S.A., McNicol, D.L., and Fasana, K.G. (2008) <i>Can Profit Policy and Contract Incentives Improve Defense Contract Outcomes?</i> IDA-P-4391. Alexandria, VA: Institute for Defense Analyses	Callahan et al. (2011) study the public policy effects of cash flow subsidies on defense contractors' capital expenditures and cost of debt from 1978 to 2009.
Project on Government Oversight (POGO) (www.pogo.org)	Project on Government Oversight (various years). <i>National Security Investigations: Wasteful Defense Spending Reports</i>	Thorpe (2010) refers to a series of POGO reports in her discussion on the characterization of defense contract allocation for weapons expenditures as wasteful and abusive.
Citizens Against Government Waste (CAGW) (www.cagw.org)	Finnigan, T. (2006) <i>All About Pork: The Abuse of Earmarks and the Needed Reforms</i> , Washington, DC: Citizens against Government Waste	Rubin (2007) uses CAGW data in critiquing an increase in the Congressional practice of spending on special interest group programs.

Government sources

The main governmental investigative entities for acquisition matters include the Government Accountability Office (GAO) and the DOD Inspector General (DODIG). The GAO, headed by the Comptroller General, is the watchdog agency of Congress. It investigates issues related to public management and, as part of its evaluation of government programs, issues reports on those evaluations. The *Assessments of Selected Weapon Programs* summarize the GAO's analysis of cost, schedule, and quantity data on DOD's major defense acquisition programs obtained from SARs. Its *High Risk* reports summarize its observations in areas judged as high risk in their vulnerabilities to fraud, waste, abuse, and mismanagement. Unstructured data from the GAO also include the legal decisions by the Comptroller General on settlements of vendor bid protests and claims. The DODIG is the principal advisor to the Secretary of Defense on matters pertaining to fraud, waste, and abuse. The DODIG's staff conducts audits and investigations and, like the GAO, issues reports on the results of these activities.

An agency within the Library of Congress which works exclusively for Congress, the Congressional Research Service (CRS) provides policy and legal analysis on a wide range of complex government topics, including defense acquisition. The CRS does not conduct audits or investigations but rather relies almost exclusively on secondary sources to produce its analyses for members of Congress and their staffs. Reports, testimonies, and other publications from the GAO, DODIG, and CRS are accessible to the general public on the respective agency websites, each of which includes advanced textual search features and links to other research resources.

Non-government sources

Several non-profit organizations conduct research and analysis on public policy and decision-making, including defense acquisition. The RAND Corporation is a federally funded research and development center (FFRDC) that has long been active in acquisition studies. The Center for Strategic and International Studies (CSIS) conducts research, analysis, and develops policy initiatives focusing on defense and security; regional stability; and global challenges and issues. Finally, the Institute for Defense Analyses (IDA) operates three FFRDCs that conduct scientific and technical research on national security issues, including acquisition-related issues. Research products for each of these organizations are archived and accessible at their respective web sites.

Two non-profit watchdog groups publish significant information on acquisition. The Project on Government Oversight (POGO) investigates corruption, misconduct, and conflicts of interest throughout the federal government. Citizens Against Government Waste (CAGW) is a nationally recognized source for information on government waste. CAGW publishes the *Congressional Pig Book Summary* containing “the most glaring and irresponsible pork-barrel projects in the 13 annual appropriations bills and their sponsors” (CAGW 2013).

Finally, a few universities have dedicated programs to promote and conduct acquisition-related research; examples include the Center for Public Policy and Private Enterprise at University of Maryland, and the Acquisition Research Program at the Naval Postgraduate School. Such entities typically publish research products on their own searchable web-based repositories, though most may also be accessed through DTIC or a search engine such as Google Scholar.

Other types of archival acquisition data

Two other important types of data deserve some attention: those related to budgeting for acquisition programs, and those that document and describe acquisition-related policies. These may be found in a variety of sources (Table 8.4), and they contain a mixture of structured and unstructured data.

Table 8.4 Other types of archival acquisition data

Type	Source(s)	Example research project
Budgetary documents:		
• DOD Budget Submissions	DTIC (http://dtic.mil)	Davis, J. (1995) documents how extensive oversight of the program’s annual budgets by Congressional committees from 1982 to 1995 created significant turbulence in the program and nearly caused its cancellation.
• Congressional Hearings and Enactments	DOD Comptroller (http://comptroller.defense.gov)	
	DTIC (http://dtic.mil) THOMAS (http://thomas.loc.gov)	
Policy documents:		
• Federal Acquisition Regulation (FAR)	FAR Site http://farsite.hill.af.mil/	Dillard, J. (2003) analyzes and critiques DOD’s imposition of increasingly onerous reporting requirements for acquisition programs.
• DOD Policy Issuances	Policy Vault http://www.acq.osd.mil/dpap/	
• Federal Statutes	Defense Acquisition Portal http://dap.dau.mil	
	THOMAS (http://thomas.loc.gov)	

Budgetary documents

An extensive amount of data is generated each year when DOD prepares and submits its annual budget request, which is then incorporated into the President's Budget to be submitted to the Congress each February for its consideration. The DOD budget request includes, for each program, detailed supporting documentation that explains and justifies the rationale for the program and for the budget needed for execution. Annual budget documentation provides a deep level of context for any individual procurement action. For example, the supporting documentation for the Navy's procurement of the Tomahawk missile in fiscal year (FY) 2013 includes:

- the number of missiles to be procured (196)
- the required FY 2013 budget (\$308.97M)
- the projected annual quantities to be procured and budgets through FY 2017
- a summary description of the program's history, current status, and plans
- a breakdown of the major cost elements (e.g. hardware, software, logistical support)
- information on the major contracts (e.g. vendor, contract method and type)
- missile production rates
- the vendor's delivery schedule (Comptroller 2012).

Such information is presently archived and publicly available from FY 2000 for all major acquisition programs in various stages of development.

For any program, the budget documents should provide sufficiently detailed information so that the Congress will approve the program's budget for the upcoming FY. The documents contain semi-structured data with defined elements in tabular formats, as well as unstructured data consisting of narrative text.

In response to DOD's budget submissions, Congress begins its annual process of hearings and debates leading to passage of laws that authorize and provide appropriations for defense acquisition programs (Candrea 2008). Records of deliberations and decisions are contained in Congressional hearings, reports, and various versions of the legislation, including the final enacted version signed into law by the President. All of these are archived and available in the Library of Congress THOMAS site and consist almost entirely of unstructured data and information. These documents provide Congressional direction on major acquisition programs as well as the actual amounts approved for any acquisition effort. For example, the FY 2008 DOD appropriations legislation approved \$339 million for the new Littoral Combat Ship (US Congress 2007a: 12), while the defense authorization legislation for the same year contained a provision that DOD may employ only a fixed-price type contract for construction of the Littoral Combat Ship (US Congress 2007b: 27).

Policy documents

In light of the apparent failure of various acquisition reform initiatives over the past half-century, scholars have recently begun to take an interest in acquisition policy as a research topic (see for example Fox 2011; Dillard 2007). The general line of inquiry is to examine the artifacts of reform-minded policy, such as statutes, federal regulations, and internal DOD procedures, in relation to some defined outcomes so as to assess a policy's effects. Acquisition-related policy documents are typically publicly available – legislative documents via THOMAS, and historical DOD documents through DTIC.

Challenges: An example

The analysis by Maser and Thompson (2010; see Table 8.3) of protests of DOD contract awards illustrates some of the processes and challenges of using archival data. This study sought to

identify misalignments in DOD's management practices which create conditions conducive to errors – whether actual or perceived – that lead to protests. While Maser and Thompson (2010) relied heavily on interviews with knowledgeable contracting and industry officials, they first established an empirical foundation that used both structured and unstructured archival data on DOD contracts and protests. This foundation illuminates the general context and trends of DOD contract protests with information such as the distributions of protests by the: numbers of bidders; dollar value and duration of contracts; sizes of winning and protesting firms; revenues of winning and protesting firms; and type of contract output (e.g. product, service). Maser and Thompson also used this data to test several hypotheses, including the likelihood of a contract protest in relation to: the number of bidders on a contract; the bidders' size; the complexity of the contracted effort; and the type of contract (fixed-price or cost-reimbursable). The retrieval and use of these data are summarized in the following sections.

Structured data

Due to the magnitude and complexity of the data collection effort (many contracts awarded by several DOD agencies to numerous firms over multiple years), Maser and Thompson relied mainly on a commercial data mining web application, FEDMINE.USTM. This tool 'aggregates data from various disparate but authoritative federal government data sources . . . with full details on each transaction for all federal contractors . . .' (FEDMINE.USTM 2013). They obtained additional and confirmatory data from several of the structured data sources described above, including FPDS-NG and FEDBIZOPPS (2010: 81).

While most of these data were available in spreadsheet formats produced by FEDMINE.USTM and FPDS-NG, Maser and Thompson (2010) undertook a significant coding effort to convert the data to simpler, more usable forms. For example, they categorized a firm as either small or large based on its annual revenue and number of employees, which were presented in terms of dollars and headcounts, respectively. To give another example, they reduced the wide range of contract outputs (e.g. missiles, cargo vehicles, information systems, medical services, construction) to just three categories – weapons, products, or services. As a final example, they simplified the multiple contract types to the two major categories – fixed-price and cost-reimbursable.

Unstructured data

Maser and Thompson relied on narrative texts of protest cases from the GAO, as well as from lawsuits brought before the Court of Federal Claims by disgruntled bidders. They used the 'Advanced Search' feature of the GAO website to identify and extract relevant protest cases (e.g. those involving DOD agencies). They read the GAO protest cases and coded them according to whether the protest was viewed favorably or was denied. As with the structured data, some simplifying assumptions were made. For example, if several firms protested the same contract award, Maser and Thompson treated that case as one protest. Because of the need for legal skills in interpreting the cases decided by Court of Federal Claims, several law school students were engaged to assist in coding (2010: 79–81).

Based on their coding of both structured and unstructured data, Maser and Thompson (2010) conducted both ordinary least squares (OLS) and logistic regression to test the hypotheses mentioned above. For the OLS regression, the dependent variable was the protest rate in each month during their time period of interest (2004–2009); independent variables included firm size, contract type, number of bidders, contract output, and several others. The logistic regression tested 65,000 DOD contracts awarded during these years, with the dependent variable for

each contract action as dichotomous, that is, either protested or not (2010: 49). Here Maser and Thompson encountered the challenge of capturing and reflecting data for all of the independent variables; indeed, they were able to obtain data on only some variables of interest. As Maser and Thompson noted in their methodology section, “Missing information [in FPDS-NG and other databases] is a significant problem” (2010: 81).

Had Maser and Thompson ended their study with this statistical analysis of archival data, it would have limited utility because of its simplifying assumptions and data limitations. As mentioned earlier, however, they also conducted a series of interviews with experts in contracting and protest resolution. As an integrated research effort, the interviews and the statistical analysis provide a valuable addition to the literature of contracting and defense management.

Summary and conclusion

The purpose of this chapter was to document and describe the principal sources of archival data on defense acquisition. While it focused on the USA, most other developed nations will have at least some similar data sources that are accessible from their MOD websites, as well as from sites that house their national government e-procurement systems. It discussed the unique nature of defense acquisition data. That is, some data are publicly available as part of the government's promotion of transparency, probity, and accountability, while other data may be controlled for security's sake, with limited access for research purposes. The chapter discussed sources of unstructured and structured data, along with budgetary data and policy documents, as well as examples of scholarly research that have drawn from those data sources.

Defense acquisition involves programs that are often fraught with cost, schedule, and performance problems. The costs, risks, and government oversight of these programs create a target-rich environment for scholarly research and investigation. Knowing how to navigate the terrain of the archival data landscape will equip the serious investigator to successfully conduct research on defense acquisition in any nation.

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