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The Defense Acquisition Workforce Growth Initiative: Toward an Assessment of Its Impact on Department of the Navy Acquisition Activity

19 October 2017

Dr. Ira Lewis, Associate Professor of Logistics

Graduate School of Business & Public Policy

Naval Postgraduate School

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

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Abstract

The U.S. Department of the Navy (DoN) 2010 acquisition workforce (AWF) strategic plan noted that, since the 1990s, the value of DoN contracting had increased by more than 50% while the acquisition workforce had declined by almost 50%. In response, as a component of the Department of Defense (DoD), the DoN set an objective to in-source at least 3,500 civilian positions over the Future Years Defense Program period and hire an additional 1,590 civilian positions using money from the Defense Acquisition Workforce Development Fund. These actions would lead to an increase of 8% in the civilian acquisition workforce over the subsequent six years. Given this increase in personnel, the questions have been asked: What has been the impact of this change in acquisition staffing within the DoN, and how is acquisition different now than with the previous smaller workforce? Addressing these issues is not straightforward, due to the complex structure of both the acquisition workforce and the acquisition activities themselves. Nevertheless, it should be possible to discern some basic measures that, while not definitive, do provide some indication of the impact of the increase in the acquisition workforce.

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Executive Summary

The U.S. Department of the Navy (DoN) 2010 acquisition workforce (AWF) strategic plan noted that, since the 1990s, the value of DoN contracting had increased by more than 50% while the acquisition workforce had declined by almost 50%. The cuts in workforce reflected the view then held in Congress that the defense acquisition workforce was too large for the acquisition budget and for the size of the uniformed force. Another trend had been the significant growth of contractor support positions, in part due to civil service hiring restrictions.

In response, as a component of the Department of Defense (DoD), the DoN set an objective to in-source at least 3,500 civilian positions over the Future Years Defense Program period and hire an additional 1,590 civilian positions using funds from the Defense Acquisition Workforce Development Fund. These actions would lead to an increase of 8% in the civilian acquisition workforce over the subsequent six years.

Given this increase in personnel, the questions have been asked: What has been the impact of this change in acquisition staffing within the DoN, and how is acquisition different now than with the previous smaller workforce? Addressing these issues is not straightforward, due to the complex structure of both the acquisition workforce and the acquisition activities themselves. Nevertheless, it should be possible to discern some basic measures that, while not definitive, do provide some indication of the impact of the increase in the acquisition workforce.

Within this context, it would be possible to take a limited number of variables that are surrogates for activity levels and compare them to AWF headcounts before and after the increase in workforce size. Broadly speaking, activities could be divided into the program and contract management realms, although it is recognized that these two are not mutually exclusive. Within program management, measures such as number, dollar amount, and program categories (ACAT) under management may serve as useful measures. In contract management, the number and total dollar

value of contracts, contract processing time, as well as some measure of contract complexity, if available, would be helpful.

One relevant issue is the change in the composition of the AWF during the period of growth. For example, there were new hires from inside and outside the civil service with limited acquisition experience, as well as retiring military personnel, many of whom had a substantial acquisition background. It would be desirable to attempt some characterization of workforce demographics rather than reduce the Navy AWF to a single number in all analyses. Management may be particularly interested in measures of before-and-after productivity.

The above measures, while not complete, can serve as a useful basis for applying a powerful range of statistical and analytical modeling that may provide a reasonable indication of the impact of the AWF growth initiative. These might include the following:

a. statistical significance comparing before-and-after effects (using two-sample dependent *T* tests and *F* tests, ANOVA, MANOVA);
b. linear and nonlinear correlation matrices with statistical significance;
c. nonlinear econometric models to identify and determine the critical independent variables that are statistically significant, as well as quantifying their impact and results of the dependent variables and related metrics;
d. creating new metrics beyond those mentioned in the previous section by collapsing multiples variables into composite measures that provide a more comprehensive and cohesive indication of the impact of the growth of the acquisition workforce;
e. Monte Carlo simulations to determine the final probability distribution and impact of changed manning levels. These distributions could serve as a benchmark for current and future metrics such as increases in acquisition complexity;
f. separating acquisition programs into levels of complexity, which categorizations could then be used for future work in predicting the turnover, schedule risk, and cost risk of new acquisition programs; and
g. establishing the implications of our findings for consideration by Navy senior leadership.

Introduction

The U.S. Department of the Navy (DoN) 2010 acquisition workforce (AWF) strategic plan noted that, since the 1990s, the value of DoN contracting had increased by more than 50% while the acquisition workforce had declined by almost 50%. The cuts in workforce reflected the view then held in Congress that the defense acquisition workforce was too large for the acquisition budget and for the size of the uniformed force. Another trend had been the significant growth of contractor support positions, in part due to civil service hiring restrictions.

In response, as a component of the Department of Defense (DoD), the DoN set an objective to in-source at least 3,500 civilian positions over the Future Years Defense Program period and hire an additional 1,590 civilian positions using funds from the Defense Acquisition Workforce Development Fund. These actions would lead to an increase of 8% in the civilian acquisition workforce over the subsequent six years (DoN, 2010; Schwartz, Francis, & O'Connor, 2016).

Given this increase in personnel, the questions have been asked: *What has been the impact of this change in acquisition staffing within the DoN, and how is acquisition different now than with the previous smaller workforce?* Addressing these issues is not straightforward, due to the complex structure of both the acquisition workforce and the acquisition activities themselves (McKeithen, 2016).

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Context

Research involving public sector procurement specialists revealed that these professionals were “skeptical about the possibility that performance measurements can be useful or can increase the quality of decision-making in public procurement” (Diggs & Roman, 2012; see also Rendon (2015)). Lewis (2016) expressed some concerns about availability and suitability of data as well as the challenges of relating inputs to outputs in a professional environment.

In a well-cited review of research into organizational performance, March and Sutton (1997) found that the structure and definition of performance were rarely explicitly justified, and that the appropriateness of performance is rarely questioned. Organizational performance is frequently used as a dependent variable, and researchers pay little attention to the complications of using such a formulation to characterize the behavior of organizational phenomena.

Part of the reason for this practice is that organizational research demands and rewards speculations about how to improve performance. March and Sutton (1997) further noted that it isn’t clear that organizational purpose can be portrayed as unitary—a factor familiar to students of public administration—and that the multiple purposes of an organization aren’t reliably consistent. March and Sutton further suggest that organizational researchers live in two worlds; one demands speculations about how to improve performance, while the other requires adherence to rigorous standards of scholarship. Finally, seeking knowledge “about historically ambiguous phenomena such as organizational performance is more a necessary form of disciplined self-flagellation than a pursuit of happiness” (March & Sutton, 1997, p. 705).

Richard, Devinney, Yip, and Johnson (2009) found a limited effectiveness of commonly accepted measurement practices in tapping the multidimensionality of performance. The authors suggested that addressing these findings required researchers to possess a strong theoretical rationale on the nature of performance, and to rely on strong theory as to the nature of measures. Further, Richard et al.

found little progress in the unquestioning assumptions about performance since what they termed March and Sutton's (1997) "call to virtue." Given the above research, it is difficult to contemplate how one would measure the addition of thousands of employees, particularly professionals doing complex work, to the Navy's acquisition workforce. On the input size, one is struck by the difficulties in measuring who worked where at what time, as well as what they did. From the output perspective, the "units of work," such as contracts, financial and other reporting documents, emails, meetings, and so forth, vary significantly in size and importance.

It would also be necessary to account for differences in work hours caused by such factors as training and leave. Measuring the productivity of military acquisition personnel, who make up approximately 10% of the Navy's acquisition workforce, has its own set of challenges above and beyond those associated with civilian personnel. These include the impact of high turnover, promotions, centralized control over most training and development, and so forth.

Part of the challenge of determining the increase in output caused by the change in size of the acquisition workforce is related to data limitations. Schwartz et al. (2016) found significant limitations in the data available to inform acquisition research, particularly with respect to reliability and comprehensiveness. The Federal Procurement Data System (FPDS), which is the central database of U.S. government procurement, contains data with limited "utility, accuracy, and completeness" (Government Accountability Office [GAO], 2012).

A DoD (2015) report on the performance of the defense acquisition system noted that defense acquisition "is complex, and each measure has its strengths and weaknesses, so attributing performance to a single measure is subject to the limitations of that measure" (p. xv), and that such data, even when combined with other information, constitute a "crude indicator of the effectiveness of these officials' decision making" (p. xv).

Nevertheless, it should be possible to discern some basic measures that, while not definitive, do provide some indication of the impact of the increase in the acquisition workforce. As Gates (2009) has suggested,

> The AW [acquisition workforce] must be viewed as an input to a process operation, and thought should be given to concrete outcomes that the workforce could be expected to influence. These would not be the high-level outputs of on-time, on-budget systems, but they could include important process oriented outcomes that reflect top-flight systems engineering practices and could ultimately lead to improvements in the key outcomes of interest. It is also critical to acknowledge that the AW is engaged in a wide range of procurement-related activities and that different types of activities are likely to require separate and distinct outcome measures.

DoN senior management has expressed the need for an improved understanding of measuring AWF productivity. As suggested previously, one important caution in considering the impact of the mandated increase in the size of the AWF relates to traceability. Changes in the total number of employees at the DoD or DoN levels may not translate directly at lower levels such as individual offices. There is considerable fluctuation at the office level, due to normal turnover as well as directed changes in personnel billets that may not be related to the mandated increase in AWF size. Gates (2009) commented on the challenges of measuring AWF productivity in the face of increasing demand for acquisition personnel:

> Key drivers of the increasing demands include the complexity of service contracting, which is a growing share of all government contracting; the fact that the number of transactions is no longer a good measure of workload; and the fact that best-value procurement approaches are substantially more complex than lowest-price contracting approaches.

In addition, the methodology for counting members of the AWF is quite complex, and considerable data collection and analysis is required to count gains, losses, and switches (personnel moving into or out of the AWF to other positions). The extensive work performed by RAND on defining and analyzing the size and composition of the AWF should be used as a starting point for any analysis of the

impact of the mandated increase in AWF, in order to provide a common baseline of personnel resources (Gates, Roth, Srinivasan, & Dougherty, 2013; Powell, 2017).

Proposed Approach

Within this context, it would be possible to take a limited number of variables that are surrogates for activity levels and compare them to AWF headcounts before and after the increase in workforce size. Broadly speaking, activities could be divided into the program and contract management realms, although it is recognized that these two are not mutually exclusive. Within program management, measures such as number, dollar amount, and program categories (ACAT) under management may serve as useful measures. In contract management, the number and total dollar value of contracts, contract processing time, as well as some measure of contract complexity, if available, would be helpful.

One factor emphasized by Powell (2017) was the change in the composition of the AWF during the period of growth. For example, there were new hires from inside and outside the civil service with limited acquisition experience, as well as retiring military personnel, many of whom had a substantial acquisition background. It would be desirable to attempt some characterization of workforce demographics rather than reducing the Navy AWF to a single number in all analyses. Management may be particularly interested in measures of before-and-after productivity.

The above measures, while not complete, can serve as a useful basis for applying a powerful range of statistical and analytical modeling that may provide a reasonable indication of the impact of the AWF growth initiative, including the following (Mun, 2015):

a. statistical significance comparing before-and-after effects (using two-sample dependent *T* tests and *F* tests, ANOVA, MANOVA);
b. linear and nonlinear correlation matrices with statistical significance;
c. nonlinear econometric models to identify and determine the critical independent variables that are statistically significant, as well as quantifying their impact and results of the dependent variables and related metrics;
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e. Monte Carlo simulations to determine the final probability distribution and impact of changed manning levels. These distributions could serve as a benchmark for current and future metrics such as increases in acquisition complexity;

f. separating acquisition programs into levels of complexity, which categorizations could then be used for future work in predicting the turnover, schedule risk, and cost risk of new acquisition programs; and

g. establishing the implications of our findings for consideration by Navy senior leadership.

Sources of Information

The information required to conduct the above analyses can be grouped into two categories: independent and dependent variables. The dependent variables represent the output or outcome measures, such as number of contracts issued, total dollars under management, and number of projects by ACAT. We are mindful of the comments by Gates (2009), cited previously, that emphasize the need for process-oriented measures such as desirable system engineering outcomes, rather than traditional output measures such as the number of contracts under management. We return to this issue later when we discuss dependent variables.

In contrast, independent variables are the inputs that (plausibly) lead to the results characterized by the dependent variables, most notably for our study workforce size and composition.

Information about AWF size and composition is maintained on the website (http://www.hci.mil) of the Office of Human Capital Initiatives (HCI) within the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD[AT&L]). For example, at the time of writing, data on total AWF workforce size and numbers by career field (there are 13 in the AWF) are available for Fiscal Year 2008 (FY08) through the first quarter of Fiscal Year 2017 (FY17Q1), as shown in Table 1.

Other data available from HCI includes level of educational attainment or certification under the Defense Acquisition Workforce Improvement Act (DAWIA), years of service, and retirement eligibility. Additionally, workforce information is available by gender and race. Overall, the DoD AWF has increased from 125,879 in FY08 to 161,712 as of FY17Q1, an increase of 28%. Navy AWF personnel as of FY17Q1 numbered 57,268, a 39% increase since FY08.

Dependent variables represent a significant challenge to the researcher in terms of availability, variety, and (perceived) relevance. Another factor, cited by McKernan et al. (2017), is that the contents of the information systems giving access to these variables are constantly in evolution due to factors such as policy and

technology. The authors identified four public databases that provided DoD acquisition information: the System for Award Management (SAM), the Federal Funding Accountability and Transparency Act Subaward Reporting System (FSRS), USAspending.gov, and the Federal Procurement Data System–Next Generation (FPDS-NG). We reviewed the offerings of each system, and only the last of these appeared to contain relevant information for our work.

The FPDS-NG may provide some useful data for dependent variables. Established in 2005 and owned by the General Services Administration, this public source of information on contracting activity describes "who is procuring what, when, how, and from whom they are buying, and where the work is being done," including spending with prime contractors; is used by governments, contractors, and the general public; and is considered authoritative (McKernan et al., 2017; Rendon & Snider, 2014). Contract actions are covered since FY04, and FPDS-NG allows the user to generate both standard and customized (ad hoc) reports.

Another potential way of measuring AWF productivity is through financial information such as budget data. There may be a relationship between the number and type of acquisition personnel and expenditures on procurement. From the president's budget, we learn that requested total DoN procurement funds in FY08 were $38,718,200,000 for an AWF of 41,078 people, giving a figure of $942,553 procured per employee. For FY17, a procurement request of $49.585,801,000 and a Navy AWF of 57,278 result in an average of $865,704 per employee, which is only a minor decrease from FY08 (DoD, 2007, 2017).

Conclusion

Our research efforts up to this point have of necessity been exploratory. As mentioned above, previous research in the field of professional productivity warns against attempts to undertake large-scale measurement efforts. However, it should be possible to discern some basic trends from before and after the increase in Navy acquisition personnel. Using available public data sources and a broad range of statistical techniques, we will attempt to discern any patterns that might indicate the impact of the change in workforce size on organizational performance.

Table 1

Department of the Navy Acquisition Workforce by Career Field

Career Field	Fiscal Year 2008	December 31, 2016	Change (%)
Auditing	0	0	0
Business	1792	2405	34
Contracting	4866	5859	20
Engineering	16353	21652	22
Facilities Engineering	3902	5481	40
Information Technology	800	2868	259
Life Cycle Logistics	4104	5981	46
Production, Quality, & Manufacturing	1980	3240	64
Program Management	3485	5514	61
Property Management	58	64	10
Purchasing	478	417	-13
Science & Technology Manager	190	559	194
Test & Evaluation	2360	3227	37
Unknown/Other	710	1	−99
Total	41078	57268	39

Source: OUSD(AT&L), Office of Human Capital Initiatives, http://www.hci.mil

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