IMPROVING SUPPLY CHAIN PERFORMANCE THROUGH ORGANIZATIONAL DESIGN

INSIGHTS FROM KEY SUPPLIERS TO THE UNITED STATES AIR FORCE

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Abstract: Creating organizational designs that maximize performance is a key goal for many executives. We sought to uncover ways that a giant organization – the United States Department of Defense (DoD) – could improve its performance via organazational design changes. Based on input from 80 executives who collectively represent over 60 defense contractors, we found that the DoD could become more efficient and effective by (1) relying on relational contracting within its supply chains, (2) designing better reward systems, (3) focusing on results rather than processes when managing its suppliers, (4) moving its supply chains toward a best value approach, and (5) investing strategically in its workforce. In drawing implications from our findings for organizations in general, we highlight companies that have reaped rewards from making these five moves in the past.

Keywords: Organization design; supply chain management; strategic management; performance

"We must…abandon inefficient practices."

Ashton Carter, United States Under Secretary of Defense
for Acquisition, Technology, and Logistics
June 28, 2010 Memorandum for Acquisition Professionals

Like most large organizations, the United States Department of Defense (DoD) acquires many of the materials it needs from outside the organization. It spends approximately $400 billion per year – roughly 57% of its overall budget – acquiring products and services via defense contractors. Each acquisition involves two main types of costs – the actual cost of the goods and services and the transaction costs involved in the acquisition process. Most organizations incur far more transaction costs than necessary, making them much less efficient than they could be.

Also like most organizations, the DoD seeks to enhance its performance by reducing costs and increasing efficiency. Under Secretary Carter's memo of June 28, 2010 notes the need to "identify and then act on steps [DoD] can take to obtain two to three percent net annual growth in warfighting capabilities without incurring a commensurate budget increase by identifying and eliminating unproductive or low-value added overhead; in effect, doing more without more." The reduction of transaction costs offers an excellent opportunity to help meet this goal.

In our view, decisions about organizational design and related aspects of organizing have the potential to improve the DoD. Further, many of the insights that can arise from analyzing DoD practices can inform organizations in general. In seeking to gain these insights, we

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tapped into the knowledge and experience of leading defense contractors that supply the United States Air Force (USAF). Because contractors have a vast experience base to draw from when assessing the USAF's supply function, they are uniquely positioned to provide valuable external points of view about opportunities for the USAF to improve supply chain performance. We collected data from 80 executives who collectively represent more than 60 of the USAF's largest suppliers. Their ideas provide the basis for five insights for the USAF and for organizations in general about how to improve supply chain performance via organizational design.

BACKGROUND AND STUDY

Words such as "overhead" and "bureaucracy" are often used to refer to administrative processes that cost money but add little value. When searching for ways to improve organizational design and increase efficiency, the leaders of an organization usually target these processes. Overhead and bureaucracy are convenient villains, but some degree of oversight is necessary within any organization in order for its goals to be met. Thus, sorting through what administrative costs are necessary and what costs are candidates for elimination should be central to efforts to become more efficient. Understanding how costs arise and evolve within administrative processes is an important first step.

Research on transaction costs offers clues about how costs arise and evolve as well as how to increase the efficiency of organizational designs. Professor Oliver Williamson of the University of California – Berkeley began developing transaction cost theory in the mid-1970s. This theory has had a profound effect on knowledge about organizational design and efficiency (Williamson, 1975, 1985). The impact of Williamson's work has been so large that he was awarded a share of the 2009 Nobel Prize in Economics. One of Williamson's key insights is that organizations can improve their performance by making organizational design decisions that minimize transaction costs.

With this insight in mind, we began our study by interviewing experts on government contracting about transactions costs within the USAF. We interviewed two sets of people. The first set was three professional consultants who collectively have worked on similar research projects to this one, have had careers in the U.S. armed forces, and have worked for defense contractors. The second set was five executives at contractors that play key roles as suppliers within USAF programs. We told both sets of people that their input was confidential in order to encourage them to offer candid thoughts and opinions.

Following the interviews, we developed a questionnaire to identify contractors' beliefs about the percentage of acquisition program costs that is typically absorbed by transaction costs, the factors that raise unnecessary transaction costs, and what could be done to reduce these costs. Alongside the questionnaire development, we identified prime- and sub-contractors[1] to target for responses. Several resources were used to identify contractors. The first was *Government Executive*, a publication that lists the 100 largest defense contractors and indicates whether these contractors work with the USAF. The second was the Federal Procurement Data System, which also contains a contractor list. The third was the DoD's website. We also searched the Internet for other USAF contractors.

Next, we telephoned each firm and identified relevant executives who work in contracts, purchasing, and business development. We then contacted these executives to determine whether they are knowledgeable about USAF acquisition programs and whether they were willing to participate in the questionnaire over the phone or via a website. We also guaranteed their anonymity. The 144 prime- and sub-contractors who were contacted are listed in the appendix.

Overall, we received input from 80 executives representing at least 60 defense contractors. We do not know the exact number of firms that are included because some firms offered more than one potential respondent and because we ensured respondents' anonymity.

1 A prime contractor is a supplier that has been awarded a contract to supply goods or services to the USAF. Sub-contractors are hired by prime contractors to perform work related to fulfilling the contract.

FINDINGS AND RECOMMENDATIONS

To gain a sense of the scope of opportunity presented by improving organizational design, we asked contractors to estimate *what percentage of USAF acquisition expenditures are transaction costs*. The average response was that transaction costs account for 25% of USAF acquisition expenditures. If we assume that this estimate is accurate and that this figure reflects the DoD as a whole, a decrease of these costs by just 5% would free up $5 billion. Such a reduction would be quite modest, given that the potential for improved performance within most supply chains is estimated to be approximately 20% (Ketchen, Rebarick, Hult, & Meyer, 2008). Realizing this full potential could result in $20 billion in savings per year across the DoD.

Respondents were also asked, *What are the main factors that create unnecessary transaction costs?* and *What steps can be taken to reduce unnecessary transaction costs?* We followed a four-step process to distill insights from the contractors' answers. First, three subject matter experts with doctorates in management independently identified themes among the responses. They then exchanged opinions and arrived at consensus about those themes. Next, a domain analysis that is popular among qualitative researchers was performed (Spradley, 1979). Third, a computer-guided qualitative analysis was performed using a program called QDA Miner. Finally, the three subject-matter experts reconvened to synthesize the insights offered by the three preceding steps. The four-step process gave rise to five main insights. These insights are explained below and are summarized in Table 1.

Table 1. Potential Benefits of USAF Contractors' Insights

Insight	Potential Benefits	Exemplar Company
Improve organizational design by relying on relational contracting.	Long-term relationships reduce uncertainty and allow partners to collaborate with greater confidence, reducing the need for costly monitoring.	Procter & Gamble is seeking to derive 50% of its innovations from external ideas, up from 10% in 2001.
Design reward systems to reward what you want done.	Sharing a portion of the savings that suppliers create encourages them to find creative ways to save money while maintaining quality standards.	To encourage its suppliers to share cost-saving ideas, communications giant R.R. Donnelly splits any savings it enjoys with the supplier.
Ask "what" not "how".	Specifying outcomes is cheaper than monitoring processes. Allowing suppliers to figure out how best to reach their goals unleashes their motivation and creativity.	A potential bonus offered to C.C. Myers led the firm to complete a 140-day construction contract in only 66 days.
Move toward a best value approach.	Some firms have enjoyed significant improvements in both efficiency and effectiveness by moving away from a focus on cost and toward a focus on total value added for the customer.	Toyota is redesigning its supply chains to ensure recovery from a major earthquake in only two weeks.
Invest strategically in the workforce.	Organizations whose personnel have the highest levels of knowledge, skills, and abilities have been found to be the most efficient and effective.	In an industry that endures more than 20% annual turnover, over 95% of employees at SAS Institute, Inc. remain with the firm each year.

1. Improve organizational design by relying on relational contracting.

From our respondents' points of view, the acquisition process could be much more efficient and effective if the USAF treated contractors differently. This perspective was captured very well by a respondent who asserted that the "government needs to view working with a contractor as a partner, not an adversary. We are trying to help improve the way they do business, yet they sometimes subtly stonewall our efforts." A similar response was that government employees "need to get to know their supply chain better. They are very standoffish so that it doesn't look like they are favoring some suppliers." Another noted that transaction costs can be reduced via "more open teaming/negotiation between contractor and government… Partnership is the key word, working toward a common goal."

Improving communication was seen by several contractors as crucial to building a spirit of partnership. One stressed the need for "strong communication paths and understanding along each step of the development, delivery, support, and intended use of the products." A similar but more colorful recommendation from a contractor was to "increase communications that create learning and understanding… During the proposal phase don't shut out industry, during the development phase be resident with the development team, during the testing phase be part of the solution and not the hammer, during the support phase communicate expectations for the end user and the equipment often and explicitly."

Relational contracting is an organizational design concept that could help the USAF as well as other organizations facing similar problems. When using relational contracting, buyers and suppliers work together to build trust. The current DoD approach is to call for competitive bids for each contract and closely monitor the winner's progress. The emphasis in relational contracting is not on individual contracts but instead on developing a long-term relationship across a series of contracts (Dyer & Singh, 1998). Rather than hoarding information and data to protect against exploitation by the other side, information and data are exchanged so that both sides can perform their roles better. As long as a contractor is working in a cooperative and trustworthy manner to steadily reduce costs, it will be well-positioned to receive future business – a promise that furnishes a strong incentive to perform. Relational contracting can reduce transaction costs in several ways (Dyer & Singh, 1998). Buyers become less fearful of being cheated by suppliers, thereby decreasing their reliance on costly reports and monitoring systems. Suppliers become less fearful of the uncertainty surrounding technological goals and demand levels. Money can also be saved to the extent that trust leads both sides to feel less compelled to negotiate and write detailed contracts. Stated simply, relational contracting can help organizations obtain products and services at the best prices.

Organizational design research has also tied relational contracting to a valuable change in the mindsets surrounding contracting (Weber & Mayer, 2011). Traditional contracting emphasizes the creation of structures and procedures for preventing losses due to misbehavior. One example is complex monitoring systems, such as those that the USAF's contractors view as wasteful. In contrast, the two sides of a relational contract are able to focus on the potential gains that can be achieved through collaboration and efforts to build trust. This not only improves efficiency, but it also can enhance effectiveness (and thus overall value). In 2001, 10% of the innovations pursued by Procter & Gamble were initiated by its suppliers. In recognition of the gains that can be achieved via relational contracting, the company's executives have set a goal of deriving 50% of its innovations from the ideas and recommendations of suppliers and other external parties (Slone, Dittman, & Mentzer, 2010).

2. Design reward systems to reward what you want done.

Decades of research have established that organizations must be careful about what they reward because inevitably people do what is rewarded (cf. Kerr, 1975). One popular book has even proclaimed "what gets rewarded gets done" to be the greatest management principle in the world (LeBoeuf, 1985). Thus, creating effective reward systems is a key element of organizational design. Communications giant R.R. Donnelly, for example, rewards suppliers financially for helping the firm cut costs. If a supplier's idea reduces R.R. Donnelly's costs, the firm splits the savings with the supplier (Ketchen et al., 2008).

In line with this idea, Under Secretary Carter's memo stresses the need to "incentivize efficiency" and the need to align the "incentives of the Department and industry." One way to incentivize contractors – which is a current focus in USAF contracting – is by splitting the savings with contractors if they perform work under budget while meeting quality standards and schedules. We encourage the continued – and expanded, where feasible – use of such incentives both inside DoD programs and among organizations in general. The alternative creates perverse incentives: If no program is in place to share savings, a contractor will be tempted to maximize its profits by spending to the limits of a contract. In an effort to avoid such problems, the DoD is pursuing a variety of 'better-buying initiatives' that attempt to tie incentives to good performance. Distilling lessons from in-depth analysis of successful and unsuccessful better-buying initiatives has a strong potential to identify best practices that can be applied broadly to reduce costs and enhance effectiveness.

3. Ask "what" not "how."

Mandated reports that are used to monitor contractors' behavior during the course of a USAF contract repeatedly came up among our respondents as a thorny issue. One respondent highlighted the wasteful nature of "development, collection, and generation of reports that are not used nor referenced during [the] contract," while another pointed to excess costs created by "documenting and maintaining processes, compliance, etc., and educating/training staff on compliance processes." Another stressed the costs created by "too many reports, too many people to have to report to…. No central focus for reporting requirements…. All asking the same questions that are constantly being asked without any value being added to product." Others mentioned "unnecessary reports," "excessive procurement red tape," "customer requirements for meetings, data, reviews, etc.," and the customer "asking for a hard copy of contracts and close outs instead of electronic."

Several contractors stressed that merely keeping up with changes to bureaucratic processes adds costs. One observed that "changing reporting requirements makes dealing with the government difficult." Another noted that creating reports is "ever changing and very onerous with always new requirements, never taking away any requirements." A third lamented that "the way the information is collected changes every two years: paper, then electronic, then back to paper." Overall, contractors called for less "paperwork," "micromanagement," and "administrative oversight." They recognize that there is a trade-off with the reporting demands of key stakeholders, but they believe costs could be reduced through "streamlining unnecessary requirements and policies" and eliminating steps in the process in order to allow for "more efficient use of our time."

A change in organizational design that could improve this situation is shifting from managing suppliers by monitoring how they do their work toward concentrating on whether or not their performance is sufficient. Specifically, performance-based contracting is a contracting approach that involves giving performance specifications to suppliers and letting them figure out the best way to meet the specifications. Rather than the buyer dictating both what needs to be accomplished and how to do it, the buyer focuses on what and allows the supplier to decide how. Because outcomes are easier and cheaper to monitor than behaviors, transaction costs are reduced (Eisenhardt, 1989). Focusing on outcomes would also give contractors the flexibility to work with their supply base in a way that suits each program's nature and, in many cases, lower the government's costs for goods and services (Crook & Combs, 2007). Indeed, the more tiers that are involved in an organization's supply network, the higher the potential for performance-based contracting to provide benefits.

A 1994 contract between the State of California and road construction company C.C. Myers, Inc. provides a striking example of how performance-based contracting can inspire exceptional performance. Following an earthquake, four bridges on the Santa Monica Freeway in Los Angeles needed to be replaced. The contract terms stated that the goal was to replace the bridges in 140 days. For each day early the work was completed, C.C. Myers would receive a $200,000 bonus. Offering this bonus was viewed as a good investment because economists estimated that the local economy was losing $1 million each day the bridges were closed. If the contractor completed the work behind schedule, it would suffer a

$200,000 per day penalty. Given these powerful incentives, C.C. Myers fulfilled the contract in only 66 days and the firm pocketed a nearly $15 million bonus (Zamichow & Ellis, 1994).

4. Move toward a "best value" approach.

Contractors contend that a narrow emphasis on cost within the USAF acquisition process actually ends up costing more in the long run. One emphasized that "They [USAF] often do themselves no favors when the primary evaluation criterion is Lowest Price, Technically Acceptable (LPTA). The LPTA is fine for the purchase of items that are commodities. However, when you are talking about specialized goods and services, LPTA is not in the best interest of the government because LPTA does not allow for a complex analysis and therefore limits the government's ability to make smart, value-based decisions. For these types of specialized services, LPTA actually presents a higher-risk approach, and in the end the government pays more than it would have if the evaluation criteria had been risk-based rather than price-based."Another respondent lamented that decision makers"…focus too much on price. The government does not get the best or the most technically sound products – just the cheapest."

Some forward-thinking organizations have been transitioning away from designing their supply chains around one main metric – usually cost or speed – and toward a best value approach. Best value supply chains focus on delivering the maximum total value added to the customer across four metrics: cost, quality, speed, and flexibility (Ketchen, et al., 2008). In particular, best value supply chains maximize total value added by developing "the three As" – *agility* (the ability to react quickly to surprises), *adaptability* (a willingness to change when needed, without concern for history and legacy issues), and the *alignment* of interests across the members of a supply chain (Ketchen & Hult, 2007).

To the extent that our respondents' concerns are accurate, shifting the focus of various programs away from cost alone and toward total value added via "the three As" has the potential to benefit the USAF and other defense organizations. More broadly, organizations in general can benefit from making organizational design choices based on finding the right balance among cost, quality, speed, and flexibility rather than fixating on cost or speed alone.

Toyota offers a good example. After the March 2011 earthquake and tsunami in Japan, Toyota struggled to maintain automobile production. Because the firm's executives had emphasized cost minimization within its supply chains, Toyota lacked the flexibility to rely on geographic areas that were not affected by the disaster. Toyota is now working on a plan aimed at creating enough flexibility in its supply chains to fully recover from a similar disaster in only two weeks (Kim, 2011). The plan centers on collaborating on common auto parts with other Japanese car makers, asking the suppliers of specialized parts to store significant amounts of inventory, and ensuring that Toyota's production facilities in other parts of the world are not solely reliant on its Japanese facilities.

5. Invest strategically in the workforce.

Contractors lamented that too many skilled and experienced people are leaving the USAF's acquisition programs and that this turnover creates major costs. One contractor expressed concern that "there has been a loss in technical capabilities within the government which impacts interpretation of deliverables meeting requirements." Others pointed to the need for a "more knowledgeable procurement workforce," "stability in the contracting offices," and "more skilled folks in the contract specialist field." When skilled and experienced people leave, one result is that people with less skill and experience are then left in charge of writing and managing contracts. This can result in requirements that are too vague, overly complex compliance processes, and long cycle times for awarding contracts.

Creating and maintaining a high-quality workforce is vital to organizational efficiency. Human capital refers to the knowledge, skills, and abilities possessed by employees within an organization. A recent meta-analysis of data from over 12,000 organizations found that human capital has a strong association with organizational performance (Crook, Todd, Combs, Woehr, & Ketchen, 2011). Organizations that are able to identify and retain their best people are much more likely to be efficient and effective than those that do not.

The organizational design implications for the USAF, and for large complex organizations in general, are simple in concept yet very challenging to leverage. When turnover is a problem, executives must identify why people with strong knowledge, skills, and abilities are leaving their positions and then take action to resolve these concerns and reduce future turnover. Such actions might include creating new pathways for recognizing, rewarding, and promoting excellent performers. Efforts to re-acquire valuable former employees also could be worthwhile. More specifically, developing metrics to assess the quality of the re-acquired work force and the effectiveness of work force improvement initiatives could improve the ability of organizations to fulfill their missions. Similarly, thorough analysis of how the various elements of oversight of the acquisition process is helping and harming the ability of program managers to meet their objectives could yield substantial benefits.

SAS Institute, Inc. is a firm that appears to have mastered the art of building and keeping human capital. According to the firm's CEO Jim Goodnight, "I guess 95 percent of my assets drive out the front gate every evening. It's my job to bring them back" (Leung, 2009). SAS executives keep employees coming back by encouraging them to get their work done in a 35-hour week, not imposing a dress code, and offering a wide variety of perks such as onsite car detailing, a golf putting green, and a masseur. While annual employee turnover at most software companies exceeds 20%, only about 2% of SAS employees leave each year. This saves SAS tens of millions of dollars on employee recruiting and training. Not surprisingly, SAS ranked as #1 on *Fortune* magazine's 2010 and 2011 lists of best places to work.

CONCLUSION

An organization's supply chain relationships are typically constructed over an extended period of time. This evolution of organizational structure can create significant advantages as well as disadvantages. On the positive side, mutually beneficial relationships between an organization and its suppliers can be developed and nurtured. On the negative side, problem areas can become more entrenched with the passage of time. Indeed, in reference to the DoD's organizational design, Under Secretary Carter's memo cautions that "it has taken years for excessive costs and unproductive overhead to creep into our business processes, and it will take years to work them out." Based on research on organizational design and insights from leading defense contractors, we offer five recommendations that may reduce unnecessary costs in the years ahead. Given that most organizations have inefficiencies within their supply chains, these recommendations also may prove useful for organizations in general.

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APPENDIX

Defense Firms Contacted for Input (n=144)

AAI Corporation	Cypress	John Hopkins
Accenture	Decibel	Kaman Aircraft
ACES	Defense Tech	Kearfott
Action Target	DEL	Kellogg Brown and Root
Advanced Integrated Systems	Digital Systems	Knights Armament
AdvatechPacific	Dillon Aero	Kongsberg Defense
Aerojet	DRS	Kratos Training Solutions
Aerospace	DYn	Lockheed Martin
Aerovironment	Dynetics	MITRE
Aegis Defense Services	EADS	M7
Airscan	East West	NexGen
Aivea	EnvironmentalTectonics	Northrop Grumman
Alliant Techsystems	Elbit Systems	ORNL
Allied Container	ENCO	OT Training
AM General	Evergreen Intl	Osterhout Design
Antonov Airlines	Exxon	OT Training
Applied Research Associates	Fabrique National De Herstal	Parsons
Aptima	FGM	Precision Cast
Argon ST	FLIR systems	Quantum
ARINC	FLUOR	QinetiQ
ASSETT	FMC	Raytheon
AV	FN Herstal	Remington Arms
BAE Systems	Force Protection	Rock Island Arsenal
Ball Corp	Foster Wheeler	Rockwell Collins
Barrett Fire Arms	Foundation Health	Rolls Royce
BDM	GA Tech	RONCO WSI
Bechtel	GE	SAAB
Beocore	Gemini	SBG Technology
Black Knight	General Atomics	SAIC
Blazeware	General Dynamics	Sensi
Boeing	GEO Centers	Senspex
BoozAllenHamilton	GB Industrial Battery	Shell Oil
Brashear	G4 plc	Simplex Grinnell
British Fuels	Glock	SGIS
Brogden	Goodrich	Smartronix
CACI Intl	Halliburton	Smith and Wesson
Carlyle Group	Harris	Sparta
Carnegie Mellon	Healthnet	Springfield Armory
Charles Stark Draper	Heckler and Koch	SRC
Chenega	Hewlett Packard	SRI
CAN	Humana	ST Engineering
Cole Engineering	IBM	Stanley
Colt Defense	Ideal Building Services	StrategyONE Services
Concurrent Tech	Industrial Machining Design	Tatitlek
Crye	Infotech	Textron
CSC	Insight Technology	VDC Displays
Cubic	International Research Group	Wackenhut
Cybernet Systems	Jacobs Engineering	Y12