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Category Management of Services: A Methodology for Strategically Clustering DoD Installations

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Abstract

In an increasingly budget-constrained environment, the Department of Defense (DoD) must maximize the value of fiscal resources obligated to service contracts. According to the Government Accountability Office (GAO) report *Strategic Sourcing*, published in 2013, over half of procurement spending between 2008 and 2013 was obligated to service contracts. Therefore, this research focused on identifying rate, process, and demand savings for common, recurring DoD service requirements. We developed a methodology to standardize analyses of service requirements to identify relevant cost drivers. Furthermore, a clustering continuum was created to organize services based on proximity between the customer and the supplier base. Utilizing commercial business mapping software, we analyzed the cost driver data, produced visualizations, and illustrated strategic opportunities for category management initiatives. Requirements for Integrated Solid Waste Management (ISWM) within the southern California area were evaluated using the software and methodology to demonstrate practical application.

Introduction

Background

U.S. economic spending has dramatically evolved over recent decades as the country has moved from a goods-consuming society to a service-consuming society. This cultural movement has led to a substantial increase in the demand for services over tangible goods. In 1968, economist Victor R. Fuchs published findings that more than half of the employed population in the United States was working in the services sector and thus was "not involved in the production of food, clothing, houses, automobiles, or other tangible goods" (Church, 2014). The U.S. economy, he argued, had become a "service economy" (Church, 2014).

Fifty years later, Fuchs' analysis stands the test of time, as services continue to comprise a significant portion of consumer spending. In early fiscal year (FY) 2017, U.S. citizens consumed nearly $9 trillion in services, up nearly $2.5 trillion from FY 2007. In comparison, spending on goods increased approximately $1 trillion, to a total of $4.2 trillion for FY 2017. This recent data suggests that the trend toward spending on services is expected to remain the same or, more than likely, increase in the foreseeable future.

Procurement in the Department of Defense (DoD) has mirrored consumer spending behavior—agencies have reported a trend toward service-related requirements. In February 2017, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD[AT&L]) reported to congressional committees that the DoD had obligated over $149 billion to service-related defense contracts in FY 2016 (see Figure 1). Accounting for over half of defense spending, service-related contracts deliver an exhaustive list of critical defense-sustaining capabilities, such as maintaining installations, information technology (IT) security services, and medical services. The DoD has consistently spent more than three times the fiscal resources on services than on supplies and equipment (S&E), such as investments in aircraft, ships, submarines, and land vehicles (OUSD[AT&L], 2017).

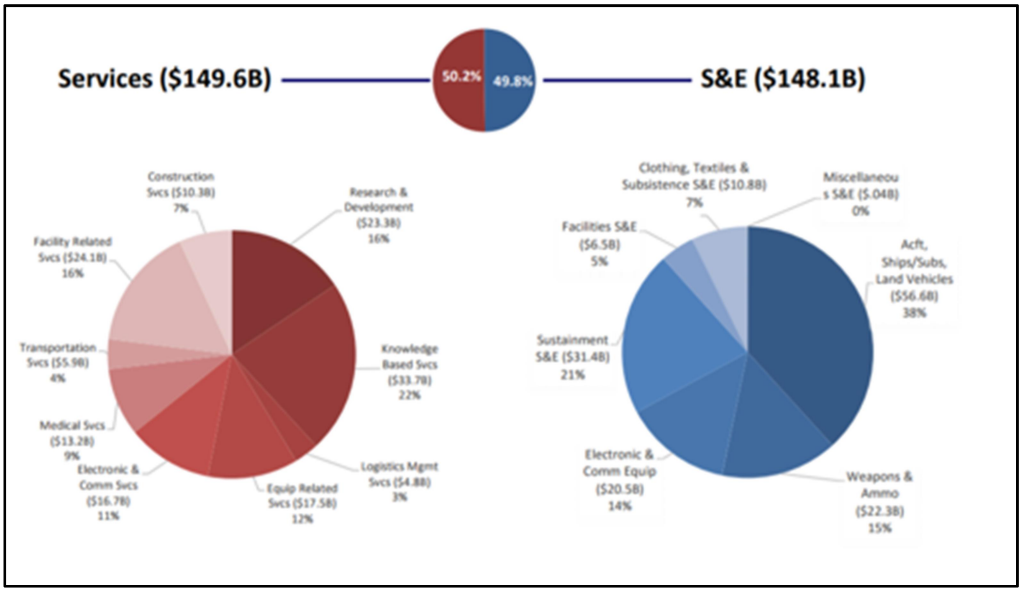

Figure 1. FY 2016 Spend—DoD as Contracting Department
(OUSD[AT&L], 2017)

Historically, the DoD has struggled with acquiring services due to the inherently complex nature of services, relative to the seemingly straightforward procurement of commodities. This complexity, paired with the DoD's growing portfolio of services, has gained the attention of multiple government watchdog agencies, including the Government Accountability Office (GAO). In 2017, the GAO released its biannual high-risk report to Congress, which "identifies government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement or the need for transformation to address economy, efficiency, or effectiveness challenges" (p. 2). In the report, the GAO noted that "Improving DOD's Acquisition of Services" is a recurring high-risk category that should be addressed immediately by DoD officials.

The DoD continues to take action to improve how it manages services acquisitions, with demonstrable progress. In January 2016, the DoD issued a new instruction for service acquisitions that provides a management structure for acquiring services and identifies the roles and responsibilities of key leadership positions; however, the DoD still lacks an action plan that will enable it to assess progress toward achieving its goals, and efforts to identify goals and associated metrics are still in the early stages of development (GAO, 2017, p. 491).

Numerous initiatives, such as Better Buying Power, have emerged to educate DoD stakeholders on best practices to improve tradecraft in services. These initiatives have inspired grassroots efforts that have led to a few attempts at enterprise-sourced, cost-saving solutions. For example, the Building Maintenance & Operations (BMO) service contracts of the General Service Administration (GSA) are an attempt at a regional-based, enterprise-sourced contract solution. However, those familiar with category management principles would argue that "big contracts," while offering process-related savings, may not be the optimal, or comprehensive, solutions for enterprise-wide services.

To promote strategic cost saving initiatives in the acquisition of services, the Air Force Installation Contracting Agency (AFICA) partnered with the Graduate School of Business and Public Policy (GSPBB) at the Naval Postgraduate School (NPS) to identify a methodology that optimally groups DoD installations for enterprise-sourced solutions.

Research Objective

This research develops a methodology that optimally clusters DoD installations based on known cost drivers of common, enterprise-wide installation services. A service contract is defined in the Federal Acquisition Regulation (FAR) as "a contract that directly engages the time and effort of a contractor whose primary purpose is to perform an identifiable task rather than to furnish an end item of supply" (FAR 37.101). Our method targets the Army, Navy, Air Force, and Marine Corps requiring activities within the continental United States (CONUS) engaged in contracting for common, recurring, installation-level service requirements. For this research, we use Integrated Solid Waste Management (ISWM), which is essentially garbage collection, as our example recurring service. ISWM services are acquired by most CONUS DoD installations and consist of identifiable tasks that are similar in nature.

While we specifically focus on ISWM services, our method is versatile and can be adapted to many other service requirements. Strategically clustering DoD installations that acquire like services allows the DoD to manage its portfolio in a way that yields the greatest rate, process, and demand savings achievable. As such, we aim to answer the following research question: Are there potential cost savings (rate, process, demand) through strategically clustering common DoD service contracts?

Literature Review

Category Management—Private Sector

Category management is the latest evolution of the private sector's attempts to control costs in order to achieve competitive advantages. Its original form was strategic purchasing, which achieved rate and process savings by aggregating purchases (leveraging spend) of similar requirements. Following strategic purchasing, the next cost control method was strategic sourcing, which achieved rate and process reductions using market-focused techniques like partnering with suppliers in the research and development stage of new product development, monitoring and measuring supplier performance, implementing supplier relationship management techniques, etc. For all its advancement, strategic sourcing remained focused on acquisition-related solutions. Category management added an additional layer of analysis to the concepts included in strategic sourcing by

> incorporate[ing] many familiar aspects of business improvement processes and change management … it is not an approach that is confined to purchasing but typically requires the active participation of and engagement with stakeholders, functions and individuals across the business to make it successful. (O'Brien, 2015, p. 5)

Category management is a functionally-led (i.e., end-user led) process, whereas strategic purchasing and strategic sourcing tend to be acquisition- or purchasing-led processes.

Historically, many organizations viewed their purchasing function as an operational entity responsible solely for handling routine transactions. Peter Kraljic (1983) asserted that organizations' top management must change this viewpoint and recognize the strategic value of its purchasing function. His philosophy was based on the practice of strategic purchasing. Kraljic (1983) asserted,

> A company's need for a supply strategy depends on two factors: (1) the strategic importance of purchasing in terms of the value added by product line, the percentage of raw materials in total costs and their impact on profitability, and so on; and (2) the complexity of the supply market gauged by supply scarcity, pace of technology and/or materials substitution, entry barriers, logistics cost or complexity, and monopoly or oligopoly conditions. (p. 110)

He used these two factors (importance or impact on the Y-axis, and complexity of market or supply risk on the X-axis) to create a matrix to categorize an organization's purchases (see Figure 2).

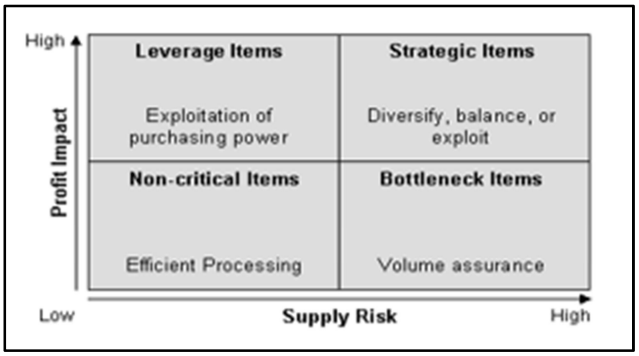

Figure 2. Kraljic Portfolio Matrix (KPM)
(Holt, 2017)

The matrix categorized supply items into Non-Critical, Bottleneck, Leverage, and Strategic quadrants. The Leverage quadrant is the most relevant to this study because it is composed of items that have a high importance to the organization and minimal supply risk. High importance to the organization and minimal supply risk are characteristics that describe most of the common, recurring DoD service requirements. Kraljic (1983) claimed,

> On items where the company plays a dominant market role and suppliers' strength is rated medium or low, a reasonably aggressive strategy ("exploit") is indicated. Because the supply risk is slight, the company has a better chance of achieving a positive profit contribution through favorable pricing and contract agreements. (pp. 113–114)

This statement suggests that supply items in the Leverage quadrant of the Kraljic Matrix provide the best opportunity to aggregate purchases by clustering common, recurring service requirements to "exploit" the enormous purchasing power of the DoD over its many, less powerful suppliers in order to achieve savings. Note that while the terminology is aggressive, the DoD is not in the business of throwing its weight around in order to put companies asunder. However, budget constraints demand the DoD sharpen its pencil when it comes to leveraging its strengths—one of which is its large, enduring buying power—to achieve reasonable savings.

To develop and implement supply management strategies as large as category management, an organization must have the proper governance structure in place, starting at the top (i.e., the strategic level). Category management decisions and policy-making need to be centralized in order to leverage the organization's buying power. While there is a need for centralized control, the goal is to simplify decentralized execution for lower level units (i.e., those closest to the requirement owner). In an article written in 2005, David L. Reese and Douglas W. Pohlman stated that

> today's commercial procurement community is leaning heavily toward the organizational concept of centralized procurement. Although the large and medium corporations around the globe that are centralizing their purchasing efforts use several different organizational constructs, the overarching objective is typically the same. To the maximum extent possible, the entire organization should be corporately leveraging its purchasing volume and customer and supplier relationships through strategic planning and execution.

> Indeed, companies that are striving to ensure supply of critical goods and services are finding a decentralized strategy that promotes fragmented processes is fundamentally detrimental to their goal. (p. 6)

In short, category strategy and planning must be done centrally, while execution remains tactical and decentralized.

Category Management—Public Sector

In 2005, the Office of Management and Budget (OMB), via memorandum, officially charged all federal government agencies to begin implementing strategic sourcing (Johnson, 2005). The OMB issued additional guidance in 2012, establishing the Strategic Sourcing Leadership Council (SSLC) and placing additional responsibilities upon the GSA for helping to implement federal-wide strategic sourcing (Zients, 2012). While these efforts led to several small strategic purchasing wins, the federal government, and the DoD specifically, still lacked a comprehensive, coordinated approach to managing its spend.

The most recent guidance, issued by the OMB in 2014, declared that category management was common in industry practices and would be the future approach to the federal government's acquisitions of goods and services (OMB, 2015). Using category management concepts and processes, spend associated with commonly purchased goods and services is owned and managed by assigned category managers. Category managers are charged with managing enterprise-level spend in a way that aligns to the way industry produces and delivers the goods and services that fall into their category in order to achieve rate, process, and demand savings. Category managers are also responsible for organizing multi-functional teams to research and understand how the DoD acquires and uses the goods and services that fall into their category, how industry creates and delivers those goods and services, and any best practices implemented by near-peer organizations. The 2014 memo appointed the GSA as the lead organization for implementing government-wide category management (Rung, 2014).

Finally, in 2015, the OMB published the *Government-Wide Category Management Guidance Document*, which provided agencies with direction for successful implementation of category management processes and established procedures for federal-wide category management operations. Importantly, the OMB established a logical grouping of goods and services purchased throughout the federal government. This logical grouping, known as the OMB taxonomy, aligns product service codes (PSCs) into Level II categories, which roll up into 10 federal-wide Level I categories. For example, ISWM is a service that falls under Facility Related Services (4.4), which falls under Facilities and Construction (4.0) in the OMB taxonomy. See Figure 3 for a more detailed view of the Level I and Level II categories created by the OMB.

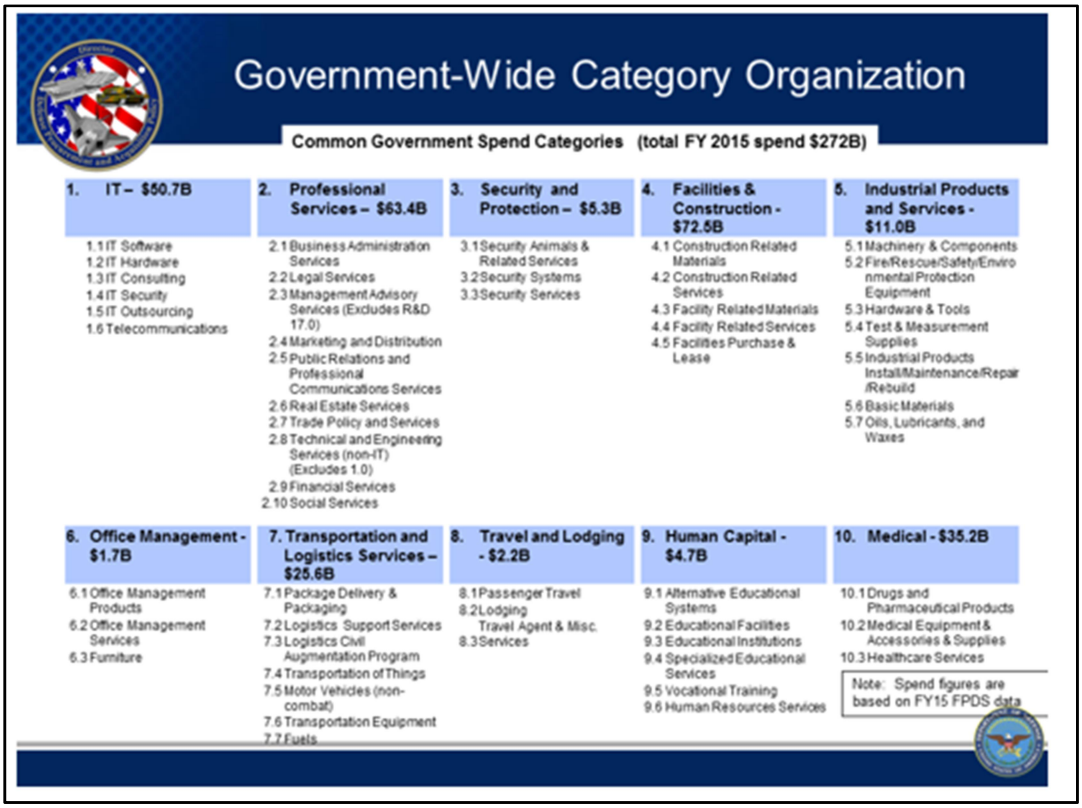

Figure 3. Government-Wide Category Organization.
(Defense Procurement and Acquisition Policy [DPAP], n.d.)

Critique of the DoD's Management of Services

In 2013, the GAO issued a report that critiqued many strategic sourcing initiatives and provided examples of commercial best practices in acquisition. For example, many companies conduct spend analyses to understand their supply chain portfolios. A spend analysis involves identifying the number of suppliers, the number of contracts, prices paid, etc. to target inefficiencies, such as paying different rates for similar services and suppliers, or not consolidating purchases across the company to achieve lower prices. This knowledge allows companies to leverage their buying power, reduce costs, and better manage their suppliers. Following a spend analysis, many companies make structural changes (with top leadership support), to establish commodity managers who are responsible for purchasing services within a category, thus leveraging their buying power to achieve substantial savings (GAO, 2013). By 2013, however, the DoD had still not performed a comprehensive spend analysis in order to highlight inefficiencies and target where to commit their limited strategic sourcing resources.

The GAO (2013) made the following observations and recommendations to overcome key challenges and improve (at the time) strategic sourcing efforts:

1. Agency officials noted that they have been reluctant to strategically source services (as opposed to goods) for a variety of reasons, such as difficulty in standardizing requirements or a decision to focus on less complex commodities that can demonstrate success.
2. For less complex services, such as housekeeping and telecommunications, agencies could consolidate purchases to leverage

buying power. Standardizing requirements could also help drive down costs.

3. For complex services, such as professional services, … agencies could apply company tactics to understand cost drivers and prequalify suppliers. (GAO, 2013, pp. 19–20, 25)

In this research, we focus on the observations and recommendations made by the GAO in 2013, specifically that agencies are reluctant to strategically source services and that opportunities to achieve savings in service requirements exist, even when the complexity of the service varies. To tackle this problem, we first identified all DoD installations that are engaged in contracting for common, recurring service requirements. Second, we analyzed existing market intelligence on several common DoD service requirements to identify an optimal service to demonstrate the potential opportunities associated with clustering DoD installations. Finally, we created a model using ISWM as an example service to demonstrate the concept of clustering to achieve category management goals.

Methodology

The Clustering Continuum

We sought to develop an elementary framework for how PSCs (referred to as services in this report) could be classified and organized to align with the category management framework. From our research, we began to understand that proximity of suppliers to their service location is often a limiting factor in developing clusters. For example, it is reasonable to assume that for a service like ISWM, suppliers would be opposed to taking on long-haul regional or interstate ventures because of the high costs of fuel, dumping fees, and maintenance on their truck fleets. Suppliers seeking ISWM contracts typically favor a short-range business model; that is, the service has proximity dependence between its supplier base and the location at which the service is performed. Granted, there are large businesses capable of covering large regions; however, even those businesses need a local office and local employees to deliver the service.

Conversely, we believe some services can be classified as exhibiting characteristics of proximity independence, a polar opposite to proximity-dependent services. Proximity-independent services are those groups of services that have limited correlation between supplier location and place of performance. For example, information technology (IT) services encompass a wide range of services such as day-to-day protection of base network security, network troubleshooting, and over-the-air software updates; many of these services are conducted in remote, centralized locations throughout the United States, or even worldwide. Figure 4 identifies a few services that we have organized on the clustering continuum. The continuum allows us to logically organize services to help determine appropriate cluster size, which is discussed later in the chapter.

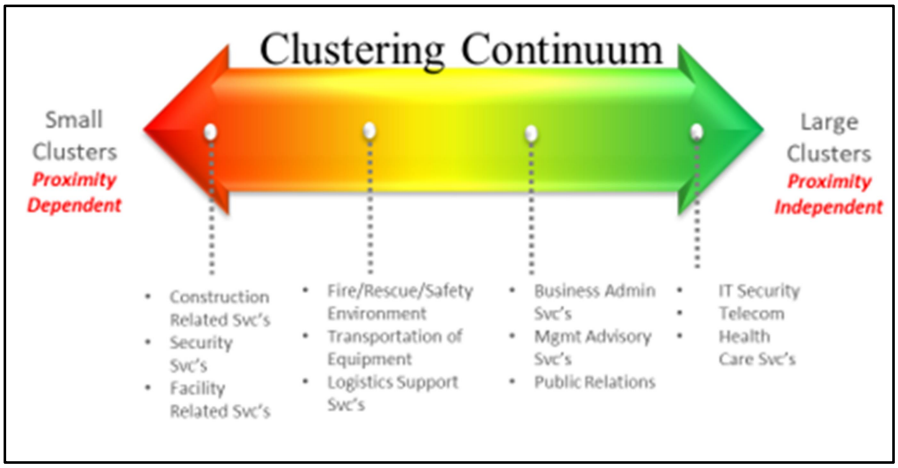

Figure 4. Clustering Continuum

Commercial Business Mapping Software

To facilitate the visual representation of clustering DoD installations and to employ the Category Management goal of mirroring commercial-sector best practices (or, as the case may be, developing new public-sector best-in-class practices), we explored numerous commercially available software options used for business analysis functions. One of the best contenders was the Maptitude Geographic Information Software (GIS). Maptitude GIS is robust, easy-to-use, professional business mapping software that businesses use for in-depth geographic analysis to make data-driven decisions (Maptitude, n.d.). Maptitude provides an array of functions, such as data-integrated heat mapping, drive-time rings, geographic census data analysis, and territory creation; and it contains expandable functions to include other third-party software. We believe Maptitude is a promising suite of capabilities that would likely yield the greatest opportunities for scalable clustering analysis. We believe the capabilities of Maptitude are promising when compared to Microsoft Excel–based mathematical clustering because Maptitude provides greater information integration, including the ability to layer information (see Figure 5, which illustrates the robust functions of Maptitude).

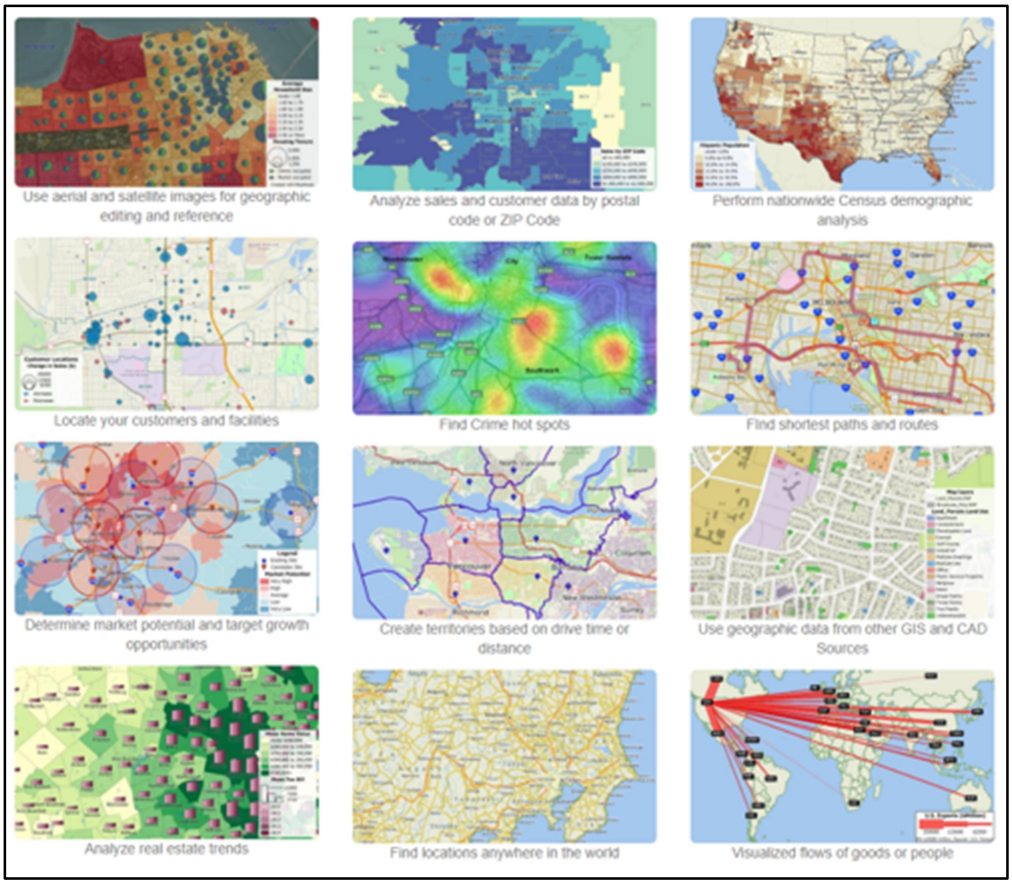

Figure 5. Maptitude Capabilities
(MPCluster, n.d.)

Integrating Installation Data

Prior to embarking on clustering analysis, we determined which requiring agencies would be involved in the procurement of services. Numerous DoD reorganizations over the past few decades, including multiple Base Realignments and Closures (BRAC), consolidated commands and assets, to include procurement units. We needed some way to decipher which areas within the United States are relevant to our analysis.

We were provided an opportunity to integrate data from the DoD Base Structure Report for FY 2015 (DoD, 2015). This valuable report provides a snapshot of real property within the DoD, including an exhaustive list of installation specifics, such as building square footage, owned acreage, and personnel assigned. We saw opportunities for comprehensive clustering analysis. To integrate the data, we converted the report into a readable database with Maptitude and incorporated each reported installation by pinning the location on a map. We also attached personnel assigned to each pinned location, which has benefits for the ISWM analysis (we discuss these benefits later).

MPCluster

MPCluster is a commercially available third-party, add-in software application that provides cluster analysis capabilities within the Maptitude GIS suite. MPCluster identifies groups or clusters in the Maptitude data and then creates new layers, drawing the clusters as boundary shapes and centroid points. MPCluster makes it possible to find clusters (natural groupings) in your Maptitude data. Although it is typically used with point layers, it

can also be used with area layers (e.g., shaded area territories). Applications include market research, the determination of supply territories, and finding potential sales territories (MPCluster, n.d.).

Incorporating MPCluster into our analysis was a simple solution to add depth to our analysis by considering potential parameters, such as minimum and maximum number of installations within a cluster, distance from a DoD installation within a cluster, and centroid weighting based on a certain factor, such as distance from a refuse collection station for ISWM requirements.

Employing the concepts of the clustering continuum within the Maptitude GIS suite with MPCluster software gives us the necessary toolset to develop a scalable methodology for clustering analysis for any service-related category management efforts. This advanced toolset offers an innovative approach that provides category management teams a way to make informed, data-driven decisions. Data-driven decisions derived from clustering not only align with category management strategies, but also correspond with the contracting officer's duty to "take the lead in encouraging business process innovations and ensuring that business decisions are sound" (FAR 1.102-4).

Model Application

The challenges we encountered with our initial approach revealed that clustering based on distance alone does not account for all of the complexities of a given service requirement. Therefore, we developed a model that determines which installations should be clustered based on the market intelligence collected for the given service requirement. The methodology has four main steps:

1. Identify DoD requiring activities for a given service.
2. Identify cost-driver market intelligence relevant to developing clusters.
3. Integrate cost-driver market intelligence into commercial mapping software.
4. Use cost-driver market intelligence to determine optimal cluster size.

To develop and demonstrate this methodology, we selected ISWM as a common, recurring DoD service requirement. ISWM provides a viable service for analysis because it is a service requirement that is common across all three service components of the DoD, and significant cost-driver data and market intelligence is available in the ISWM Category Intelligence Report (CIR; Brady et al., 2016). We narrowed the scope of our ISWM test case to the southern California region for feasibility. We lacked the raw data required to import all landfill and transfer stations into Maptitude, but future research should find and include these data points in order to produce more robust clusters.

In Step 1, we identified DoD requiring activities in southern California that purchased ISWM services in FY 2012–FY 2016. We included the entire service contract spend data on the most recent five-year span to ensure that we captured all contract awards during that time period. We filtered that spend data down to contracts awarded under PSC S205 for "Trash/Garbage Collection Services" within the state of California to give us an accurate picture of which requiring activities had a valid ISWM requirement. After we identified all DoD requiring activities, we integrated them into the Maptitude software by geocoding all DoD installations contained in the 2015 Base Structure Report (DoD, 2015).

For Step 2, we identified cost-driver market intelligence relevant to developing clusters intended to target rate, process, and demand savings. AF CIRs are composed from extensive market research and provide significant insight into common, recurring DoD service requirements. The ISWM CIR highlighted the industry cost structure, cost drivers,

and other factors that were of interest for clustering decisions. Figure 6 shows the cost structure of the ISWM industry on the right, as compared to the overall service industry on the left.

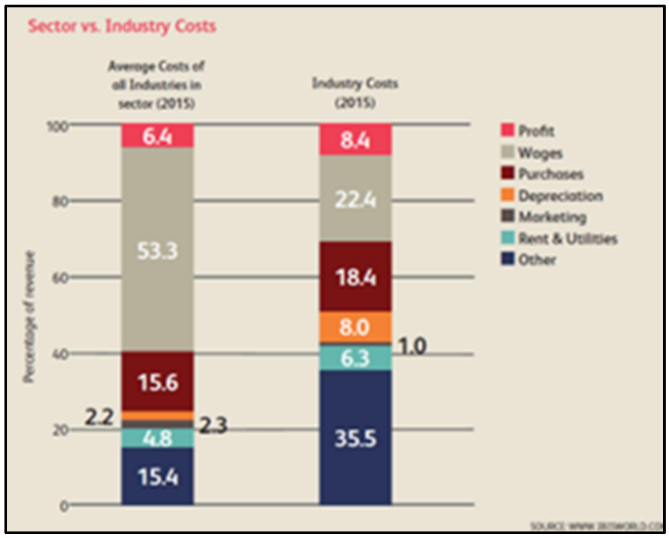

Figure 6. ISWM Cost Structure
(Brady et al., 2016, p. 32)

ISWM is less wage-driven, compared to the overall service sector, because it is a capital-intensive service requirement, requiring significant investment in fixed assets, such as trucks, equipment, and dumpsters. The cost structure shows that 18.4% of the industry costs are attributed to purchases and an additional 8% to depreciation, as compared to 15.6% and 2.3% respectively for the overall service sector (Brady et al., 2016, p. 32). Additionally, the garbage trucks employed during ISWM performance are not fuel-efficient. Fuel costs represented a significant amount of variable costs in the industry. Last, "other fees/expenses" are high in the industry because of the use of landfills and transfer stations, which charge fees based on usage. Fuel costs and "other fees/expenses" were referred to as "Other" in Figure 6 and represented 35.5% of the ISWM cost structure. "Other" costs were substantially higher for ISWM, whereas "Other" costs accounted for only 15.4% of costs in the overall service sector (Brady et al., 2016, p. 32).

Clustering DoD requiring activities based on cost drivers potentially drives efficiency in the utilization of fixed assets and generates savings related to fuel costs and "other fees/expenses." Small, dense clusters would offer opportunities to utilize excess capacity of fixed assets for a proximity-dependent service like ISWM. Additionally, these small cluster sizes would allow contractors to design optimal routes that minimize fuel expenses, as well as labor costs of employees sitting in traffic or taking unnecessarily long routes. Finally, a cluster of bases could allow contractors to negotiate more favorable rates or fees for dumping waste at one landfill or transfer station that is centrally located among requiring activities, which could also subsequently minimize fuel expenses.

Step 3 in the methodology is integration of cost drivers and market intelligence into the Maptitude software. For ISWM, this step entailed mapping all of the landfill and transfer stations in close proximity to the DoD installations. After we mapped those locations, we utilized a feature in Maptitude referred to as "drive time rings." We dropped pins on the map around each grouping of installations and then applied the "drive time rings" feature. This feature produced three 25-minute drive time rings emanating from each pin, as shown in

Figure 7. This allowed us to see how many DoD installations, landfills, and transfer stations are within a 75-minute radius of each pin.

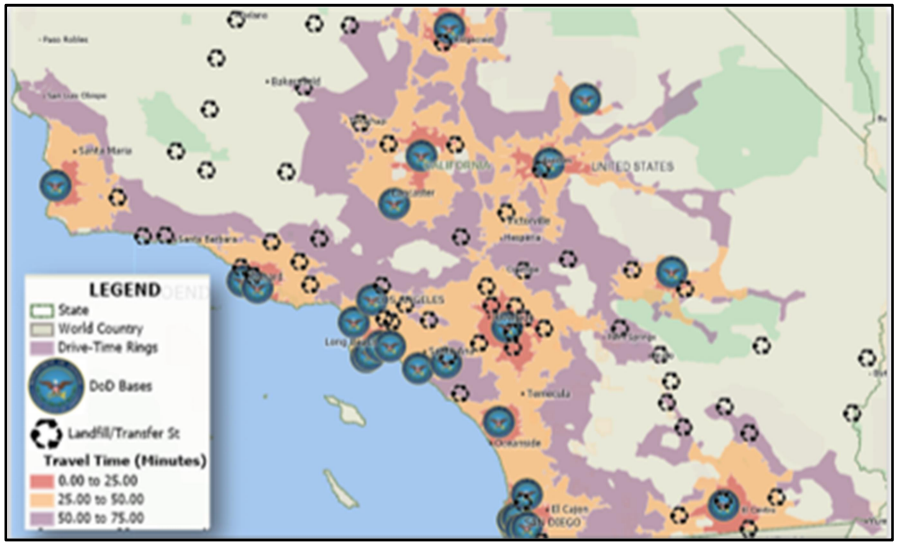

Figure 7. ISWM Drive Time Rings

Step 4 is to use cost-driver market intelligence to determine the optimal cluster size for the given service requirement. The inherently complex nature of contracting for services makes determination of the optimal cluster size challenging. This step in the methodology allows the flexibility that is required to develop an acquisition strategy that makes the most sense for the given service requirement. The category management team should use outputs from Maptitude and MPCluster to make data-driven decisions for the optimal cluster size. These decisions may require them to adjust Maptitude and MPCluster outputs to account for factors like small business participation, competition, and other public policy goals. Distance, travel time, or geographic features are examples of factors that could affect optimal cluster sizes. Distance and travel time were relevant for ISWM due to the proximity-dependent nature of the service, but also because of the specific cost drivers associated with ISWM. Category managers could achieve some of the savings discussed in Step 3 by consolidating requirements.

However, consolidating requirements is not the only way to lower costs for ISWM. Clustering could also have other applications, like demand management. For example, ISWM best practices could be applied through clustering, such as the use of weight sensors to trigger dumpster service, higher capacity dumpsters, or the use of kitchen waste dehydrators.

With the information outlined within the Category Intelligence Report for ISWM service, we derived two key cost drivers that could be used for our model: range constraints and wage constraints (determined by the Department of Labor for all federal contracts).

To better understand the key cost driver of ISWM range constraints, we needed to understand general distance capabilities of suppliers in terms of fuel consumption constraints. As a benchmark, we estimated that the farthest distance a refuse truck could service was approximately 200 miles roundtrip. This estimate was derived from research led by Dr. Sandhu at North Carolina State University, which found that traditional refuse trucks have a “typical fuel economy of 2 to 3 mpg of diesel” (Sandhu et al., 2014). Because our model was applied to the southern California area, we determined that it would be

reasonable to err on a conservative estimate of 2 mpg, considering the congested traffic environment. Peterbilt, an industry manufacturer of refuse trucks, advertises fuel tank capacities ranging from 50 gallons to 150 gallons (Peterbilt, n.d.). On average, we estimated 100 gallons available for use on a typical refuse truck. Therefore, our calculated range of a refuse truck was 200 miles roundtrip, which means that all servicing locations must be within 100 miles of a central location.

Results

Using our map of DoD installations and landfill and transfer stations, we overlaid service range constraints and wage constraints to create clusters. Figure 8 shows a consolidated geographic output visualizing driving distance rings in 25-mile increments from El Segundo, CA. We chose El Segundo as a point of reference because of its relatively central location in the southern California area. Furthermore, El Segundo is also home to Los Angeles Air Force Base (AFB), which provides an opportunity to showcase the number of procuring agencies and places of performance contracting for ISWM. Examining FPDS-NG system data from FY 2012 to FY 2016, we were able to identify and validate 15 DoD installations procuring refuse collection services under the PSC S205 "Trash/Garbage Collection Services" within a 100-mile radius of El Segundo's Los Angeles AFB (DPAP, n.d.). Moreover, the data shows an additional 151 DoD locations listed as procuring "waste collection services" working in commercial office space (DPAP, n.d.). We assume these other locations may be various program offices that consist of DoD employees. In addition, 166 adjacent locations have procured the same service over a five-year period (DPAP, n.d.). Finally, within a 100-mile driving range, 27 landfill or transfer active stations are available for use. This provides great opportunity for competition or negotiated rate savings, which are discussed later in this chapter.

Figure 8. PSC S205 Data Shown in 25-Mile Distance Intervals From El Segundo

To add depth to our research, we decided to test our model with a rough round-table estimate that assumes a refuse truck would remain within a two-hour roundtrip drive time from its base of operations. This estimate is used strictly to test our model's clustering in terms of labor or hourly wage constraints. For example, suppose industry practice suggests the most efficient routes for refuse collection has a truck remain in a centralized location versus servicing areas spanning large geographic distances. Viewing the data in terms of drive time provides an analysis of locations available to be serviced within a relatively congested location like southern California, as compared to rural areas.

Figure 9 shows drive time in minutes from El Segundo, CA. The rings are divided into 20-minute increments, up to 60 minutes from El Segundo. From this output, we were able to derive a total of 38 locations procuring ISWM services within a 60-minute driving time. Additionally, nine landfill or transfer stations are available for use for ISWM services within the same area.

Figure 9. PSC S205 Data Shown in 20-Minute Drive Time Intervals From El Segundo

For comparative analysis, Figure 10 and Figure 11 show differences in driving distance analysis and driving time analysis. Determining which output to utilize depends on the type of cost savings being targeted. For example, if market intelligence leans toward the assumption that fuel costs are a significant factor to overall ISWM costs, then the driving distance clusters may provide a better solution. If labor costs are a more heavily weighted cost driver, the driving time output may provide a better solution.

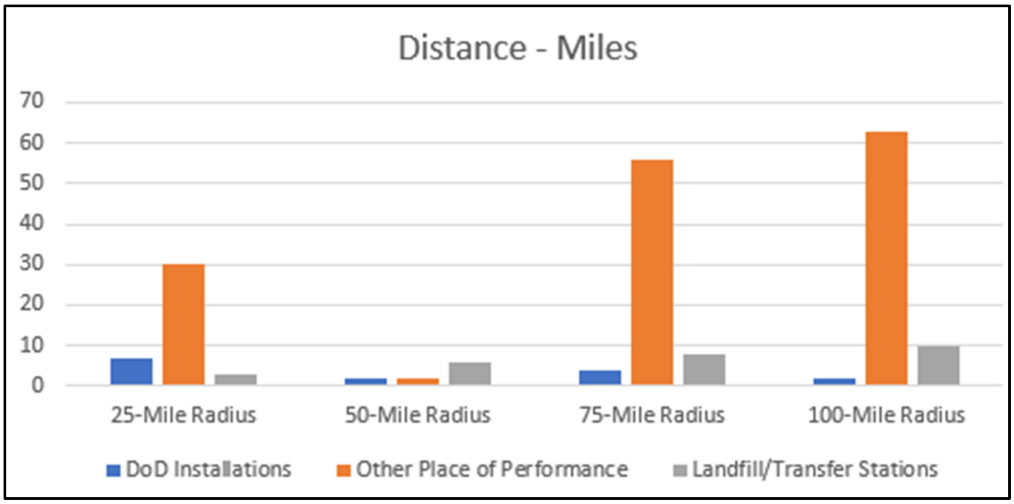

Figure 10. PSC S205 Cost Driver: Driving Distance (Miles) From El Segundo

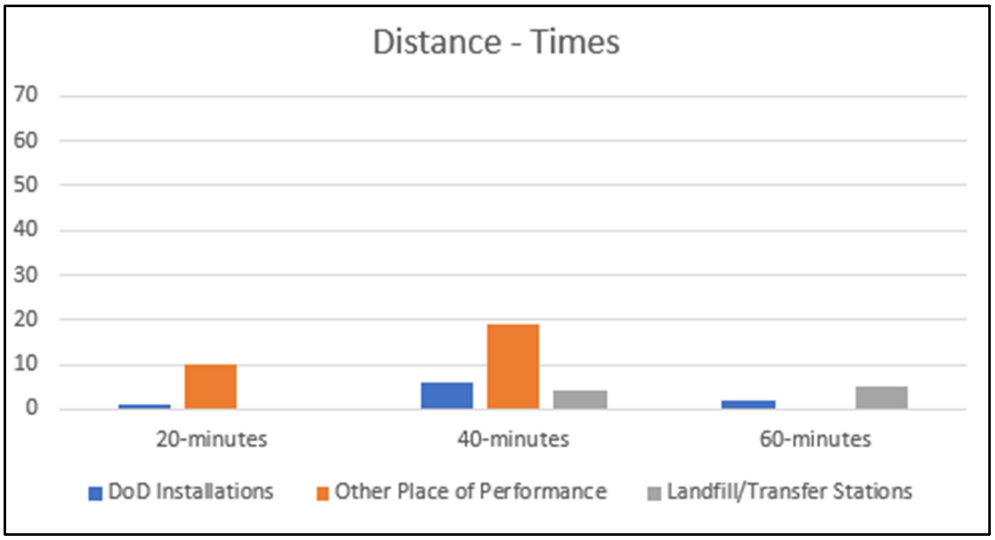

Figure 11. PSC S205 Cost Driver: Driving Time (Minutes) From El Segundo

Discussion and Conclusion

Service contract requirements need to garner additional focus in future DoD category management efforts. Service-related contracts deliver critical defense-sustaining capabilities and account for over half of defense spending. Historically, the DoD has struggled with the acquisition of services due to the inherently complex nature of services, compared to the seemingly straightforward procurement of commodities. This reality makes improvements in category management of service contracts vital to future mission success of the DoD.

We developed a methodology that clusters installations strategically, based on relevant cost drivers of a specific service. We recognize that recurring, common DoD service-related requirements yield the greatest opportunity for implementing strategic initiatives to achieve rate, process, and demand savings. A one-size-fits-all mathematical model will not generate optimal clusters for every service acquisition scenario. Rather, a flexible solution, like our model, allows category management teams to uphold their charge to innovate and enact best-in-class solutions for their category. Our solution is a versatile, commercial off-the-shelf software solution that provides the capability to map DoD requiring activities and cluster them based on virtually any type of data inputs.

As a reminder, our research question was: Are there potential cost savings (rate, process, demand) through strategically clustering common DoD service contracts?

Rate Savings

AFICA published the most recent version of the *Cost Savings Tracker Guidebook* in February 2017, which outlines how organizations should verify rate, process, and demand savings achieved through category management initiatives (AFICA, 2017). Clustering DoD-requiring activities based on cost drivers specific to the service requirement may lead to rate savings. We used ISWM to demonstrate the potential for rate savings by promoting efficient utilization of fixed assets, saving fuel costs, and reducing labor costs and "other fees/expenses" associated with landfills and transfer stations.

We are unable to state the achievement of rate savings with certainty in this study because we do not have the proper data to make a quantifiable claim. Due to the varying levels of service quality and the scope of work performed at various requiring activities across the DoD, we are unable to quantify levels of service quality or scope of work

performed by looking at the collected spend data, which only provides a total contract price. We are unable to discern the number of containers serviced on base, the volume of waste produced, or other factors related to cost (e.g., hazardous waste disposal). Without a higher level of data granularity, we are unable to make an "apples-to-apples" comparison, which prevents us from stating the rate savings that could be achieved with certainty. The DoD could implement a pilot test at a few locations to estimate potential savings before undertaking an enterprise-wide approach.

Process Savings

Clustering DoD installations to develop large acquisition solutions like indefinite quantity/indefinite delivery (ID/IQ) contracts would create significant process savings in contract formation and administration. The use of IDIQs, where practical, would decrease the number of contract awards and subsequent administrative actions required to provide common services to DoD installations.

One of the requiring activities in close proximity to Los Angeles AFB is Edwards AFB, which has fulfilled its ISWM requirement using an ID/IQ contract since 2009. The remaining requiring activities awarded their ISWM requirement under individual definite delivery/definite quantity contracts with one base year and four option years. The metrics from the AFICA Cost Savings Tracker prove that substantial process savings are possible. The Cost Savings Tracker uses a 2014 Operational Contracting Air Force Manpower Standard developed by the Fifth Manpower Requirements Squadron (5MRS) to measure process savings by establishing standard process times for the award and administration of various contract types (AFICA, 2017). This manpower standard requires 615.08 hours to award a "definite" service contract and 219.66 hours to award a service task order off an "indefinite" contract vehicle (AFICA, 2017). This suggests that the DoD could potentially realize 5,535.88 hours of process savings—395.42 hours per contract over a five-year period—should the 14 other DoD installations in the southern California area fulfill their ISWM requirements using the ID/IQ awarded at Edwards AFB. These savings are even more substantial when extrapolated to include clusters encompassing all CONUS DoD installations.

Demand Savings

Lastly, clustering common, recurring DoD service requirements would result in standardized levels of service at all installations. The demand savings from clustering would promote the implementation of best practices for that service requirement across the DoD, which would eliminate non-value-added activities currently performed at some installations. The Air Force Civil Engineer Center (AFCEC) gathers ISWM sub-Activity Management Plan (sub-AMP) data for Air Force ISWM requirements—data points on the number of containers at each base, tons of waste generated, and cost per ton to remove the waste (CIR; Brady et al., 2016). However, ISWM data for the other DoD installations in the southern California area was not available. Therefore, based on the lack of data availability/granularity, we are unable to validate any demand savings for ISWM services.

Our findings suggest that there are substantial opportunities to achieve process savings through strategic management of common, recurring DoD service requirements. Additional research and application are needed to prove rate and demand savings. We narrowed the scope of this research to ISWM to provide depth of analysis and to demonstrate a methodology for a common, recurring DoD service. It was not feasible to discuss all common, recurring DOoD service requirements in this research. However, ISWM spend during FY 2016 was less than 1% of the $149.6 billion spent on all DoD service

contracts. This suggests that our research barely scratched the surface of total spend on DoD service contracts.

Our research revealed a significant number of complexities associated with Category Management of service contracts that prevented us from recommending a "one-size-fits-all" model. We recommend additional data be gathered on service requirements procured within the DoD for future research related to category management of services.

Additionally, future research should focus on services that fall on the proximity-independent end of the continuum. We suspect there are several proximity-independent services in the IT category. Our model allows future researchers to collect data and develop visualizations that inform category management decisions for proximity-dependent and proximity-independent services.

References

Air Force Installation Contracting Agency (AFICA). (2017). *Cost savings tracker guidebook*. Wright-Patterson Air Force Base, OH: Author.

Brady, S., Briden, D., Carper, N., Dunham, S., Herrmann, P., Lovejoy, A., & Turnipseed, C. (2016). *Category intelligence report—Appendix A: Integrated Solid Waste Management*. Air Force Installation Contracting Agency (AFICA).

Church, J. D. (2014, April). Explaining the 30-year shift in consumer expenditures from commodities to services, 1982–2012. *Monthly Labor Review.* Retrieved from https://www.bls.gov/opub/mlr/2014/article/explaining-the-shift-in-consumer-expenditures.htm

Defense Procurement and Acquisition Policy (DPAP). (n.d.). Government-wide category management organization [Figure]. Retrieved September 28, 2017, from http://www.acq.osd.mil/dpap/ss/images/Government-wide_Category_Structure1.png

DoD. (2015). *Base structure report—Fiscal year 2015 baseline*. Retrieved from http://www.acq.osd.mil/eie/Downloads/BSI/Base%20Structure%20Report%20FY15.pdf

Defense Procurement and Acquisition Policy (DPAP). (n.d.). Inventory of services contracts. Retrieved October 10, 2017, from http://www.acq.osd.mil/dpap/cpic/cp/inventory_of_services_contracts.html

Federal Acquisition Regulation (FAR), 48 C.F.R. 1.102-4 (2017).

Federal Acquisition Regulation (FAR), 48 C.F.R. 37.101 (2017).

GAO. (2013). *Leading commercial practices can help federal agencies increase savings when acquiring services*. Retrieved from https://www.gao.gov/assets/660/653770.pdf

GAO. (2017). *High-risk series: Progress on many high-risk areas, while substantial efforts needed on others*. Retrieved from http://www.gao.gov/assets/690/682765.pdf

Holt, C. (2017, January). *AFICA business analytics*. Presented during conference at Wright-Patterson Air Force Base, OH.

Johnson, C. (2005). *Implementing strategic sourcing*. Washington, DC: Office of Management and Budget.

Kraljic, P. (1983, September). Purchasing must become supply management. *Harvard Business Review,* 109–117.

Maptitude. (n.d.). Maptitude business mapping software. Retrieved October 10, 2017, from http://www.caliper.com/Maptitude/BusinessMap/default.htm

MPCluster. (n.d.). MPCluster for Maptitude: Features. Retrieved from http://www.mpcluster.com/features.php

O'Brien, J. (2015). *Category management in purchasing*. London, UK: Kogan Page Limited.

Office of Management and Budget (OMB). (2015, April). *Government-wide category management guidance document.* Washington, DC: Author.

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD[AT&L]). (2017). *FY16 spend—DoD as contracting dept*. Retrieved from http://www.acq.osd.mil/dpap/sa/Learn-More/images/ServicesSpendingFY16.pdf

Peterbilt. (n.d.). Peterbilt vocational model 320 [Specification sheet]. Retrieved August 27, 2017, from http://www.peterbilt.com/products/vocational/320/#specifications

Reese, D., & Pohlman, D. (2005, Spring). Centralized purchasing power: Why Air Force leadership should care. *Air Force Journal of Logistics*, 2–12.

Rung, A. (2014). *Transforming the marketplace: Simplifying federal procurement to improve performance, drive innovation, and increase savings*. Washington, DC: Office of Management and Budget.

Sandhu, G., Frey, H. C., Bartelt-Hunt, S., & Jones, E. (2014, April). *Real-world activity and fuel use of diesel and CNG refuse trucks* [PowerPoint slides]. Retrieved from http://www.cert.ucr.edu/events/pems2014/liveagenda/25sandhu.pdf

Zients, J. (2012). *Improving acquisition through strategic sourcing.* Washington, DC: Office of Management and Budget.

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