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The Use of Reverse Auction within the U.S. Army

December 2016

MAJ Amy A. Saal, USA

MAJ Stephen S. Settembre, USA

Thesis Advisors: E. Cory Yoder, Senior Lecturer
Dr. Douglas Brinkley, Senior Lecturer

Graduate School of Business & Public Policy

Naval Postgraduate School

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ABSTRACT

The purpose of this research project is to analyze the effectiveness and efficiency of the U.S. Army's use of reverse auctions (RAs) in regard to contracting. RAs are powerful procurement tools that leverage the power of fluid market conditions through a dynamic pricing environment. This project examines the use of RAs within the Army Contracting Command (ACC) using E. Cory Yoder's Three Integrative Pillars for Success. Research questions focus on identifying best practices currently used within the contracting field. Data gathered through personal interviews with subject matter experts and practitioners of RA tools identifies whether current RA platforms deliver "best value" procurements and generate true cost savings. Interview questions target three key focus areas: personnel, platforms, and protocols. If the ACC is to utilize RAs in the most effective and efficient manner, it is essential to select the appropriate RA type, field the best platform, and implement the correct protocols to maximize the use of RAs. These three factors together will yield maximum savings while generating new process improvements that will enable the ACC to become a more efficient and lean organization. Conclusions and recommendations provide suggestions for improving the Army's future use and application of RAs.

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We would like to thank Professors Yoder and Brinkley for their passion and expertise in pursuit of our research studies. We would also like to thank our spouses, Nidia Settembre and Brandon Hickman, for their love and support throughout the completion of this research project.

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ABOUT THE AUTHORS

Stephen Settembre, Major, graduated from the University of Nevada Las Vegas with a Bachelor of Science Degree in architecture in May 2006. He was commissioned as a Second Lieutenant in the United States Army and was ordered to active duty as a Quartermaster Officer in June 2006. MAJ Settembre's first tour of duty was with the 3d Armored Calvary Regiment (ACR) in December of 2006, where he was a Supply Support Activity Platoon Leader and Accountable Officer for a Maintenance Company. While assigned to the 3d ACR, he was deployed to Mosul, Iraq from November 2007 through January 2009, where he was the Distribution Platoon Leader for a Supply and Transportation Company. Following his redeployment, he became the Battalion Adjutant until May 2009. Upon his arrival to the 2nd Brigade, 1st Armored Division (2-1 AD) in July of 2010, he became the S4 for the Special Troops Battalion. In September 2010, MAJ Settembre was selected to take Command of Echo Forward Support Company, 47th Brigade Support Battalion (attached to the 1st Battalion, 6th Infantry Regiment) in Fort Bliss, Texas. In September 2012, he took command of the South Bend Recruiting Company, 3rd BDE, United States Army Recruiting Command. In April 2014, he was selected to be the Aide-de-Camp to the Commanding General of the United States Army Recruiting Command at Fort Knox, Kentucky. MAJ Settembre is currently attending the Naval Postgraduate School and will graduate in June 2017 with a MBA and a focus in the acquisition and contract management and program management curriculums. Upon Graduation, in the summer of 2017, MAJ Settembre will attend the Command and General Staff College at Fort Leavenworth, Kansas. MAJ Settembre is married to the former Nidia Pacheco-Lopez from Durango, Mexico. They have one daughter, Adriana Marie Settembre, who was born on July 3, 2014.

Amy Saal, Major, graduated from the United States Military Academy at West Point, NY in 2003 with a Bachelor of Science degree in systems engineering. Her first assignment was at the United States Military Academy Preparatory School (USMAPS) where she served as an athletic officer and assistant women's basketball coach. Upon graduating from the Air Defense Artillery Officer's Basic Course, MAJ Saal was assigned to 6-52 ADA Battalion (Patriot) in Ansbach, Germany. During her tour, MAJ

Saal served as launcher platoon leader for Bravo Battery, fire control platoon leader for Charlie Battery, and assistant battalion S3. Following her assignment with 6-52 ADA Battalion, MAJ Saal served as the assistant brigade S4 for 69th ADA brigade. While stationed in Germany, MAJ Saal twice participated in Juniper Cobra, a bi-lateral ADA exercise between U.S. armed forces and the Israeli Defense Forces. Following her completion of the Combined Logistics Captain's Career Course (CLC3), MAJ Saal again served as the assistant brigade S4 with the 10th Sustainment Brigade (10th SBDE) in Fort Drum, NY. In October 2008, MAJ Saal deployed to Victory Base Complex (VBC) in Iraq and assumed command of the 590th Quartermaster (QM) Company. Upon redeployment, MAJ Saal continued to serve as the company commander for the 590th QM Company until June 2010. Following command, MAJ Saal served with the 10th Regional Support Group (RSG) from 2010 through 2012 in Okinawa, Japan. MAJ Saal twice participated in Balikatan, a combined and joint exercise between the U.S. and of the Republic of the Philippines. In addition, MAJ Saal supported Operation Tomodachi in response to the Great East Japan earthquake and tsunami in March 2011. Upon leaving Okinawa, MAJ Saal served as a contracting officer for the Mission and Installation Contracting Command (MICC) – Fort Knox, KY. While serving at the MICC, MAJ Saal deployed in support of Operation Enduring Freedom (OEF) where she was the Chief of Contracting for the Regional Contracting Office – Southwest on Camp Leatherneck. In Afghanistan, she managed a team providing contingency contracting support to over 40,000 United States, Coalition, and Afghan Forces. MAJ Saal also served in the contracts division at MICC-Knox and as a member of the Army Advertising Team assigned to administrate the multi-million dollar Army Advertising Contract. She held a $1M warrant both in a garrison and contingency environment. MAJ Saal is currently an MBA graduate student studying Acquisition and Contract Management at the U.S. Naval Postgraduate School in Monterey, CA. She was recently married to Mr. Brandon Hickman from Elizabethtown, KY.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Army Contracting Command
ACWS	Army Contract Writing System
APG	Aberdeen Proving Ground
ACA	Army Contracting Agency
ARB	Acquisition Record Brief
BPA	Blanket Purchase Agreement
CAPPMIS	Career Acquisition Personnel and Position Management Information System
CAMP	Career Acquisition Management Portal
CBA	Cost–Benefit Analysis
CE	Cost Estimating
CECOM	Communications Electronics Command
CHESS	Computer Hardware Enterprise Software and Solutions
CLC	Continuous Learning Course
CONUS	Continental United States
CPM	Command Policy Memorandum
DASA[P]	Deputy Assistant Secretary of the Army for Procurement
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DFAS	Defense Finance and Accounting Service
DHS	Department of Homeland Security
DOD	Department of Defense
DUNS	Data Universal Numbering System
ECC	Expeditionary Contracting Command
EC/EDI	Electronic Commerce/Electronic Data Interfaces
e-RA	Electronic Reverse Auction
ERAPT	Electronic Reverse Auction Project Team
FASA	Federal Acquisition Streamlining Act
FAR	Federal Acquisition Regulation
FARA	Federal Acquisition Reform Act
FACNET	Federal Acquisition Computer Network

FSS	Federal Supply Schedule
FFP	Firm-Fixed Price
FTS	Federal Technology Service
FY	Fiscal Year
GAO	Government Accountability Office
GSA	General Services Administration
GWAC	Government-Wide-Acquisition Contract
ID/IQ	Indefinite Delivery/Indefinite Quantity
IGCE	Independent Government Cost Estimate
IFF	Industrial Funding Fee
IT	Information Technology
JPME	Joint Professional Military Education
LPTA	Lowest Price Technically Acceptable
MAC	Multiple-Award Contract
MICC	Mission and Installation Contracting Command
MILSPEC	Military Specification
MIT	Massachusetts Institute of Technology
MOS	Military Occupation Specialty
NAVICP	Naval Inventory Control Point
OCS	Operational Contract Support
OFPP	Office of Federal Procurement Policy
OPM	Office of Personnel Management
PALT	Procurement Acquisition Lead Time
PEO EIS	Program Executive Office for Enterprise Information Systems
PC	Personal Computers
PD2	Procurement Desktop Defense
PM	Program Management
PQM	Production Quality and Manufacturing
RA	Reverse Auction
RDECOM	Army Research Development and Engineering Command
SAP	Simplified Acquisition Procedures
SAT	Simplified Acquisition Threshold
SASC	Senate Armed Services Committee

SME	Subject Matter Expert
SOP	Standard Operating Procedures
SPS	Standard Procurement System
TIPS	Three Integrative Pillars of Success
VCE	Virtual Contracting Enterprise

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I. INTRODUCTION

The use of reverse auctions (RAs) is a powerful procurement tool that continues to grow in size and scope. In December 2013, the Government Accountability Office (GAO) published a report titled *Guidance Is Needed to Maximize Competition and Achieve Cost Savings*, which analyzed the use of RA within four federal government agencies. During fiscal year (FY) 2008, the Departments of the Army, Homeland Security, Interior, and Veterans Affairs executed 7,193 RAs (GAO, 2013, p. 6). Only four short years later, that number grew to over 19,000. The GAO estimated that the total procurement value for RAs executed in FY2012 was more than $2 billion. The significant growth in the use of RA warrants future investigation to determine whether this innovative procurement tool is being used to its fullest potential.

A. PURPOSE

The purpose of this research study is to assess the effectiveness and efficiency of the U.S. Army's use of reverse auctions in contracting. The data gathered through personal interviews with SMEs and practitioners of RA tools within the U.S. Army Contracting Command (ACC) will help the researchers to identify whether the use of RA platforms generates true cost savings. Interview questions with practitioners of RA tools focus on assessing effectiveness and efficiency. We define effectiveness as being "adequate to accomplish a purpose and producing the intended or expected result" (Effective, 2016). Efficiency is the ability to accomplish a task with the least waste in terms of time, resources, effort, and competency in performance (Efficiency, 2016). An analysis of interview results using E. Cory Yoder's Three Integrative Pillars for Success (TIPS) model identifies best practices currently used within the contracting field.

B. BACKGROUND

The Federal Acquisition Regulation (FAR) forbids auctions or "auctioning techniques" for the procurement of goods and services before 1997. However, the FAR revisions in 1997 eliminated this language, paving the way for the use of electronic reverse auctions (e-RA) within the federal government (Kelman, 1999, para. 3). In 2000, the Communications Electronics Command (CECOM) conducted the first RA for the

U.S. Army. The organization purchased a secure fax machine from the General Services Administration (GSA) schedule, securing savings of approximately 28%. Immediately following the fax machine, CECOM bought two computers for a total of $3,280, achieving a roughly 50% savings (Murray, 2000, para. 15).

RAs allow the buyer to have sellers compete among one another, which in return lowers the price. The RA model reduces price while facilitating fair and open competition. This process is the opposite of a conventional auction, where multiple buyers compete for one sale and the seller then accepts the highest bid. Typically, lowest price technically acceptable (LPTA) is the criteria for selecting the awardee when using RAs. However, RAs are also suitable for procurements utilizing trade-off procedures when evaluating proposals and selecting awardees. Although procurements utilizing trade-off evaluation criteria are not common when conducting RAs, there are several occasions where their use was successful.

Established in 1999, FedBid serves as the Army's primary source for RA services, although other RA platforms exist. Currently, FedBid provides services to more than 75 federal agencies with access to a network of over 83,000 suppliers (FedBid, 2016b). ACC–Aberdeen Proving Ground (ACC-APG) awarded contract number W91ZLK-12-P-0699 to FedBid, Inc., on September 22, 2012, to provide an online marketplace for RAs. In accordance with the contract terms and conditions, FedBid is to provide training to users, assist with account maintenance, and provide technical and user support while maintaining a list of qualified suppliers. This contract is set to expire in 2017.

Since its contract start date, FedBid has achieved more than $300 million in cost savings for the three organizations that compose the U.S. Army's Contracting Command. The Expeditionary Contracting Command (ECC) has achieved savings in excess of $10 million, and the ACC centers have realized over $44 million in savings (Z. Ennis, personal communication, June 2, 2016).[1] However, the Mission and Installation Contracting Command (MICC) is the biggest user of RA within the ACC. Command

[1] Email communication with Zach Ennis of FedBid on June 23, 2016, in the form of an Excel spreadsheet. The spreadsheet addressed buying agency, actions, target price, award price, savings, bidders, bid count averages, and small business dollars. The data included the ACC, ECC, and MICC organizations from January 1, 2000, through May 23, 2016. Additional information exchange conducted through ongoing email discussion from May 23, 2016, through October 5, 2016.

policy within the MICC mandates the use of RA for designated product and service codes. To date, the MICC has generated savings in excess of $250 million with FedBid's online marketplace (Z. Ennis, personal communication, June 2, 2016).

Recently, the GSA developed and launched its own RA platform. Established in 2013, users of the GSA RA website have awarded over $5 million in contract awards. GSA's RA platform has helped the government to achieve almost $1 million in savings, with an average selling price that is 14.44% lower per contract award when compared against the independent government cost estimate or IGCE (C. Wingate, personal communication, April 15, 2016).[2] In addition, the Army's Computer Hardware Enterprise Software Solutions (CHESS) implemented its own RA tool. However, data on its use and cost savings was unavailable.

C. RESEARCH QUESTIONS

Our analysis identifies best practices currently used within the contracting field and helps to determine whether the use of RAs yields "best value" procurements and generates true cost savings.

1. Primary Research Question

- Is the Army using RAs in the most effective and efficient manner, or are there opportunities for expansion and/or improvement?

2. Secondary Research Questions

- What theories govern the use of RA within the Army?
- What are the current rules and regulations governing the use of RAs in the Army? What are the Army's past experiences in using RAs?
- What platforms has the Army used in the past for conducting RAs, and what platforms is it currently utilizing?
- Is the Army generating the desired cost savings through its policy on the use of RA?

[2] Email communication with Charles Wingate from GSA on April 14, 2016. The information provided tracked the Army's use of the GSA RA tool from July 1, 2013 through February 29, 2016. The data package included the total IGCE amount for awarded auctions, award values, savings, percent savings versus the ICGE, amount of the highest bid award, savings versus highest bid, percent savings versus highest bid, and total highest bid by winning vendor.

D. SCOPE AND ORGANIZATION

Multiple organizations within the federal government utilize RA platforms. This MBA project focuses solely on the Army's use of RA tools. Interviewees possessed various levels of experience and success in their use of reverse auctioning as a procurement technique. The intent was to capture a snapshot of data and experiences to help identify procurement trends and understand how the Army employs RA tools. Qualitative data in the form of interview responses was the primary basis for our final recommendations and conclusions. Quantitative data provided by FedBid also aided in determining effectiveness. Recommendations offer suggestions for achieving optimal results using RA while also understanding any limitations or shortcomings.

Our main objectives when conducting the interviews were to determine organizational processes for identifying inbound requirements as potential RA candidates, to identify the internal standard operating procedures (SOPs) that govern the use of RA, to find how agencies capture savings, and to determine the types of procurements that are best suited for reverse auctions. The ACC provided a list of recent users of RA tools, with varying levels of success in terms of generating cost savings. The data provided by the ACC encompassed a wide range of requirements and cost savings ranging from $0 to as much as $446,997 per contract action (J. Staggs, personal communication, April 20, 2016).[3] Identified personnel received recruitment emails, and those willing to participate were interviewed by telephone.

E. METHODOLOGY

We began our research by conducting a literature review on auction theory and the economic principles surrounding open markets and competition. Books, magazine articles, online material, and other resources were examined to understand the origins of auctions throughout history. More detailed research into the Army's use of RA was conducted by interviewing personnel with institutional knowledge inside of the ACC.

[3] Communication with Jennifer Staggs, ACC procurement analyst, via ongoing email correspondence from April 13, 2016, to July 18, 2016. The data arrived in the form of an Excel spreadsheet, email chains, and a Microsoft Word file. The data and correspondence provided an in-depth understanding of how the ACC tracks and conducts RA. Ms. Staggs also provided a list of suggested RA users throughout the ACC for soliciting interviews.

Information regarding the Army's current position on the use of RA was also compiled. Policies, procedures, and other regulations were assessed to help understand the Army's history and evolution in using this procurement technique.

This research project also draws upon quantitative data provided by FedBid and the GSA. GSA provided only general data, and the researchers were unable to conduct a detailed analysis with the information given. However, the researchers analyzed data provided by FedBid by comparing target prices with award prices. The average number of sellers bidding compared to total bid counts also helped to determine whether the Army achieved adequate price competition maximizing the benefits of RAs. The researchers also attempted to contact the Computer Hardware Enterprise Software and Solutions (CHESS) for data regarding cost savings and other statistics achieved through their RA platform, but personnel were unresponsive.

The primary form of data collection for this project was through personal interviews with SMEs and practitioners of RA platforms. The data collected was analyzed to determine if the Army could gain greater efficiencies by using RAs. Interview questions spanned the six phases of the contract management process: procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout (Garrett, 2007, p. 20). Interview questions were also formatted based off E. Cory Yoder's (2016) TIPS model and centered on personnel, platforms, and protocols.

1. Yoder's Three Integrative Pillars of Success

The TIPS model is an assessment and management tool used to identify critical organizational design elements. It was originally designed to support the planning and execution of contingency contracting operations (Yoder, 2016). An organization's operational success is based on personnel, platforms, and protocols that make up the three pillars of success in the TIPS model. Authorization and appropriations are the foundation of the TIPS model. Without the proper authorization and appropriations, achieving organizational success is inherently more difficult. Successful organizations lie at the top of the TIPS Model, indicating that they have achieved the desired outcome. The TIPS model is a balance between analytical and conceptual approaches and is explained in

detail during later chapters. The model has previously been used for analyzing Air Force green acquisitions, contingency contracting operations, and operational contract support (OCS) activities (Yoder, 2016).

2. Personnel, Platforms, and Protocol

Personnel is the first pillar that identifies the critical link between rank, position, credential, capability, and connection between appropriate workloads (Yoder, 2016). According to Yoder (2016), platforms are the second pillar that comprises the hardware and software structures used for "analysis, decision-making, production, management, and communication" within selected agencies. Protocol is the third pillar that "includes the rules, decision-making framework, policies, and business models" designed to attain organizational goals and objectives (Yoder, 2016). All three pillars work symbiotically with one another to form the base of the TIPS model.

F. LIMITATIONS AND EXPECTED BENEFITS

The project is limited in complexity, breadth, and depth due to the small interviewee sample size. Statistics provided by both the GSA and FedBid contained only summary-level information that was cumulative from the initiation of their respective RA platforms. However, auctioning techniques provide a unique method for procuring goods and services while attaining strong price competition and realizing significant cost savings. The results of this project will primarily benefit the ACC by providing analysis and recommendations for the future use of RA.

G. SUMMARY

This chapter laid the groundwork for understanding the methods and techniques used to analyze the overall efficiency and effectiveness of RA tools. Our research focused on collecting data through personal interviews with contracting professionals within the ACC. Chapter II provides a history of auction theory and formats. Comprehending how markets operate is critical to understanding how RAs leverage economic principles to drive prices down and why their use is effective at achieving cost savings for the government.

II. AUCTION THEORY

A. INTRODUCTION

The purpose of this chapter is to introduce auction theory and to show how it helps to explain buyer and seller interaction in the marketplace. Within the free market economy, buyers and sellers of goods and services have different desired outcomes; economic principles within auction theory examine buyer and seller motivation.

B. AUCTION THEORY

Auction theory explains how market participants behave from an economics perspective. The basic economic framework is important for understanding price elasticity and inelasticity, competition, and shifts on the supply and demand curve. Ultimately, the concepts presented within auction theory explain how the free market determines a steady state of equilibrium and efficiency. Auction theory is the building block for formulating a good business strategy that benefits both buyers and sellers. For our purposes, the buyer is the U.S. Army, and the sellers are the suppliers of goods and services in government acquisitions.

C. HISTORY

The use of auctions, as a means for selling goods and services in an organized marketplace, stretches back to antiquity. However, there is no record of the use of auctions prior to the establishment of structured societies. A marketplace with buyers and sellers is necessary for the employment of auctions; auctions also require a recognized currency that serves as a method for swiftly categorizing the value of bids. The frequency and popularity of auctions increased as societies and economies matured, and the need for acquiring and selling goods and services grew (Engelbrecht-Wiggans, Shubik, & Stark, 1983, pp. 44–45).

The first recording of a structured auction was the annual Babylonian marriage market (Engelbrecht-Wiggans et al., 1983, pp. 39–40). In this auction, the women of marrying age gathered in the village as the men surrounded them in a circle. The auctioneer, known as the herald, began the bidding with the prettiest of the Babylonian

women. The wealthiest men desiring to marry paid for the most beautiful women to become their wives. The men that were indifferent to beauty agreed to marry the more humble of Babylonian women. These men received a marriage-portion, or a stipend, in exchange for agreeing to marry the less desirable women. The herald used the money generated by the auctioning of the prettiest woman to pay the marriage-portions for the remaining women.

The Roman soldiers also utilized auctions to sell the property and goods they attained in battle. The soldiers would gather their war trophies around a spear driven into the earth. The auctioneer would then sell the acquired loot to the highest bidders. The Roman army also executed slave auctions in this same manner. Prisoners of war from Roman military campaigns were sold as slaves; the revenue from these slave auctions helped to finance military operations (Engelbrecht-Wiggans et al., 1983, p. 40). However, the use of auctions declined during the Middle Ages. The feudal system, small populations, and an ineffective monetary system made the use of auctions difficult and impractical.

Beginning in the 17th century, auctions began to reemerge as a means for selling goods. The hammer, the hourglass, the candle, and the Dutch auction gave birth to the auction types commonly known today (Engelbrecht-Wiggans et al., 1983, p. 45). The hammer auction is the traditional auction type that is also known as the English auction. The hourglass and candle permitted bidders only a small amount of time to place bids. Thus, these types of auctions were more specific in scope and forced the bidder to possess a greater variety of auctioning skills. The Dutch auction was a descending-bid auction originating in Holland but used less frequently during the beginning of the 17th century.

D. BASIC TYPES OF AUCTIONS

As auctions developed, they assumed various forms evolving into the ascending bid, descending bid, and sealed bid. Within each form, there are also basic auction types, including the English, Dutch, sealed-bid first price, sealed-bid second price (also known as the Vickrey auction), and the RA (Krishna, 2010, p. 2). Each type of auction leverages different aspects of competitive bidding strategies to acquire or dispose of goods and

services that facilitate the procurement process. Auctions also allow for the transfer of ownership from one entity to another. Selection of the appropriate auction type is critical to facilitating the transfer of goods and services.

Most individuals are familiar with the traditional English auction. The use of this auction type has always been to sell goods and services effectively in an expedited marketplace. Images of bidders with signs responding to the oral cues of the auctioneer in a loud and open auction arena are typical of English auctions. Bidding begins with the lowest price, and the action is facilitated by an auctioneer who controls the auction. One seller and multiple buyers compete among each other for a given item. Each individual bidding in the auction incrementally increases the asking price of the item with the winning bidder being the individual who bids the highest amount. The auction concludes with highest bidder winning the auctioned item as long as the final bid price is higher than the seller's reserve price. If the bidder does not bid above the seller's reserve price, then the sale of the auctioned item is no longer binding and the transaction is invalid (Gimpel, 2008, p. 167). The English auction ensures that the seller will receive a minimum acceptable price for a given item. Many organizations and marketplaces utilize this auction type, which occurs both electronically and at live events.

The Dutch auction is counter to the English auction and utilizes a descending price system. Auctions begin with a starting price that exceeds the value of the item, and the auctioneer continues to lower the price until bids begin. This auction strategy is not often used because it does not facilitate the exuberant atmosphere commonly associated with regular auctions. Bidders watch the price gradually decrease on a price clock. Auction participants hit a button once the price reaches an acceptable level or a price that individuals are willing to pay. Regardless of its inability to generate an enthusiastic environment, the Dutch auction is still an effective auctioning technique.

Sealed bidding is the next auction type. Buyers receive bids from multiple sources in sealed envelopes. The two types of sealed bidding are sealed-bid first price and sealed-bid second price. In the first price scenario, auction participants place bids without the knowledge of who the other participants are and their bid amounts. The winner of the sealed-bid goes to the individual with the highest bid.

Economists also refer to the sealed-bid second price auction as the Vickrey auction (Wyld, 2000, p. 18). According to Wyld (2000), Vickrey auctions are identical to sealed-bid first price auctions with one exception. The final price paid by the bidder in the sealed-bid first price differs from the final price paid in the Vickrey auction. Sealed-bid second price incentivizes each participant to bid closer to the "true value" of the auctioned item (Wyld, 2000, p. 18). Vickrey auctions assign the winning bid to pay only the amount equal to the next highest or second place bid. Wyld (2000) also explains that by bidding closest to the true value of the item, the seller receives a price that is closer to the value of the item being auctioned. At the same time, the winner only pays the amount of the next highest bidder (second place) and does not pay the winning bid amount. This dynamic makes the sealed-bid second price one of the most efficient auction types.

The Yankee auction takes into account bid price, quantity, and the earliest bid time when determining auction winners (Wyld, 2000, p. 17). When using the Yankee auction, the buyer can select to purchase a partial quantity instead of the entire amount. This type of flexibility enables the buyer to execute multiple buys from different sellers for the same requirement. This aspect is unique to the Yankee auction and gives the buyer more options when considering the distribution of sales.

E. REVERSE AUCTIONS

Unlike the ascending bid auction types that serve to drive the price up, the goal of RAs is to drive the price down. In a traditional auction, there are one seller and numerous buyers. In RA, there are one buyer and multiple sellers (see Figure 1). The sellers compete among one other to win the contract, and the winner is the lowest bidder. Competition between bidders serves to drive the price down while satisfying all contractual requirements. Each auction is set for a predetermined amount of time, allowing for increased competition among a pool of qualified and vetted bidders. This type of auction is similar to the sealed-bid; however, bidders are aware of their place within the auction, unlike with a sealed-bid. Bidders know their location within the queue and whether their bid is the lowest.

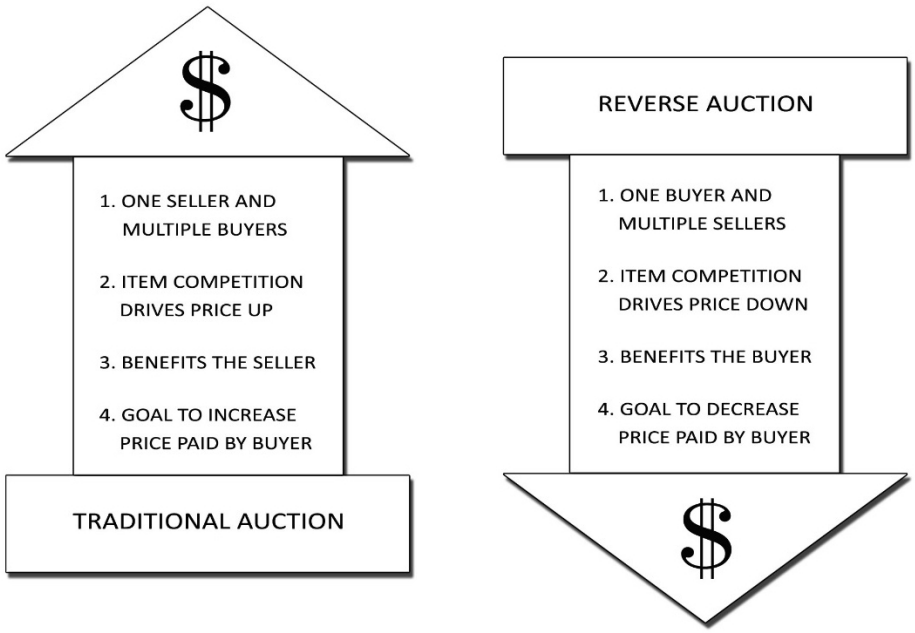

Figure 1. Traditional Auction versus RA Comparison Analysis.
Adapted from Kuo, Roger, & White (2000).

As the government strives for innovative cost-cutting solutions in today's current fiscal environment, one of the most successful tools for strategic procurement is the RA platform. With RAs, buyers, who serve in the role of the auctioneer, retain the value and the cost savings achieved because of this auction type (Klemperer, 2004, p. 19). Unlike regular auctions, the challenge in using RAs is how to gather and vet qualified sellers in a consolidated marketplace. The success of RAs depends on the ability of the marketplace to leverage competition and reduce cost. Therefore, a well-developed marketplace with adequate competition is fundamental to the ability of RAs to lower prices and generate true cost savings.

RA platforms work in real time by having multiple sellers of goods and services bid down the price of the auctioned item (Hawkins, Coyne, & Hudgens, 2010, p. 3). Buyers determine the length of the auction, which is dependent upon the procurement complexity and the nature of the requirement. The winner of the RA, opposite of a traditional auction, is the seller who places lowest bid (Wyld, 2011a, p. 16). To achieve the lowest bid, sellers are able to revise their bids until the auction ends, creating a dynamic pricing environment (see Figure 2). The process of RAs can create noteworthy

savings through enhanced competition, price reduction, and significant small business participation (Rung, 2015).

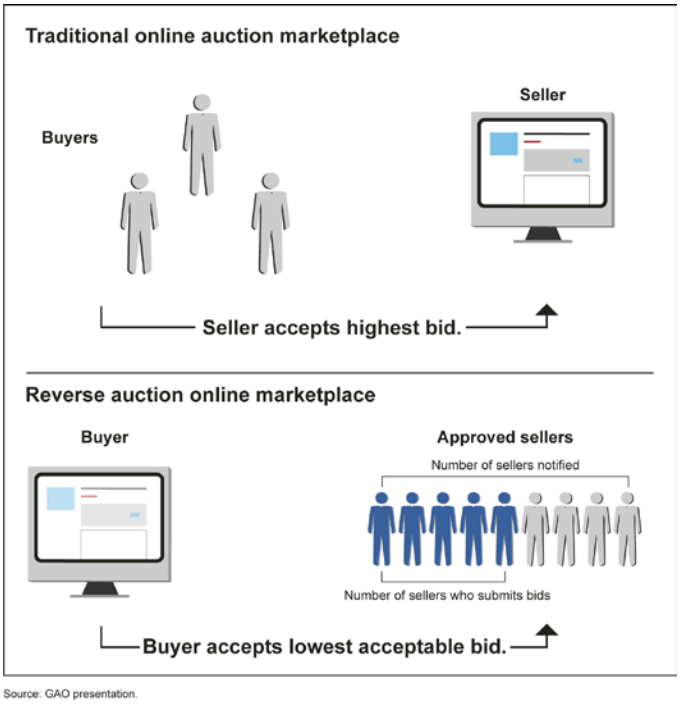

Figure 2. Traditional versus Marketplace Comparison. Source: GAO (2013).

The use of the RA tool creates a large-scale marketplace for sellers competing for both federal and private sector contracts. According to FAR Part 15.404-1(b)(2)(i), the government's preference for "determining fair and reasonable price" is through "adequate price competition" (FAR, 2016a). Sellers are able to conduct multiple rounds of bidding that serve to drive prices down and strengthen competition. The drive for increased competition is what ultimately creates cost savings and helps to determine price reasonableness for users of RA tools.

The vetting process gives an agency the ability to prescreen sellers and determine responsible vendors. Government agencies are also able to reserve certain types of contracts for socially and economically disadvantaged small business groups while still achieving maximum competition. Thus, maturing and developing the RA platform,

infrastructure, and subsequent marketplace sets the conditions to establish a well-vetted supplier base. Maintaining a strong supplier base is essential to amalgamate the best mix of quality and performance for the buyer to receive the highest quality product and service at the most competitive prices. In both private and public sectors, online marketplaces govern today's use of RA. RA platforms also provide features that enable organizations to capture and view data that helps to determine true cost savings and price reasonableness based off of historical data. Online marketplaces also facilitate dynamic pricing, which is the ability to submit bids in multiple rounds of competition, allowing the market to establish a fair and reasonable price (Wyld, 2010, p. 24). Examples of the concept of dynamic pricing are given later in the chapter.

F. MYTHS AND BIASES

The process of reverse auctioning carries with it inherent biases and myths. Some of the most prevalent myths about RAs are its negative effects on the supplier base and that large companies with greater economies of scale benefit the most. Another common misconception is that the government awards contracts for commodity goods based solely on LPTA evaluation criteria and excludes contracts for services. Each of these biases and myths are nothing more than shortsighted obstacles that obscure the reality and power of RAs.

1. Myth 1: RAs Damage Suppliers

Incumbents are the main suppliers at risk from outside competition. Often the incumbent's processes and systems contain inefficiencies from lack of price competition used to drive down costs (Wyld, 2013, p. 44). Without competition, there is less of an incentive to improve and streamline efficiencies. RA platforms ease barriers to entry and promote competition that supports new market entrants.

2. Myth 2: Lowest Price Wins the Auction

Buyers are not required to select sellers based solely on LPTA evaluation criteria. Several other factors like past performance, seller capabilities, and creditworthiness are considerations when determining best value (Wyld, 2013, p. 44). It is true that price is a

driving factor in determining the RA winner, but other factors still hold weight when selecting the winning seller.

3. Myth 3: RAs Favor Large Businesses

Small businesses have one key advantage when competing against large businesses. Large businesses have higher fixed costs that prevent them from competing against smaller business that contain specialized expertise in specific areas, which is why small businesses win the majority of RAs (Wyld, 2013, p. 44). To stay competitive, larger businesses often acquire their smaller rivals.

4. Myth 4: RAs Are Limited to Commodity Goods and Not Services

Typically, buyers use RAs when purchasing fixed priced goods and services that have well-defined requirements and contain a high level of specificity. Services contracts that contain the same characteristics, such as well-defined requirements, also serve as good candidates for RAs because they provide adequate competition to drive down price (Wyld, 2013, p. 44).

G. ECONOMICS OF SUPPLY AND DEMAND

RAs support full and open competition, when applicable, and allow the market to determine winners and losers. RAs provide a platform for enabling buyers and sellers to achieve price equilibrium, which is one of the most basic functions observed within a free market economy. Understanding market behaviors is critical to discerning how RAs work and why they continue to increase cost savings. The strategy of each market participant increases the probability that outcomes are fair and reasonable, placing market participants in a better position than when they started. Competition increases efficiencies; buyers and sellers share the benefits of the cost savings achieved.

The philosopher Fleischacker (2009) examined economist Adam Smith's famous book *Wealth of Nations*, which brought to light the importance of the "invisible hand" that controls how buyers and sellers interact in open markets when determining price (p. xvi). Market equilibrium occurs at the point where the supply curve intersects the demand curve (Mankiw, 2012, p. 77). According to Mankiw (2012), market equilibrium is the

point where sellers are willing to sell an item and the price at which buyers are willing to pay for that item (see Figure 3). At this intersection, the market achieves maximum efficiency and contains no deadweight loss, which is the ideal market solution.

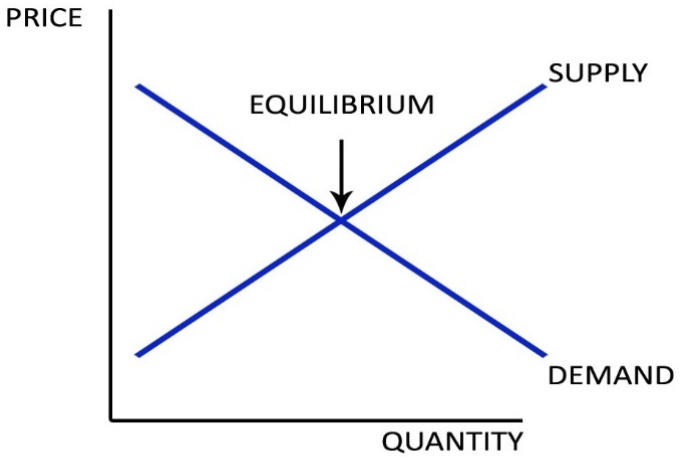

Figure 3. Standard Supply and Demand Curve. Adapted from Mankiw (2012).

H. PRICING STRATEGIES

Cost-based pricing strategies allow the seller to detail expenses when establishing a total price for the supply of goods and services. However, one weakness of these strategy types is that they disregard key elements of demand that are fluid in nature, like price elasticity and competitive pricing (Hinterhuber & Liozu, 2012, pp. 70–71). Cost-based strategies also carry significant up-front costs since they require sellers to develop a cost accounting system, which sellers utilize when estimating internal costs and developing prices (Garrett & Williams, 2009, p. 28). Market-based strategies provide sellers with the ability to leverage market conditions and adjust prices according to market fluctuations. Thus, the major difference between the two strategies is that the cost-based approach uses fixed pricing according to the internal price structure of the seller, and market-based pricing is dynamic because it changes in response to market conditions.

1. Cost-Based Pricing

Markup pricing is the new price that the seller chargers the buyer above what the seller originally paid when acquiring or producing the goods or services. For example, if a vendor purchases an item at wholesale from another source and uses that item for resale, or in conjunction with another product, the amount added to the original price is the markup price. The additional cost to the original price is the profit that the seller desires to generate from the sale of that particular item.

Margin pricing is a technique used to compare the marginal benefit of the sale of an additional one item against the marginal cost to produce that additional item. The marginal cost is the direct labor and material used for manufacturing an item. Since rational people think at the margin, marginal pricing is a technique that aids sellers in their decision-making process when determining specific quantities and prices for goods and services based off of market demand (Mankiw, 2012, p. 285). Margin pricing also enables the seller to set prices above marginal costs to expedite the sale of unwanted inventory.

Rate-of-return is similar to markup pricing in determining selling price. The rate-of-return is an objective used to determine a predetermined rate of return based off of initial product investments. The rate-of-return is the markup amount added to production costs. This pricing technique is primarily used for large-scale projects or items with high levels of demand to justify the capital investment. Rate-of-return pricing is effective for selling products like automobiles because the cost of producing one vehicle, with the desired rate-of-return, determines the selling price. Pricing compares total profits received to investments required to generate those profits. Rate-of-return pricing is also associated with target pricing, which takes into account the cost of producing one item and the amount of return generated from selling that one item.

2. Market-Based Pricing

Profit maximization occurs at the point where the marginal cost intersects with the marginal revenue (Mankiw, 2012, p. 282). Mankiw (2012) explains that at this intersection marginal revenue is equal to marginal cost achieving the highest level of

profit maximization. Profit-maximization pricing takes into account basic market conditions within the economy and assumes a horizontal demand curve, as seen in Figure 4. Sellers utilize profit-maximization pricing when market conditions are inelastic or when buyers are less sensitive to changes in price. The profit-maximization pricing technique identifies the price and quantity levels that generate the highest amount of profit for the seller.

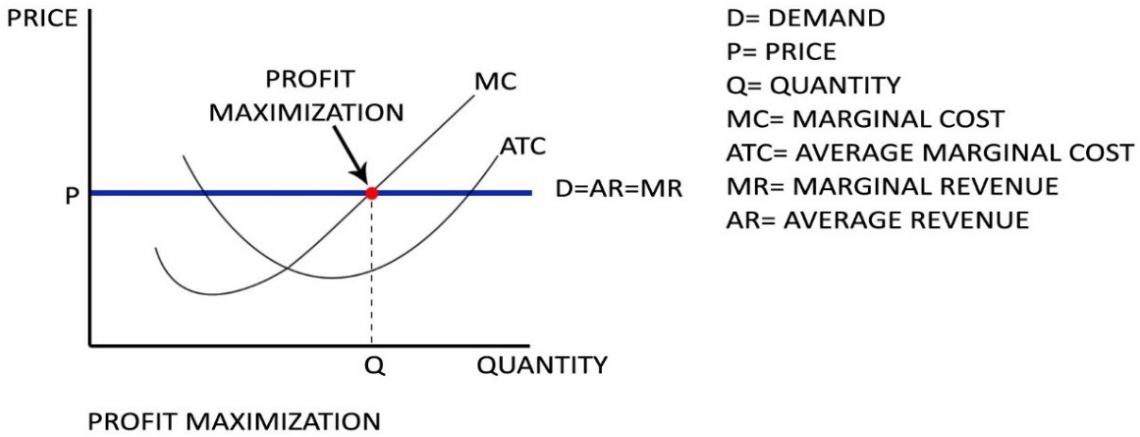

Figure 4. Profit Maximization Pricing. Adapted from Mankiw (2012).

Market share lowers prices to the break-even point in an attempt to have competitors exit the market. Lower cost producers often utilize this pricing technique to drive out higher cost producers. It is a short-term strategy aimed at achieving a long-term solution often experienced in commodity markets. Sellers experience a temporary contraction of profit margins in exchange for the opportunity to gain a greater percentage of the market. With increased market share, sellers can raise prices after reducing competition to increase long-term profits. Taking an initial net loss creates barriers to entry and prevents new participants from entering the market.

Market-skimming pricing is the opposite of market-share pricing. In market skimming, the seller offers its goods and services at elevated prices to give the perception of having a superior quality. This strategy allows the seller to sell fewer goods and provide fewer services, but at higher prices, which facilitates higher profit margins. Additionally, as the sale of goods and services increases, growth rates and profit margins

expand rapidly. Buyers believe they are receiving a better value while sellers benefit from the higher prices.

Current-revenue pricing seeks to increase revenues and gain share in markets where buyers have a higher sensitivity to price. This technique is common when sellers enter new markets or launch new products. Profit margins are secondary goals behind increasing sales and controlling market share.

Promotional pricing initially offers products at lower prices to target specific consumer groups in the hopes of changing individual buying habits. This approach incentivizes a customer to start doing business with a specific seller or for the seller to introduce a new product to the buyer. Once the buyer has accepted the promotional offer, the seller can increase prices in the future.

Demand-differential pricing leverages different buyers' valuation by raising or lowering prices in relation to varying demand levels. An example is airline tickets, which use the number of seats available and sells them to customers at different price points based on availability and timing. Pricing factors used to generate profits are in the best interest of the seller who is looking at pricing from a trade-off standpoint.

Market competition causes sellers to jockey for position among one another in the form of competitive pricing to win over buyers. This happens in every market, but the extent is determined by product differentiation and the number of market competitors. Market competition places the buyer in the best position for cost savings, since each participant is willing to decrease prices to win over business from competitors. Market competition is the number one factor in achieving a fair and reasonable price from the buyer.

I. THE PRICING HIERARCHY

Adequate price competition is the government's preferred method for determining price reasonableness. Pricing environments are constantly changing in order to provide the right services to the correct customers in a timely manner. The government's objective is to establish fair and reasonable prices regardless of whether market

conditions are fluid or fixed. Some of the more common pricing types articulated in detail within this section include dynamic, sale, promotional, and fixed pricing.

1. Dynamic

Dynamic pricing, similar to an ascending price, uses the competitive bidding process where multiple sellers engage in competition with one another, driving the price higher. The dynamic pricing environment gives participants the ability to adjust real-time pricing based on other market participants' actions providing sellers with increased flexibility to adapt in fluid market conditions. Similarly, RAs use a pool of qualified vendors to drive prices lower through a dynamic pricing environment that utilizes a competitive bidding process (Wyld, 2011a, p. 17).

The four types of dynamic pricing are the auction, haggle, exchange, and bidding process (Wyld, 2000, p. 13). The auction is one buyer offering a contract to multiple sellers. This differs from the haggle, where one buyer and one seller bargain for an agreed price. Next, the exchange contains multiple buyers and sellers involved in negotiations to reach an agreed-upon price. Lastly, the bidding process involves one buyer with numerous sellers competing to provide a good or service (see Figure 5).

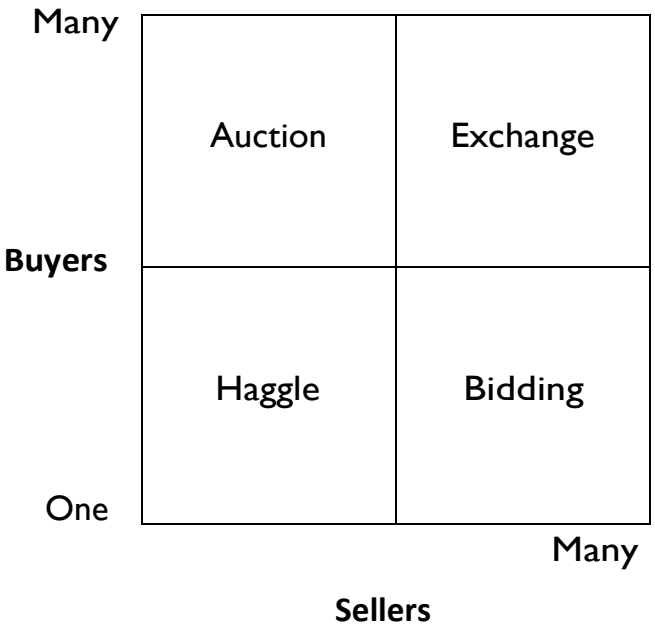

Figure 5. Four Types of Dynamic Pricing.
Source: Wyld (2000).

Price sensitivity is the basis for dynamic pricing, which encourages substitutes for goods and services to enter new markets and determines how customers will react to changes in price. Price elasticity of demand is one measure of price sensitivity; the more elastic the price, the more consumers will change behaviors in response to increases or decreases in price (Mankiw, 2011, p. 90). This is the opposite of how price elasticity of demand works; changes in price only have a slight effect on demand (see Figure 6).

A third type of elasticity, personal elasticity, allows consumers to determine the price they are willing to pay in a "price/value trade-off" situation (Wyld, 2000, p. 14). Price/value trade-offs take into account quality as well as total utility per dollar and allow for other factors, such as quality and performance, when considering what products to purchase.

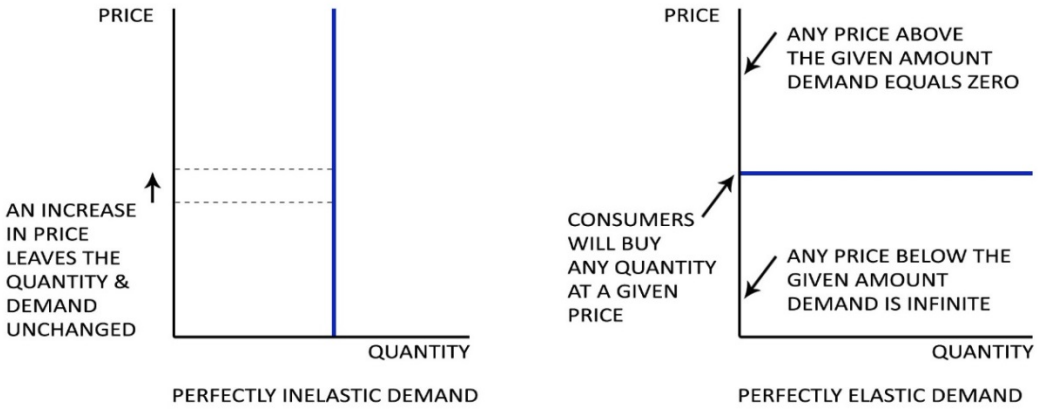

Figure 6. The Price Elasticity of Demand. Adapted from Mankiw (2012).

2. Promotional

Promotional pricing attracts buyers by offering reduced prices or promotional pricing for a short amount of time with the goal to decrease inventory levels. Since vendor prices are not set in stone and are reactive to buyer patterns, prices for items will fluctuate to generate additional sales or to reduce inventory levels. Promotional pricing helps sellers to adapt to market conditions by influencing buyer behavior through price manipulation.

3. Sale

Sale pricing, like promotional pricing, establishes a tier system for increasing demand by lowering prices. The seller will discount products to encourage sales after a product's marketing period is over; during the initial marketing period, the product sells at full price. Unlike promotional pricing, sale pricing occurs incrementally. Buyers with lower price elasticity will purchase products at the seller's going rate, or market price, whereas buyers with a higher price elasticity will not. The two buyers are both willing to purchase the product, but only one makes the purchase when the product is at a more attractive price. Therefore, the two buyers will purchase the exact same product but at different times and for different amounts.

4. Fixed

Fixed pricing is a static pricing strategy that does not provide the buyer with a lower price. Pricing does not change; price levels are set, and buyers do not have the ability to negotiate price. Fixed pricing is much like static pricing that occurs during sealed bidding because it does not allow auction participants to adjust bid prices based on the current low bid or to view the total number of bidders (Compte & Jehiel, 2007, p. 355).

J. SUMMARY

This chapter presented the framework for understanding how free markets operate and how economics plays a fundamental role in auction theory. It is important to understand how free markets operate to fully comprehend auction theory and why auctions are so effective.

This chapter also introduced the concept of RAs, which possess many of the same qualities of other basic auction types seen throughout history. The RA platform and marketplace define how buyers and sellers interact in the process of acquiring goods and services. Chapter III continues by providing a brief history and examination of the Army's use of RAs.

III. A HISTORY OF THE USE OF REVERSE AUCTIONS WITHIN THE ARMY CONTRACTING COMMAND

A. INTRODUCTION

This chapter begins with an overview of the federal acquisition environment in the early 1990s. An understanding of the legislative initiatives and technological advances that occurred during this time helps to explain the evolution of the RA as an electronic procurement tool. This chapter also highlights current policy that governs the use of RAs in Army acquisitions and introduces the three most common RA types. By examining the ACC's use of RAs, including the RA process and current agency practices, we provide a thorough analysis of cost savings. The chapter concludes with a discussion on the differences between cost avoidance and actual cost savings.

B. BACKGROUND

The mid-1990s witnessed a series of acquisition reforms aimed at increasing competition, streamlining the acquisition process, and adopting business best practices more in line with the private sector. Beginning with the Federal Acquisition Streamlining Act (FASA) in 1994 and the Federal Acquisition Reform Act (FARA) in 1995, the government strove to maximize resources and achieve greater process efficiencies. As part of the FASA, the simplified acquisition threshold (SAT) increased from $25,000 to $100,000 (Drelicharz, 1994, p. 13). Increasing the threshold was significant, for it meant that a larger amount of acquisitions could use simplified acquisition procedures (SAP). Eliminating overly burdensome regulations and redundant statutes from the contracting process meant significant savings for the government by lowering its costs of doing business (Drelicharz, 1994, p. 16). According to Drelicharz (1994), the legislation was the first to establish a formal commercial item definition and a preference for the "acquisition of commercial items to the maximum extent practicable." By incorporating a broad definition into the FAR, the government strove to purchase commercial items on commercial terms and leverage current industry processes (Drelicharz, 1994, p. 13).

A lesser recognized fact is that FASA legislation also required the creation of a Federal Acquisition Computer Network (FACNET), which was a requirement that supported

President Clinton's memorandum entitled "Streamlining Procurement through Electronic Commerce," issued on October 26, 1993. FACNET's intent was to develop a paperless and electronic system to streamline the procurement process and encourage competition among small businesses (Drelicharz, 1994, p. 15). By establishing a single point of entry, small businesses could receive access to small-purchase solicitations, submit their quotes, and receive award information, thereby reducing the administrative burden required for doing business with the federal government. Under FASA, federal agencies were required to install FACNET systems within five years (Drelicharz, 1994, p. 15).

Ultimately, FACNET produced little success for the government, but President Clinton's memorandum and FASA legislation, coupled with advances in automation and technology, created the catalyst for government procurement agencies to begin to alter their processes and methods of doing business. Electronic Commerce/Electronic Data Interfaces (EC/EDI) were viewed as resources to achieve greater efficiencies as the government began to transition to the information age and paperless transactions began. In 1997, changes to the FAR permitted the use of electronic commerce as the Internet simultaneously became more prevalent and reliable. Modifications in the government's procurement processes and procedures were now needed to fully leverage new market technologies and competition present in the commercial marketplace.

Matthew Meinert, director of the ACC's Virtual Contracting Enterprise (VCE) suite of business tools, described the acquisition environment of the 1990s as follows:

> I would say up until 1996, we were doing everything in paper, mainframe computers, using MS DOS—very cumbersome tool. Then the internet, the web came out, and obviously back then it blew everyone away. Concurrently with that, Dr. Hamre [deputy secretary of defense], I believe, he put out a goal on the wall and said we are going to be paperless. We are going to have paperless contracting. Showing some leadership skills that "hey, the internet is here." We know—it's obvious where we need to go, let's get there. That gave us the impetus or the top cover to go ahead and starting pushing technology, e-business. (M. Meinert, personal communication, July 25, 2016)[4]

[4] This information was communicated to us during a telephonic interview, conduct on July 25, 2016, at 10:40 PST.

Meinert is Defense Acquisition Workforce Improvement Act (DAWIA) Level III certified, holds an unlimited warrant, and possesses over 30 years of government contracting experience. He was also a member of CECOM's acquisition team when the organization initiated the Army's first RA in 2000.

Edward Elgart, former director of the CECOM Acquisition Center, explained that CECOM became interested in the idea of RAs while attending a seminar at the Massachusetts Institute of Technology (MIT). Personnel learned about private industry's use of RAs in MIT's seminar on the use of the Internet as a business tool. CECOM officials began to conduct market research on RA software developers and formed a relationship with Frictionless Commerce of Cambridge, MA. CECOM arranged an agreement for a pilot program and RA test with Frictionless (Harris, 2001, para. 3).

CECOM formed its own Electronic Reverse Auction Project Team (ERAPT), which drove the effort to test and field the RA software. After the initial test proved successful, CECOM purchased the RA software, linking it with the Army's business webpages and making it available for use by other contracting agencies. Frictionless licensed its software enabling organizations to purchase the company's license and conduct its own RAs via the worldwide web. Users only require 30 minutes of familiarity with the program before having the ability to execute their own RAs (Harris, 2001, para. 7).

Following CECOM initial success and cost savings, the organization purchased additional personal computers (PCs) for performing RAs. Electronic components for the PATRIOT missile system achieved savings in excess of 30%. Over the next 10 auctions, CECOM saved a total of $2.2 million, demonstrating the effectiveness of the RA as a procurement tool (Harris, 2001, para. 14). In 2000, the Army executed 41 RAs; this number has steadily increased as the use of RAs in the federal government has grown in popularity (Harris, 2001, para. 14). To date, the Army has successfully awarded over 48,000 contracts using RAs as a procurement instrument (Z. Ennis, personal communication, June 23, 2016).[5]

[5] This information was communicated to us via email on June 23, 2016, in the form of an Excel spreadsheet by FedBid. The spreadsheet addressed buying agency, actions, target price, award price, savings, bidders, bid count averages, and small business dollars. The data included the ACC, ECC, and MICC organizations from January 1, 2000, through May 23, 2016.

Initially, the other services, such as the Air Force and Navy, witnessed the cost savings and began to execute their own RAs. In a reverse auction meeting on June 26, 2001, Lt Col Sel Snyder explained to the Senate Armed Services Committee (SASC) that the Air Force decided to collaborate with the Army on the CECOM RA tool. He discussed the types of commodities purchased and the savings achieved through its use (J. Staggs, personal communication, June 30, 2016).[6] In May 2000, the Navy achieved a savings of over 28% during a 51-minute RA conducted through FreeMarkets, Inc., web-based auction software. Sellers participating in the RA downloaded the company's free BidWare software via CD-ROM or the Internet. FreeMarkets monitored the auction to assist with any issues and assessed a fee at the conclusion of the auction. Fee determinations were a flat percentage and assessed based on the total auction value. The Naval Inventory Control Point (NAVICP) awarded a $2.37 million contract to Hi-Shear Technology Corporation of Torrance, CA, for 756 recovery sequencers used in aircraft ejection seats for the B-1, F-15, F-16, and F-117 aircraft (Murray, 2000, para.7).

Unfortunately, the use of RAs in government procurement declined in the years following the success of CECOM and the other military services' early demonstrations. From 2002 to 2007, agencies seemed to lose interest, and contracting officers were reluctant to employ RAs as a procurement instrument (M. Meinert, personal communication, July 25, 2016). In 2007, RAs began to build momentum again when FedBid collaborated with the Army under a "Proof of Concept" program. FedBid, in conjunction with the Army Contracting Agency (ACA), started a preliminary program at five U.S. Army installations. Following its opening achievement, the program expanded to five more installations ("FedBid Wins Work," 2007). On September 15, 2009, the U.S. Army Research, Development, and Engineering Command (RDECOM) contracting center awarded FedBid a three-year contract (one base and two option years) under delivery order (DO) W91ZLK-09-F-0307 against GSA schedule GS-35S-0752R for RA services. RA services were available to all ACC agencies under this contract (U.S.

[6] This information was communicated to us via Microsoft Word file on June 30, 2016. The feedback contained background information germane to how the ACC implements policy, accounts for savings, SOPs for conducting RAs, interactions with FedBid, and internal platforms and protocols.

Department of the Army, 2011, para. 9). ACC-APG awarded a follow-on contract to FedBid for RA services on September 22, 2012, under contract number W91ZLK-12-P-0699. Currently, FedBid is operating under option year three, and the Army has continued use of RA services through September 30, 2016. Next year, 2017, is the final option year with the contract expiring on September 30, 2017.

The ACC published an information paper in June 2011 describing two online RA tools: FedBid's online marketplace and the ACC's VCE. VCE is a suite of tools developed by the ACC to assist contracting personnel in the performance of their duties. VCE-RA was originally designed as a pricing tool targeted for military specification (MILSPEC) items and other large commercial items anticipated to be awarded under either FAR Part 14, Sealed Bidding, or FAR Part 15, Contracting by Negotiation, procedures (U.S. Department of the Army, 2011, para. 14). VCE-RA is now obsolete and no longer in use by the ACC.

The GSA's Federal Technology Service (FTS) created Buyers.gov in 2001 to serve as a platform for e-commerce. One of three procurement tools offered on the website was the private auction, or GSA's version of reverse auctioning. During that same year, FTS executed an RA for computers and other IT equipment for the Defense Finance and Accounting Service (DFAS). The buy was worth approximately $10 million and at the time, was the biggest RA in government history (Government Executive, 2001, para. 2). Buyers.gov is no longer in use by the federal government, and in July 2013, the GSA developed and launched another RA platform to compete with FedBid. The GSA RA tool has accumulated significantly less volume than FedBid, which continues to serve as the Army's primary source and provider for RA services. Since its inception, only approximately $5 million in contract awards have been procured through the GSA's RA platform despite achieving savings on average of 14.4% per award (C. Wingate, personal communication, April 15, 2016). Unlike FedBid, the GSA does not assess a fee for the use of their RA platform. Recently, the Army's CHESS also released its own RA tool. However, there is limited qualitative or quantitative data available to determine the effectiveness and efficiency of CHESS's platform.

C. CURRENT POLICY

Organizations within the ACC vary in their stance on the use of RAs. However, all levels of the government recognize the value of RAs as a procurement instrument due to its ability to achieve significant time and cost savings. Within the ACC, the MICC is the biggest user of RAs due to its command policy, which mandates the use of RAs in certain circumstances. Policies and procedures throughout all levels of the Army encourage the use of RAs to one degree or another. Each policy establishes RAs as viable means for procuring specific types of goods and services to generate higher cost savings due to increased competition. This section details the current policies governing the use of RAs.

1. Deputy Assistant Secretary of the Army (Procurement) Policy

The deputy assistant secretary of the army for procurement (DASA[P]) published its RA policy on April 24, 2013, with the goal of establishing standard policies and procedures for the use of RAs within the U.S. Army. The memorandum stated, "Reverse auctions are best suited for simple or standardized products such as commodities or commodity-like products that have well-defined specifications and universally accepted standards" (Bass, 2013, para. 2). DASA(P) policy is to encourage the use of RAs for firm-fixed price (FFP) procurements under SAP for commercial items and services when two or more vendors are present.

2. Mission and Installation Contracting Command Policy

The MICC was the first command within the ACC to establish its own RA policy. As shown in Table 1, Command Policy Memorandum (CPM) 12-15, signed August 28, 2012, mandates the use of RAs for procurements above the micro-purchase threshold in the following product codes.

Table 1. Mandatory RA Product Codes per MICC CPM 12-15. Adapted from Vollmecke (2012).

Product Code	70	Information Technology
	71	Furniture
	58	Communication, Detection, and Coherent Radiation Equipment
	84	Clothing, Individual Equipment, and Insignia
	66	Instruments and Laboratory Equipment
	42	Fire Fighting, Rescue, and Safety Equipment
	59	Electrical and Electronic Equipment Components
	75	Office Supplies and Devices
	74	Office Machines, Text Processing Systems, and Visible Record Equipment
	23	Ground Effect Vehicles, Motor Vehicles, Trailers, and Cycles
	78	Recreational and Athletic Equipment
	56	Construction and Building Materials
	69	Training Aids and Devices
	39	Materials Handling Equipment
	67	Photographic Equipment
	54	Prefabricated Structures and Scaffolding

MICC policy also prescribes the use of RAs to the "greatest extent practicable" for requirements above the "micro-purchase threshold," but below the SAT for the service codes listed in Table 2 (Vollmecke, 2012, para. 3). Through an independent analysis of spending trends, the MICC identified these product and service codes as the top 20 categories to stimulate maximum competition and reduce prices, making them the ideal candidates for RAs. However, the MICC's intent is not to limit or restrict the use of RAs to only these categories. The policy expresses a goal for the use of RAs in at least 25% of all SAP purchases, which includes both supplies and services.

Table 2. Mandatory RA Service Codes per MICC CPM 12-15. Adapted from Vollmecke (2012).

Service Codes	S	Utilities and Housekeeping Services
	V	Transportation, Travel, and Relocation Services
	W	Lease or Rental of Equipment
	J	Maintenance, Repair, and Rebuilding of Equipment

MICC CPM 12-15 highlights two RA tools in its memorandum: FedBid's online marketplace and the VCE-RA tool. It also includes language identical to the DASA(P)'s policy stating that RAs are best suited for simple or standardized products. MICC's policy elaborates further, stating that price needs to be the primary evaluation factor in utilizing RAs, and use of RAs is not appropriate for complex requirements or in circumstances with limited competition.

3. Army Contracting Command Policy

After witnessing the success of the MICC's CPM on RAs, the ACC quickly issued its own policy with the hopes of gaining similar cost savings. CPM 13-20, released on February 7, 2013, outlines the ACC's guidance on the use of reverse auctioning and applies to all ACC contracting centers within the command (Nichols, 2013, para. 6). Unlike the MICC policy, the ACC's policy does not mandate the use of RAs for identified product and service codes. The policy states that contracting officers should consider the use of RAs for supplies and simple services valued between $15,000 and $6.5 million. Policy goals include 25% use of RAs for fixed-price supplies and commercial services for continental United States (CONUS) buys where the estimated dollar amount exceeds $15,000, but is less than or equal to $150,000. For CONUS buys estimated between $150,000 and $6.5 million, the goal is 10% (Nichols, 2013, para. 5).

4. Office of Federal Procurement Policy

In 2004, the Office of Federal Procurement Policy (OFPP) issued a short memorandum entitled *Utilization of Commercially Available Online Procurement Services* (Burton, 2004). The memorandum promoted the use of online procurement resources in the achievement of organizational and fiscal goals. The OFPP encouraged agencies to leverage these valuable services to their greatest capacity and listed many advantages to automating the steps in the procurement process, which included achieving greater taxpayer savings. The OFPP specifically mentioned the use of reserve auctioning services as a prime example, citing the ability of RAs to enable competitive pricing (Burton, 2004).

Several years later, in June 2015, the OFPP issued another memorandum entitled "Effective Use of Reverse Auctions" (Rung, 2015). The OFPP provided many techniques, best practices, and points of consideration for contracting officers and specialists to employ when using RAs. The memorandum also cites the GAO's December 9, 2013, report *Reverse Auctions: Guidance Is Needed to Maximize Competition and Achieve Cost Savings*. In its report, the GAO recommends that OFPP issue direction to its subordinate organizations for reporting cost savings information as well as recording other efficiencies gained by using RAs (GAO, 2013). The OFPP, pursuing the GAO's recommendations, solicited the help of chief acquisition officers and senior procurement executives by requesting their support in recognizing and gathering data on RAs. The OFPP's intent was to analyze the data to improve results seeking "to maximize the value of reverse auctions and ensure practices are effective and meeting their intended purposes" (Rung, 2015, p. 5).

D. LEGALITIES OF RA

Auctions became legal after the FAR re-writes in 1997 that removed specific language that prohibited their use. In 2004, OFPP issued guidance for all federal agencies to increase the use of online procurement services as a push for RAs (FedBid, 2016a, para. 5). Additional language added to FAR 14.202-8 grants the contracting officer authority to use electronic commerce for soliciting bids. In matters relating to RAs under 10 USC 2304, Section 824 states,

> (1) single bid contracts may not be entered into resulting from reverse auctions unless compliant with existing Federal regulations and Department of Defense memoranda providing guidance on single bid offers; (2) all reverse auctions provide offerors with the ability to submit revised bids throughout the course of the auction; (3) if a reverse auction is conducted by a third party—(A) inherently governmental functions are not performed by private contractors, including by the third party; and (B) past performance or financial responsibility information created by the third party is made available to offerors; and (4) reverse auctions resulting in design-build military construction contracts specifically authorized in law are prohibited. (Carl Levin and Howard P. 'Buck' Mckeon National Defense Authorization Action for Fiscal Year 2015, 2014, p. 149)

Part A of section 3 is particularly interesting and explicitly dissuades the delegation of "inherently governmental functions" to third parties. It is the responsibility of contracting officers to ensure the integrity of the procurement process when building solicitations, selecting appropriate vendors, and other types of administrative tasks. FAR Part 7.503 discusses the determination of inherently governmental functions as it specifically pertains to federal procurement. Under FAR 7.503(d), services in support of acquisition planning are not inherently governmental functions. By this description, third-party contractors like FedBid are able to support the contracting officer during acquisition planning. The extent to which third-party contractors' support contracting professionals depends on the terms and conditions of their contract with the government and the administrative procurement services requested by the contracting officer.

FedBid, like other third-party contractors, must comply with FAR Part 9.5, which identifies responsibilities and rules for characterizing and evaluating organizational conflicts of interest. This compliance is necessary since RA tools provide services to both buyers and sellers, and that interaction alone can lead to conflicts of interest. Under FAR Part 9.504, it is the contracting officer's responsibility to mitigate organizational conflicts of interest before contract award. Both the contracting office and the FedBid personnel must work together to ensure the integrity of the procurement process.

In 2005, the MTB Group, Inc., protested an online auction on grounds of price disclosure during the auction. The GAO denied the protest issuing the following decision:

> Protest that conducting procurement using reverse auction format is impermissible because vendors' prices will be disclosed during the auction is denied; agency is conducting reverse auction under simplified acquisition procedures, which encourage use of innovative procedures and do not expressly prohibit disclosure of vendors' prices in implementing such procedures, and disclosure is not prohibited under the procurement integrity provisions of the Office of Federal Procurement Policy Act. (GAO, 2005, p. 1)

The Court of Federal Claims under MTB Group, Inc. v. United States, 65 Fed. Cl. 516, 523-24, determined that the use of reverse auctions is a legal procurement method and found MTB's protest without merit. RAs enable transparency through public competition and each bidder, while anonymous, is able to determine if it has the lowest bid. MTB also

brought light to the issue of market competitors being able to derive what each vendor submitted and use that information in future auctions (GAO, 2005, p. 4). The courts decided that this disclosure of information is no different from what occurs in a sealed bid where all offerors can view the winning bid amount. Transparency with respect to bid ranking during online auctions is what helps to prevent fraud, corruption, and collusion.

E. THE REVERSE AUCTION TYPES

The government's selection of the appropriate RA platform is an important decision when trying to maximize efficiencies and achieve true cost savings. David C. Wyld, founder and director of the Reverse Auction Research Center, published a comparison of the reverse auction models, available for use by the public sector. The three models are fully managed RA marketplaces, self-service reverse auctions, and event-based software reverse auctions (Wyld, 2014). Each RA type varies in its characteristics and business model description providing varying levels of service, market parameters, and customer support.

With marketplace management come increased costs for the service providers. According to Wyld (2011b), RA service providers utilize four business models. First, winning sellers pay a variable transaction fee based on a percentage of the winning amount. Second, buyers pay the transaction fee determined using the same methodology. Fees are variable; they are a percentage of the winning bid amount. Under these first two models, RA service providers provide market research assistance, design the software, provide training, and execute the RA events (Wyld, 2011b, p. 11). Next, buyers purchase a license under the software-only option. After obtaining the license, buyers structure and execute their own RAs. Consequently, buyers are responsible for training sellers on the use of the platform. Finally, buyers can outsource to an RA service provider for a fixed price. The fixed price amount enables buyers to use service providers and conduct RAs for an established period. Like the first two business models, service providers assist with the market research, training, and execution of events (Wyld, 2011a, p. 11).

1. Fully Managed RA Marketplaces

Fully managed RA marketplaces are marketplaces that provide a complete suite of services from marketplace maintenance to training and full-service customer and technical support. Fully managed RA marketplaces are available globally through the Internet and enabled by online marketplaces; no software installation is required. Wyld (2014) described the seller community as robust and active with automated email notifications alerting potential sellers of online requirement postings. The recommended size for acquisitions utilizing a fully managed RA marketplace is $3,000 to $500,000 with procurement types including commodities and simple services that vary in size and dollar amount (Wyld, 2014, p. 1). Interfaces are user friendly with customer support available from auction initiation through closure.

2. Event-Based Software RA

The event-based software RA is a tool that contains only the platform for conducting the RA bidding process. Any specific support services require additional cost and are priced higher when needed. The buyer uses the platform to conduct the RA and pays only for the additional services that it requires. This allows the buyer to tailor each RA event based on specific market research that establishes specific suppliers who are able to compete, which creates a smaller marketplace. Marketplaces are limited to a selected pool of potential sellers; buyers notify vendors for auction participation via email. Procurements are for larger commodity buys and may consist of manufactured items where multiple awards for blanket purchase agreements (BPAs) and indefinite delivery/indefinite quantity (ID/IQ) classify the contract type (Wyld, 2014, p. 2).

3. Self-Service RA

Self-service RAs provide fewer amenities than their counterpart types and require software installation; however, additional services may be available for purchase and include consulting support. Service levels vary depending on the characteristics of the auction, and costs increase with the need for additional services (Wyld, 2014, p. 3). Transaction fees are typically per RA event or are a flat percentage fee determined by the contract award amount. Like event-based software RA auctions, requirements are

generally larger commodity buys and manufactured procurements in excess of $500,000. The acquisition process is lengthy since the buyer must determine the auction scope and provide sellers with training. During auction execution, sellers view pricing among their competitors; auction extensions risk excess pricing pressure creating anxiety and potential default risks for sellers (Wyld, 2014, p. 3).

F. MARKET RESEARCH

The acquisition process begins when contracting officers receive a complete requirements package, which signals the beginning of the procurement acquisition lead time (PALT). Contracting officers begin by collecting data to determine the capabilities of the marketplace. Market research validates requirements and serves to establish a comprehensive procurement strategy, and it is the single most important aspect for developing sensible business judgment and implementing a sound acquisition approach. Market research defines requirements, manages risk, and ultimately promotes market competition and changes based on the complexity of the requirement. Thorough market research gives the buyer the ability to understand current market conditions, to discover alternative solutions to requirements, and to gain insight into price expectations (Mission and Installation Contracting Command [MICC], 2012). Every procurement must take into account market conditions, which can have the greatest impact in determining a fair and reasonable price.

Typically, a fair and reasonable price for buyers means not paying above the standard market value. The buyer seeks to determine current market rates partly set by what other market participants, or other buyers, are willing to pay for similar goods and services. Determining what others are willing to pay takes both good market research and a certain reliance on historical data. For sellers, a fair and reasonable price typically means achieving the highest price that the market is willing to pay. Costs are the expenses incurred for a seller to make a good or provide a service. The costs, plus the profit or compensation that the seller expects to receive, usually result in the vendor's selling price. Both the buyer and seller have different strategies that they can employ to achieve their desired outcomes. The dilemma is bringing the buyer and the seller together at an agreed-upon price that satisfies both side's needs.

Historical data analysis gives the buyer the ability to see what others have paid for similar goods and services in the past and provides another venue for determining price estimates and general price ranges. Historical data analysis, coupled with market research, gives the buyer a good understanding of the current market conditions and a solid foundation to develop a well-crafted procurement plan. From the results of market research, contracting officers develop their acquisition strategy, which includes choosing a solicitation technique for procuring goods and services from an approved source that is at a fair and reasonable price. The most accepted method for the government when determining price reasonableness is through price competition.

Results of market research also influence socioeconomic set-aside requirements and determinations. The small business reservation includes commercial item procurements that are above the micro-purchase threshold of $3,000, but below the SAT of $150,000. Under FAR 19.502-2, contracting officers utilize the small business reservation when there are "two or more small business concerns" that are able to satisfy the acquisition (FAR, 2012c). If a procurement is set aside for a particular socioeconomic class, contracting officers and specialists will only solicit those vendors within that category. For example, if a requirement is set-aside for small business, then vendors classified as large businesses may not participate in the bidding process. Upon completion of market research and the acquisition strategy, contracting officers will have determined if a socioeconomic set-aside applies. Otherwise, contracting officers will utilize procedures that encompass "full and open competition" under FAR subpart 6.1 that includes large businesses (FAR, 2016b).

G. THE RA PROCESS

Contracting officers set the terms for the procurement and decide the parameters governing the RA. These parameters include the auction length, item descriptions and quantity, delivery dates or periods of performance, vendor qualifications, set-aside requirements, and other terms and conditions. Contracting officers also enter a target price that serves as an anchor and the government's reservation price. Upon the conclusion of the RA, the contracting officer may elect to end the auction by selecting the winning seller, or the contracting officer may extend the auction length if there are no

bids. Contracting officers may also choose to re-procure the requirement using full and open competition if not enough responses were returned when using set-aside restrictions. RAs are anonymous, meaning the seller identification is generic. Buyers are able to view the identity of sellers competing, but participants in the RA only know their place in the auction. For FedBid, sellers see their bids labeled either "LEAD" or "LAG." Upon conclusion of the RA, sellers may view the winning bidder's identification and bid price (FedBid, 2016b).

1. Buyer Benefits

For simple supplies and services, market research often reveals RAs as an appropriate solicitation tool and a potential procurement instrument for maximizing competition and generating cost savings. Online RAs benefit buyers through the knowledge that they are receiving real-time market pricing from approved sources of supply (Wyld, 2011a, p. 16). RAs create a "dynamic" pricing environment. This means that sellers interact through competitive bidding to drive the price down until the true market price is achieved (Wyld, 2011a, p. 17). Sellers engage in multiple rounds of bid submissions designed to generate cost savings. Thus, for buyers, the importance of effective competition is of the upmost importance since this is the primary means for achieving hard cost savings. As Wheaton (2010) explains in his informative synopsis of government RAs,

> As long as the government buyer has a pool of qualified suppliers that are willing to participate in a reverse auction, the power of competitive bidding and price disclosure will drive the price lower. It is important to remember, that in a reverse auction, it is the power of the market and competitive bidding, not the buyer bullying the vendor that drives the pricing lower. Vendors then respond to these market price signals and adjust their pricing accordingly.

2. Seller Benefits

Reverse auctioning is effective because it can serve to benefit both buyers and sellers by providing a consolidated marketplace that is both easily accessible and user friendly. While buyers benefit through efficiencies gained by competition, sellers also profit by providing prices that are most advantageous to their situation. For example, a vendor might be holding excess inventory on their books, resulting in increased carrying

costs. By offering competitive pricing in an RA scenario, a seller could propose lower bid prices that would benefit their bottom line by reducing operating expenses (Wyld, 2011a, p. 17). In addition, RAs also benefit vendors by reducing administrative burdens that occur when companies prepare and submit bids. Greater process efficiencies serve as an advantage for both sides, especially sellers that are small businesses and that might not otherwise have robust resources that both government and large businesses employ.

H. FEDBID, INC.

FedBid provides a fully managed RA marketplace, meaning that the company delivers the full suite of RA services. In accordance with contract W91ZLK-12-P-0699, P00002, this includes the following list of reverse auctioning services:

- Train acquisition users.
- Set up accounts for acquisition users.
- Provide technical/user support (help desk) to troubleshoot problems with the system.
- Provide a qualified list of suppliers.
- Recruit and train new sellers to expand the supplier pool.
- Allow the Army to provide suggested sources.
- Notify vendors of any new postings.
- Allow suppliers/bidders to bid down prices and submit multiple bids.
- Hide the identity of bidders, so bidder information is anonymous to each other.
- Serve as a proxy to post and cancel bids when necessary.
- Provide expert reverse auctioning advice when necessary (i.e., timeframe of bids, cancellations and reposting of bids, etc.)
- Provide a summary of all bids submitted per event.
- Provide details of each bid submitted per event.
- Provide vendor specific information (i.e., company name, address, point of contact, POC phone numbers and e-mail addresses, company's tax identification number, company's Data Universal Numbering System [DUNS] number, Cage Code, etc.)

- Enable buyers to utilize existing Multiple-Award Contract (MACs) or Government-Wide-Acquisition Contracts (GWACs) with the system.
- Create and maintain solid relationships with the ACC user community (Buyers and Sellers). (U.S. Department of the Army, 2012, pp. 5–6)

When the buyer conducts an RA through FedBid's online marketplace, the contracting officer or specialist enters a target price provided by the requiring activity. IGCEs most commonly serve as the basis for establishing target prices. Market research and catalog pricing is a technique for determining target prices when IGCEs are not required. Comparisons between the final award price and the initial target price are the basis for determining savings; inaccurate IGCEs or target prices can provide a misrepresentation or inflation of cost savings. Many critics question the methodology for calculating cost savings since IGCEs and target prices serve as only cost estimates.

FedBid follows a business model that assesses no more than a 3% variable transaction fee per contract action; the fee caps at $10,000 per transaction based off the lowest bid received. FedBid adds this transaction fee to the winning seller's final price, so it is essentially a pass-through cost paid by the government. Upon completion of contract performance, FedBid bills the winning vendor, and the contractor then pays the fee (see Figure 7). Additionally, within FedBid, there is the option to set aside requirements specifically for GSA schedule holders. Agencies that solicit and award requirements through the Federal Supply Schedule (FSS) essentially pay a double fee. GSA schedule holders assess a 0.75% fee based on the total sale price, known as the Industrial Funding Fee (IFF). When awards are made through FedBid to FSS holders, the government pays a double fee that includes the IFF and FedBid's fee.

Figure 7. FedBid's Process for Assessing Fees.
Source: FedBid (2016b).

If the final price exceeds the initial target price, the contracting officer or specialist may request that FedBid remove its fee. Per the Performance Work Statement included in contract W91ZLK-12-P-0699, P0002,

> FedBid reserves the right to adjust its fee downward to address situations in which the buyer has met its competition and other procurement goals through FedBid, but the fee has caused the selected vendor's bid to exceed a target price based on an actual market research quote or official published contract price. In such cases, FedBid shall reduce or remove its fee so that the awarded price will not exceed the target price. (U.S. Department of the Army, 2012, p. 5)

Fee removal is not automatic, and the government will absorb the additional 3% cost in the final price paid when the fee is not waived.

I. COST SAVINGS ANALYSIS

In July 2012, David C. Wyld, professor of management at Southeastern Louisiana University, published a report that analyzed the ACC's cost savings using RAs. To calculate savings, while mitigating the impact of inaccurate target prices, Wyld applied three screening criteria to the ACC's FY2011 RA buys. He removed any awards that were (1) made with inactive or no established target prices, (2) made with inflated target prices, as evident by cost savings greater than 50%, and (3) made with target prices set too low, ending with negative cost savings or prices above the target price (Wyld, 2012, p. 10). The purpose of the screening criteria was to remove any erratic data resulting from poor market research and reflected in skewed target prices.

Wyld (2012) concluded that most of the ACC's RA buys had valid target prices; however, Wyld eliminated 17.8% of RA buys since they satisfied one of the three criteria. For FY2011, Wyld screened 4,786 buys, and 3,933 were valid representing 88.5% of all dollars obligated and 82.2% of contract awards. Overall, savings averaged 11.5% per contract action for FY2011. Wyld (2012) also performed a similar screening and analysis for FY2007–FY2011. For these years, savings averaged 9.9% for 19,240 contract awards. Savings percentages for unscreened RA buys were higher for both categories. For FY2007–FY2011, savings for unscreened buys were 13.7% vice 9.9% for screened buys; for FY2011, savings were 14.3% for unscreened buys and 11.5% for screened buys. Wyld (2012) attempted to eliminate any skepticism in regard to inaccurate IGCEs or target prices. He ended his report by concluding that the critics were wrong and that he believed that RAs present an opportunity to generate substantial cost savings.

1. Hard Savings

Data provided by FedBid, since the inception of the platform, reveals cost savings consistent with the findings in Wyld's report. From January 1, 2000, to May 23, 2016, RA buys conducted by the ACC through FedBid's online marketplace received an average savings of 10.97% (Z. Ennis, personal communication, June 2, 2016). These findings present solid documentation and supporting evidence that the government can realize significant savings with RAs. Unlike Wyld's report, these numbers only compare target prices to award prices and do not consider flawed or inflated IGCEs and target

prices. To gain greater clarity on true cost savings, it is important to analyze the data in relation to the fees assessed by FedBid for the use of their platform and online marketplace.

From August 8, 2015, through February 19, 2016, the ACC completed 368 RAs using the FedBid's RA platform. Of those 368 RAs, 255 were open market buys, 72 were CHESS buys, and 39 were from the GSA schedule holders. Open market buys represented almost 70% of total auctions. The average percent savings was 9%, ranging from 0–49.3% with an average dollar savings of $5,461. Over a third (37%) of the total RAs conducted by the ACC had no reported cost savings, and 46% had no costs savings over $12 (J. Staggs, personal communication, April 19, 2016). When fees exceed target prices, FedBid waives its fee at the request of the contracting officer. When analyzing the data presented in this section, it appears that FedBid applied fees on buys that achieved zero cost savings and only waived fees to an extent not to exceed target prices. To determine true cost savings, it is necessary to subtract the fee amount from the total cost savings generated to determine realized cost savings.

More than 50%, or 193 of the total 368 RAs conducted during the 28-week period, generated a realized cost savings, ranging from zero to negative $10,000. Of the remaining 175 RAs, the average savings was $10,466 and ranged from zero to $437,110. Additionally, of the total 368 RAs conducted, 150 auctions (40%) did not produce cost savings, and FedBid charged the government a fee that resulted in negative cost savings to the government. For all buys, the realized cost savings totaled $1,655,393, and this new savings amount is significantly less than the $2,009,750 reported by FedBid for the same period (J. Staggs, personal communication, April 19, 2016). The large discrepancy is a result of the way that realized savings are calculated. The reported savings by FedBid takes the difference in the target price from the final price paid. It does not take the total savings and subtract the actual charged fee. More than half the time in our sample, the difference between savings minus fees resulted in no cost savings for the use of RAs.

2. Soft Savings

Dollars saved is not the only form of savings; there are soft savings as well. The RA platform generates efficiencies for an undermanned and over-utilized contracting workforce. During particularly hectic times, such as the end of the fiscal year, RAs provide a valuable service to contracting officers and specialists seeking to make contract awards in an expeditious fashion. Lowering PALT times means that acquisition professionals can rededicate their time to other tasks. Online RAs and e-commerce also provide savings to organizations by improving processes when awarding contracts. The MICC concludes

> that the use of RA not only results in contract savings, but it also reduces touch labor for MICC contract specialists. MICC specialists save on average approximately five hours on touch labor per action because RA minimizes market research needs and small business determinations. (J. Staggs, personal communication, July 1, 2016)[7]

Having an established online platform along with a vetted customer base saves time during each new solicitation and requires less time from contracting personnel who no longer need to contact vendors individually. Online platforms give the contracting officer the ability to clone specific buys by keeping all relevant data the same and leveraging speed to issue new solicitations. This results in time savings during each new post for similar or like items and services while still giving the contracting office the ability to tailor each new solicitation to meet customer requirements. These efficiencies in the procurement process continue to pay dividends for each new auction since the framework is already in place and the upfront costs are paid. New efficiencies also give commanders the opportunity to repurpose unspent funds and time to achieve other command priorities and objectives. Soft savings provide unit commanders with the flexibility to manage priorities and create a more efficient contracting workforce.

J. COST SAVINGS VERSUS COST AVOIDANCE

When discussing the use of RAs, it is important to distinguish between true cost savings and cost avoidance (M. Meinert, personal communication, July 25, 2016). Cost

[7] This information was communicated to us via email correspondence on July 1, 2016, in response to interview questions discussing the background information pertinent to ACC.

savings uses historical pricing, which contains the actual price paid by buyers for previous procurements. Past pricing sets a baseline for costs, and any reduction from that established anchor is cost savings. Buyers return the savings to the customer for reprogramming to other areas. Cost avoidance occurs when an item is selling for retail and the RA process drives the original selling price lower. With cost avoidance, there are no realized savings; there is only the difference between the final selling price and the pre-established retail price. The reprogramming of the cost savings fails to occur. The buyer simply reduces the amount allocated for the purchase of that item, constituting cost avoidance.

Sustained cost savings also occurs when the buyer continues to generate reduced pricing from repeated purchases. For example, if a buyer purchases computer paper and is able to pay less than 25% of the asking price, the buyer has reduced costs. The 25% reduction in price is cost avoidance. However, if the 25% reduction in price is generated from a previous buy, then that reduction is classified as cost savings. The two terms have different applications and when used interchangeably, misrepresent actual savings (Wyld, 2011a, p. 16).

K. SUMMARY

This chapter summarized the history of the acquisition environment that led to the development of RAs as an online procurement tool. The chapter also included a discussion of the history of RAs within the ACC, current policies governing the use of RAs, the three primary RA types, a cost savings analysis, and the differences between true cost savings and simply cost avoidance. The next chapter continues with an analysis of personnel, platforms, and protocols.

IV. EXAMINATION OF THE USE OF RA WITHIN ACC

A. INTRODUCTION

The purpose of this chapter is to examine the ACC's use of personnel, platforms, and protocols using E. Cory Yoder's Three Integrative Pillars of Success (TIPS) model. This chapter also helps to identify whether the Army is using RAs in the most effective and efficient manner to realize true cost savings. The basis for this analysis is from personal interviews conducted with SMEs and practitioners of RAs within ACC. The researchers also analyzed current policy to recognize protocol differences and their effects on RAs.

B. MODEL

The TIPS model is well known and a commonly utilized management tool that characterizes key organizational design elements. E. Cory Yoder established the model as an "assessment and management tool for planning and executing contingency contracting operations" (Yoder, 2016). Since its development, the TIPS model has been employed by various entities including the Commission on Wartime Contracting in Iraq and Afghanistan (E. Cory Yoder, personal communication, October 27, 2016).[8] The TIPS model is such a successful tool because it can be applied in multiple capacities and provides the framework for evaluating the effectiveness and efficiency of an organization.

The Gansler Commission also utilized the Three Tier Model (TTM), the precursor of the TIPS model, when discussing personnel in its 2007 report, *Urgent Reform Needed: Army Expeditionary Contracting* (Gansler et al., 2007). The commission provided several key findings specific to personnel, platforms, and protocols. The Gansler Commission identified personnel shortages as not having enough people in the right positions with the proper training to accomplish the mission. Platforms for contracting support functions and tasks were also inadequate in facilitating contracting and management operations. Lastly, existing protocols failed to provide the necessary legislative and regulatory

[8] Conversation with E. Cory Yoder on October 27, 2016. Professor Yoder debriefed the Commission on Wartime Contracting in Iraq and Afghanistan on the TIPS model on May 4-5, 2011.

changes needed to give the right people, in the right positions, the required authority to accomplish their assigned missions (Gansler et al., 2007, pp. 47–57).

Figure 8. E. Cory Yoder's TIPS Model. Source: Yoder (2016).

Every organization's operational success depends upon its ability to properly manage and use its personnel, platforms, and protocols, which represent the three freestanding pillars in the TIPS model. In 2013, the model received an update that included the addition of authorization and appropriation as the base of the model. Without the proper funding, it is impossible to structure any activities, execute any function, or even hire personnel, which are all essential elements to an organization's existence. Therefore, authorization and appropriation symbolize the foundation upon which all future elements are built. Successful organization stands at the top of the model signifying optimization or the complete and successful integration of the three pillars into an organization's daily operations and processes.

The TIPS model is such an effective assessment tool because it helps to identify both organizational weaknesses and best practices. By identifying areas for improvement, the TIPS model serves as a guide for leadership by helping to focus their efforts on areas that require additional emphasis. Assessment results also help in the achievement of

process improvement and efficiencies for enhancing information sharing (Yoder, 2016). By identifying best practices, the TIPS model helps organizations to recognize areas for sustainment where internal processes are effective. The sharing of lessons learned and best practices also assists other units seeking to implement improved business processes.

1. Personnel

Personnel is the first pillar, and it identifies the critical link between rank, position, credential, capability, and appropriate workloads (Yoder, 2016). Ultimately, the personnel pillar is about having the right people, in the right positions, and with the proper authority. Education, functional training, certifications, and experience are all essential factors to cultivating and maintaining a well-credentialed and effective workforce. Furthermore, each of these components addresses a critical aspect necessary for developing a professional career field that is capable of performing in complex organizations and in a highly technical function like federal contracting.

The Office of Personnel Management (OPM) classifies the contracting series as 1102 with the following definition:

> This series includes positions that manage, supervise, perform, or develop policies and procedures for professional work involving the procurement of supplies, services, construction, or research and development using formal advertising or negotiation procedures; the evaluation of contract price proposals; and the administration or termination and close out of contracts. The work requires knowledge of the legislation, regulations, and methods used in contracting; and knowledge of business and industry practices, sources of supply, cost factors, and requirements characteristics. (U.S. Office of Personnel Management [OPM], 1983)

Military Occupation Specialty (MOS) 51C is the designation for uniformed contracting personnel within the Army and includes both commissioned and noncommissioned officers. Regardless of rank, position, grade, military, or civilian, only properly warranted contracting officers maintain the authority to legally bind the government. The requirements and process for warranting contracting personnel vary across commands and organizations. Evaluating personnel as potential warranted contracting officers means identifying the right mix of training, education, and experience. Leaders must also strategically place individuals in positions that enable them

to have the most significant impact within the organization. Properly structuring and empowering personnel helps to integrate the three pillars of success and is essential to maintaining a highly effective unit.

a. Training and Education

The contracting series is a professional career field that places a high value on both education and training. Formal education includes higher degrees obtained from accredited colleges and universities. Education aids in the development of critical thinking skills for higher-level management functions that include tasks such as the development of policy. The contracting career field places a special emphasis on obtaining business credit hours, which is a requirement for certification (see Figures 9, 10, and 11). Education also includes Joint Professional Military Education (JPME) and other military courses required for promotion within the officer and noncommissioned officer ranks. Training focuses on the practical application of skills necessary to perform a task or specific function. Training primarily refers to functional training offered through the Defense Acquisition University (DAU), but other forms of training may include briefings, exercises, conferences, and other events hosted by both external agencies or by groups internal to the organization.

b. Defense Acquisition Workforce Improvement Act (DAWIA) Certification Levels

Defense acquisition workforce groups contain experienced personnel who possess accreditations under DAWIA that are internal requirements to the Department of Defense (DOD). DAWIA certifications are only available to DOD military and civilians assigned to acquisition coded positions (Defense Acquisition University [DAU], 2016). The DAU offers certifications in the following career fields: Auditing; Business—Cost Estimating (CE); Business—Financial Management (FM); Contracting; Engineering; Facilities Engineering; Industrial/Contract Property Management; Information Technology (IT); Life Cycle Logistics; Program Management (PM); Production, Quality, and Manufacturing (PQM); Purchasing, Science and Technology Manager; and Test and Evaluation (DAU, 2016). There are three DAWIA certification levels within each career field, and obtaining each level requires functional training, job experience, and education

to satisfy DAWIA requirements. Both civilian and military personnel need to achieve the proper credentials to serve in the contracting career field, but certification is not a qualification requirement for employment (DAU, 2010). Again, DAWIA certifications are internal to DOD personnel only. For example, contracting certifications obtained with outside agencies like the Department of Homeland Security (DHS) are non-transferable, and DAWIA requirements are non-waivable (DAU, 2016).

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	None required
Functional Training	● CON 090 Federal Acquisition Regulation (FAR) Fundamentals **(R)** ● CON 100 Shaping Smart Business Arrangements ● CON 121 Contract Planning ● CON 124 Contract Execution ● CON 127 Contract Management ● CON 170 Fundamentals of Cost and Price Analysis **(R)** ● CLC 025 Small Business Program for Contracting Officers ● CLC 033 Contract Format and Structure for DoD e-Business Environment ● CLC 057 Performance Based Payments and Value of Cash Flow ● CLC 058 Introduction to Contract Pricing
Education	● At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management ● Baccalaureate degree (Any Field of Study)
Experience	1 year of contracting experience.

Figure 9. DAWIA Level I Certification Standards. Source: DAU (2016).

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	ACQ 101 Fundamentals of Systems Acquisition Management
Functional Training	● CON 200 Business Decisions for Contracting ● CON 216 Legal Considerations in Contracting ● CON 270 Intermediate Cost and Price Analysis **(R)** ● CON 280 Source Selection and Administration of Service Contracts **(R)** ● CON 290 Contract Administration and Negotiation Techniques in a Supply Environment **(R)** ● CLC 051 Managing Government Property in the Possession of Contractors ● CLC 056 Analyzing Contract Costs ● HBS 428 Negotiating
Education	● At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management ● Baccalaureate degree (Any Field of Study)
Experience	2 years of contracting experience.

Figure 10. DAWIA Level II Certification Standards. Source: DAU (2016).

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	ACQ 202 Intermediate Systems Acquisition, Part A
Functional Training	● CON 360 Contracting for Decision Makers **(R)** ● 1 additional course from the Harvard Business Management Modules ● Elective Requirement. Select one of the below courses: ● ACQ 265 Mission-Focused Services Acquisition **(R)** ● ACQ 315 Understanding Industry (Business Acumen) **(R)** ● ACQ 370 Acquisition Law **(R)** ● CON 232 Overhead Management of Defense Contracts **(R)** ● CON 244 Construction Contracting **(R)** ● CON 252 Fundamentals of Cost Accounting Standards **(R)** ● CON 334 Advanced Contingency Contracting Officer's Course **(R)** ● CON 370 Advanced Cost and Price Analysis **(R)**
Education	● At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management ● Baccalaureate degree (Any Field of Study)
Experience	4 years of contracting experience

Figure 11. DAWIA Level III Certification Standards. Source: DAU (2016).

The Career Acquisition Personnel and Position Management Information System (CAPPMIS) serves as the system that manages the DAWIA certification process for Army military and civilian contracting personnel. Accessed through the Career Acquisition Management Portal (CAMP), CAPPMIS also tracks all individual educational and functional training, providing an Acquisition Record Brief (ARB) for both Army military and civilian contracting personnel. Certifications for acquisition-coded personnel do not expire, and DAWIA encourages workforce members to obtain certifications in multiple career fields (DAU, 2010).

c. Experience

Experience is a valuable intangible asset and an important component of the personnel pillar under the TIPS model. There are two categories of experience, which are general and specialized (DAU, 2015). DOD contracting is a very technical career field that requires contracting-specific experience. DAWIA certification requirements assess and measure experience in terms of years and months (DAU, 2015). In addition, the certification process enables contracting personnel to exchange education for experience. For example, DAWIA applies an education credit to substitute for a year of experience when applying for certifications. Unfortunately, multiple degrees do not equate to multiple credits for additional years of experience (DAU, 2015). It is possible to gain creditable DOD acquisition experience from a number of sources including designated

and non-designated DOD positions, other government agencies, and private industry (DAU, 2015).

2. Platforms

Platforms are the second pillar that comprise the hardware and software structures used for analysis, decision-making, production, management, and communication within selected agencies (Yoder, 2016). The platform pillar works in unison with the other two pillars, and each relies on the others to operate effectively. For example, the organization's personnel utilize platforms dictated by the organization's protocols to execute operations and conduct daily business.

Many of the platforms used in the contracting career field serve as the internal systems that document each stage of the contract management process from procurement planning to contract closeout. These platforms manage and track customer requirements, document market research, support the creation of solicitations, and generate the final contract for award including all contract terms, conditions, and clauses. The standard procurement system (SPS), also referred to as procurement desktop defense (PD2), is an internal platform and is the current contract writing system that the Army uses to solicit, award, and close out contracts.

Online databases and web-based platforms also support varying phases of the contract management process. For RAs, the Army currently utilizes three main platforms: FedBid, GSA, and CHESS. All RA platforms are web-based and external to the organization, with the primary platform being the fully managed marketplace offered by FedBid. The three RA types, mentioned in Chapter III, include the fully managed RA marketplace, the event-based software RA, and the self-service RA. Each of these RA marketplaces offer varying levels of service and support based on the customer's needs and the organization's goals and objectives. Determining what type of platform and service level to use depends on several factors that include the procurement type, agency procedures, and other requirement specifications.

3. Protocols

The third pillar, protocols, is made of organizational rules and guidelines, decision-making frameworks, policies, and business models tailored to attain specific goals and objectives (Yoder, 2016). Protocols help to define the problem and provide procedures that act as a guide for achieving a desired outcome. Protocols also provide the specific guidelines for the use of decision-making frameworks that promote consistent and rational decisions from all members of the organization. Thus, applicable rules and regulations help the contracting officer in determining the best means and methods for fulfilling customer requirements. Specific command policies, memorandums, regulatory guidance, and other publications further refine the rules and other contracting procedures that encourage the standardization of systems and processes. These regulations serve to support, manage, and track the contracting process throughout the entire organization and the acquisition phases.

Statutory requirements implemented through the FAR serve as the primary source of protocols for contracting professionals. Under FAR Part 14.202-8, Electronic Bids, the contracting officer has discretion in authorizing the use of electronic commerce to solicit bids, and in selecting the appropriate "electronic commerce method(s)," which includes the use of RAs. FAR Part 6 - Competition Requirements, FAR Part 8 - Required Sources of Supplies and Services, FAR Part 12 - Acquisition of Commercial Items, FAR Part 13 - Simplified Acquisition Procedures, and FAR Part 19 - Small Business Programs are several FAR parts that also affect RAs. Each of these FAR parts provides the contracting officer with options for selecting a solicitation method and evaluation criteria that provides the government with best value.

Through policy memorandums, commands influence and manage employee behavior, reducing variance and individual discretion. The choice to enact policy memorandums are the product of an organization's decision-making framework. Leaders seek to focus the direction of their organizations to perform consistently and uniformly as opposed to individuals working autonomously. The result is CPMs and other guidance designed to promote certain objectives such as process improvements, efficiencies, and organizational goals.

C. ANALYSIS

As stated prior, every organization's operational success depends upon its ability to properly manage and use its personnel, platforms, and protocols. The purpose of this section is to examine whether the Army is using RAs in the most effective and efficient manner to realize true cost savings.

1. Personnel

The ACC contains a well-trained and educated force of acquisition professionals. Personnel interviewed within the ACC were practitioners of RAs and SMEs on the use of RAs; their years of contracting experience well exceeded that of their DAWIA accreditation level. Many of the interviewees were highly credentialed with numerous years of contracting experience. On average, personnel interviewed had over 12 years of contracting experience. All interviewees held an active warrant ranging from the current SAT of $150,000 to an unlimited amount. Furthermore, only one interviewee was DAWIA Level II certified, with all remaining personnel being DAWIA Level III certified in contracting.

Surprisingly, none of the personnel interviewed had completed any functional training on RAs despite being exceptionally qualified. When asked about training, several interviewees stated FedBid had provided their organization with formal training, but the briefings from FedBid mainly focused on account set-up with only a brief overview of the platform. DAU does offer a continuous learning course (CLC), CLC 031—Reverse Auctioning, with the following course description:

> Reverse Auctioning is a self-paced module that provides a basic introduction of a new, Internet-based contracting technique that is used by the DOD acquisition community to achieve significant cost savings through the use of e-commerce capabilities. The course is intended for entry- and middle-level acquisition managers who might use the Internet-based technique in their daily business environments. (DAU, 2014)

CLC 031 is listed as "desired training" under the Core Plus Development Guide for DAWIA Level II certification, but it is not mandated functional training per the core certification standards.

Table 3. Discussion of Results for Personnel

Personnel	
Functional Training	• DAU offers CLC 031, Reverse Auctioning, as functional training for contracting personnel. However, none of the interviewees had completed any formal functional training. • Most received training provided by FedBid that focused mainly on account set-up and only provided a brief overview of the RA platform. • None experienced any training on the use of the GSA or CHESS RA tools.
Education	• Interviewees were well-educated holding a bachelor's degree or higher and maintained the requisite 24 semester business hours required for DAWIA certification.
Experience	• Personnel interviewed ranged in experience levels. Years of experience varied from seven years to 20+ years of contracting experience. DAWIA Level III certification requires four years of experience.
DAWIA Certification	• Only one interviewee was DAWIA Level II certified, remaining interviewees were all DAWIA Level III certified in contracting.

2. Platforms

FedBid consistently received positive feedback in areas such as customer service and ease of use. Many interviewees noted the process efficiencies gained through the time savings enabled by the use of RAs and FedBid in particular. The use of these web-based software systems can provide users with the ability to reduce solicitation and acquisition timelines. Through FedBid's RA platform, contracting personnel can easily clone purchases when conducting multiple buys and operating under time constraints. This feature enables the purchase of multiple requirements within a condensed timeline and is especially useful during the end of the fiscal year and other peak seasons.

Unfortunately, not all interviewees agreed that RAs and the FedBid platform generated significant time savings. Other users noted that the use of FedBid requires double-work since personnel must build the solicitation for the RA platform for bidding and again within PD2/SPS for contract award. Program Executive Office Enterprise Information Systems (PEO EIS) is in the process of developing the Army Contract Writing System (ACWS) as a replacement for SPS/PD2. The ACWS encompasses and affects approximately 8,000 users in 280 sites worldwide (Army Contract Writing System

[ACWS], 2016, para. 2). One of the objectives of ACWS is to reduce "the number of complex interfaces while fostering audit readiness" (ACWS, 2016, para. 1). Currently, none of the RA platforms directly interfaces with SPS/PD2. The result is that contracting officers and specialists must build all the contract terms, conditions, requirements, and clauses within FedBid, GSA, or CHESS for solicitation/bidding and then again within SPS/PD2 for contract award.

Table 4. Discussion of Results for Platforms

Platforms	
SPS/PD2	• Currently, the Army's contract writing system (SPS/PD2) is not directly integrated with any RA platform. Contracting specialists and contracting officers must complete double-work by building the solicitation and the line item descriptions once into their RA platform for solicitation and then again into their contract writing system for award. • The future ACWS may include a RA feature in its effort to streamline and consolidate interfaces (M. Meinert, personal communication, July 15, 2016).
GSA	• GSA's RA platform provides contracting officers with a viable alternative to the use of FedBid, but only includes access to the GSA schedule holder community. • Launched in 2013, GSA's RA platform has saved users more $18.5 million with small businesses receiving 92% of all contract awards (Koehler, 2011, para 1). • In June 2016, GSA announced RA 2.0, which is its latest platform with additional and enhanced features based off initial reviews and feedback from users (Koehler, 2011, para 2). Interviewees agreed saying that the GSA platform was "not as user friendly as they hoped it would be, so they are taking their lessons learned and redoing it" (Interviewee #3, personnel communication, May 13, 2016).[9]
FedBid, Inc.	• Interviewees noted several advantages in the use of FedBid including ease of use, superior customer service, and time savings. Time savings is a particularly important advantage during peak seasons such as the end of the fiscal year when workload requirements typically increase. • Requires double-work; solicitation must be built within FedBid online web interface and again within PD2. • Several interviewees described the cloning option within FedBid as an important feature that provided valuable time savings. Users can clone and post similar buys for bidding without having to re-create requirements. • FedBid also enables contracting personnel to transfer buys among users balancing workloads when necessary and improving process efficiencies within organizations. • Interviewees also noted that FedBid provided superior customer service. Representatives were easily accessible and physically on-site during peak seasons. FedBid personnel were responsive, actively involved in agency buys, and easily accessible. • Centralized seller markets with additional options and access to multiple seller communities that include both GSA and CHESS.
CHESS	• Limited experience with the use of CHESS RAs. • No quantitative or qualitative data available. • Not user friendly. • No experience interacting with customer service representatives.

[9] Communicated by interviewee #3 on May 13, 2016, at 0710 PST during a telephone interview.

3. Protocols

RA users adhere to the guidance outlined in FAR Part 4.502(a) that states, "The Federal Government shall use electronic commerce whenever practicable or cost-effective." Thus, the FAR specifically encourages the use of electronic commerce and provides agencies with the discretion for implementing its use. Under FAR Part 1.102(d), the responsibility of determining applicability remains with every member of the acquisition team to "exercise personal initiative and sound business judgment in providing the best value product or service to meet the customer's needs." This type of language indicates that the contracting officer has personal discretion in determining the means and method to fulfill requirements exercising personal business acumen. This includes determining methods for the solicitation and award of contracts. Specifically, FAR 13.106-1(c)(2) outlines procedures for soliciting competition orally up to $25,000. However, organizations may also implement additional acquisition regulations that supplement the FAR.

Consequently, the major commands within the ACC maintain their own CPMs regarding certain acquisition policies. The ACC Centers, the MICC, and DASA(P) all have published guidance on the use of RAs. Each policy differs in its approach, with MICC policy being the most prescriptive, mandating the use of RAs for specified product and service codes regardless of dollar amounts. MICC CPM 12-15 requires that contracting officers receive a waiver approved by the director of the organization for procurements that deviate from the policy and the use of RAs. Hence, contracting officers within the MICC must utilize RAs for procurements under $25,000 instead of retaining the option to solicit oral quotes.[10] MICC protocols also outline an annual goal to "utilize RAs for at least 25% of simplified acquisition purchases" (Vollmecke, 2012, para. 4).

The ACC's policy, CPM 13-20, *Use of Reverse Auctioning*, articulates similar goals but fails to mandate the use of RAs. It describes RAs as a mechanism for achieving "acquisition savings, increased competition, and results in a significant number of

[10] During telephonic interview #3 on May 13, 2016, at 0710 PST, the subject participant mentioned the restrictive nature of the MICC's current RA policy, highlighting that the FAR allows contracting officers the ability to solicit orally for requirements with estimated dollar amounts up to $25,000. However, MICC policy supersedes the procedures outlined in the FAR requiring contracting officers and specialists to utilize RAs for mandated product and services codes regardless of estimated dollar amounts.

contract awards to small businesses" (Nichols, 2013, para. 2). It also states that RAs are best suited for procurements of simple supplies and services. The ACC sets a goal to utilize RAs in 25% of procurements for fixed-price supplies and commercial services between $15,000 and $150,000 within CONUS. For CONUS contractual actions in excess of $150,000, but less than $6.5 million, the ACC sets the RA goal at 10% (Nichols, 2013, para.5).

Similarly, DASA(P) encourages the use of RA for simple supplies stating that reverse auctioning is most "successful in the areas of information technology, materials, and common supplies" (Bass, 2013, para. 1). DASA(P) further states that contracting officers should consider the use of RAs in solicitations for FFP commercial items and commodities. However, DASA(P) differs from both the ACC and MICC since DASA(P) is the only policy that specifically identifies and encourages the use of FedBid as a commercial provider of RA services. In addition, DASA(P) policy is the only policy that specifically identifies and encourages the completion of functional RA training available through DAU.

Table 5. Discussion of Results for Protocols

Protocols	
FAR	• The main purpose of the FAR is to implement acquisition policies and statutory guidance. It serves as the primary publication and guiding document for Army contracting officers. • In 1997, amendments to the FAR enabled the use of e-commerce (FAR Part 4.5), paving the way for the implementation of online procurement tools like RAs. • Being less prescriptive in nature than MICC policy, the FAR allows for the use of oral solicitations up to $25,000 (FAR 13.106-1(c)(2)).
ACC Centers	• In accordance with CPM 13-20, "ACC is targeting high volume, recurring supply and commercial services procurement as the focus for its RA implementation" (Nichols, 2013, para 4). • ACC's CPM establishes goals for the usage of RAs. For CONUS buys, the goal is 25% for procurements valued between $15,000 and $150,000 and 10% for buys valued between $150,000 and $6.5 million (Nichols, 2013, para 5). • Provides greater discretion to the contracting officer by not mandating the use of RAs for particular product and service codes.
MICC	• Within ACC, the MICC is the biggest user of RAs due to its command policy. Because of its increased use, the MICC also achieves the greatest amount of hard dollar cost savings. • Unlike the ACC Centers, MICC policy mandates RA use based on designated product and service codes. If contracting officers desire to deviate from MICC's RA policy, then the field director, chief of contracting (CoC), Contracting Support Brigade (CSB) commander, or other commanding officer must approve a waiver. • Since MICC policy designates the use of RAs based off product and service codes, it fails to establish dollar thresholds and goals similar to the ACC Centers. Thus, regardless of anticipated dollar amount, the MICC utilizes RAs for the product and service codes listed in its policy. This means that procurements could range from the current micro-purchase threshold of $3,500 to millions of dollars. • However, MICC policy is to utilize RAs for a minimum of 25% of all SAP buys. Vollmecke (2012) encouraged greater use of RAs when practicable.
DASA(P)	• Attempts to standardize "Army-wide policy and procedures for utilizing reverse auctions for Army procurements" (Bass, 2013, para. 1). • Identifies FedBid as the Army's commercial provider for RA services and encourages agencies to utilize FedBid for conducting RAs. • References DAU functional training, CLC031—Reverse Auctioning, and encourages contracting personnel to complete the training.

D. SUMMARY

This chapter discussed the TIPS model in detail outlining personnel, platforms, and protocol and their application to the contracting workforce and RAs. We focused our examination on assessing the effectiveness and efficiency of ACC's use of RAs through interviews with SMEs and by analyzing current contracting policy. The next chapter presents the final analysis, conclusions, recommendations, and areas for further research.

V. FINDINGS AND RECOMMENDATIONS

A. INTRODUCTION

The purpose of this MBA project was to investigate the following research questions.

1. Primary Research Question

- Is the Army using RAs in the most effective and efficient manner, or are there opportunities for expansion and/or improvement?

To answer the primary research question, we conducted interviews with practitioners and SMEs of RAs within the ACC. Interview questions centered on the three pillars for integrative success identified as personnel, platforms, and protocols. For the purposes of this project, the researchers also defined effectiveness as "adequate to accomplish a purpose and producing the intended or expected result," and efficiency as "the ability to accomplish a task with the least waste in terms of time, resources, effort, and competency in performance."

2. Secondary Research Questions

- What theories govern the use of RA within the Army?
- What are the current rules and regulations governing the use of RAs in the Army? What are the Army's past experiences in using RAs?
- What platforms has the Army used in the past for conducting RAs, and what platforms is it currently utilizing?
- Is the Army generating the desired cost savings through its policy on the use of RA?

For the secondary research questions, we used interview results and performed a literature review that examined economic principles such as auction theory, pricing strategies, and the pricing environment. We also explored the concept of competition and its effects on the marketplace. Interview questions strove to identify current processes, RA platforms, and results (cost savings) achieved with RAs. Interview and research results helped to formulate the Army's history in regard to its RA use, current processes and policy, and recommendations for the future.

B. DISCUSSION OF RESULTS

1. Personnel

Personnel interviewed were all DAWIA Level II– or III–certified, generally working as contracting officers within the ACC. Study participants included both military and civilian personnel, and interviewee positions included active contracting officers, procurement analysts, team leads, branch chiefs, and division chiefs. Consequently, personnel interviewed within the ACC were properly credentialed and in the right positions to maximize the use of RAs. All ACC interviewees held active warrants ranging from $150,000 to an unlimited amount. Many serve in leadership positions with years of contracting experience and institutional knowledge on the ACC's use of RAs. Thus, personnel that participated in the study were highly credentialed with several years of contracting experience.

2. Protocols

A common theme was present in our analysis of cost savings. The contracting command in the ACC with the largest use of RAs, the MICC, also achieved the greatest "hard-dollar" cost savings. In his article, "Procuring Dollar and Time Savings: A Case Study of the Implementation of Reverse Auctions in the Federal Government," Wyld reaches a similar conclusion, asserting that "the more procurements that are competed through the online marketplace, the greater the savings will be for the agency, the government as a whole, and most importantly, for the taxpayer" (Wyld, 2010, p. 18).

Currently, only the MICC mandates the use of RAs for specified product and service codes previously determined to be the best candidates for RAs. Despite the recent emphasis from OFPP's 2015 memorandum, *Effective Use of Reverse Auctions*, the ACC has not updated its RA policy since 2013. For FY2015, the ACC completed 2,409 RAs through FedBid's online marketplace. Of the total FY2015 RAs, the MICC executed 1,997 buys, the ACC Centers executed 339 buys, and the ECC executed 79 buys (J. Staggs, personal communication, July 1, 2016). Without the emphasis of a prescriptive command policy, organizations fail to utilize RAs to the maximum extent, yielding less than optimal cost savings. In order to maximize savings, it will be necessary to increase efforts and the utilization of RA platforms implemented through the application of policy.

3. Platforms

FedBid's online marketplace is the most utilized RA tool within the ACC. FedBid provides a fully serviced RA marketplace with outstanding customer support and a user-friendly interface. With each use of its platform, FedBid assesses a 3% transaction fee and adds its fee to the winning vendor's bid. The transaction fee is for the use of the RA service, and FedBid applies its fee regardless of whether the buy generates any cost savings. Upon request of the contracting professional conducting the RA, FedBid will waive a portion, or its entire fee, for buys that exceed target prices. ACC's current contract with FedBid expires on September 30, 2017, and the ACC will need to re-compete its requirement for RA services at that time.

GSA and CHESS also provide RA platforms, but contracting officers and specialists within the ACC utilize these RA tools significantly less. Initially, the Army fielded its VCE-RA tool, but it is now obsolete due to lack of use, despite the license for the software being significantly lower in cost when compared to FedBid. However, GSA, CHESS, and VCE-RA were not fully serviced RA marketplaces. One of the biggest advantages with FedBid is that it significantly reduces "touch time" for contracting professionals. The significant reduction in processing time means that contracting officers can re-purpose their efforts and address higher-level tasks that are more complex in nature.

Currently, the SPS/PD2 is the Army's contract writing system. PEO EIS is in the process of developing the ACWS as a replacement to SPS/PD2. The current RA platforms utilized by the Army cannot directly interface with ACC's contract writing system. The new ACWS intends to have an RA module where users will have the ability to conduct RAs within the new system. However, it is still uncertain as to the features and RA type that will be included within ACWS (M. Meinert, personal communication, July 25, 2016).[11]

C. FINDINGS AND RECOMMENDATIONS

If the ACC is to utilize RAs in the most effective and efficient manner, it is essential to select the appropriate RA type, field the best platform, and implement the correct protocols to maximize the use of RAs. These three factors together will yield

[11] Interview conducted telephonically on July 25, 2016, at 10:40 PST.

maximum savings while generating new process improvements that will enable the ACC to become a more efficient and lean organization.

1. Finding and Recommendation 1

The ACC completed 368 RAs from August 8, 2015, through February 19, 2016, using FedBid's online RA platform and marketplace (J. Staggs, personal communication, April 20, 2016).[12] Open market buys represented almost 70% of total auctions, meaning there was no set-aside restrictions. Thirty-seven percent of RAs conducted during this time had no reported cost savings, and 46% had no cost savings over $12. On 71.4% of occurrences, FedBid assessed a fee on buys with cost saving of $12 or less, resulting in fees totaling over $139,000. Consequently, FedBid applies fees on buys that achieve zero cost savings and, many times, only waives fees to an extent not to exceed target prices. In addition, when fees exceed target prices, FedBid only waives its fee at the request of the contracting officer. However, FedBid is not responsible for the results of the auction, but only accountable for providing RA services, which includes the online marketplace, platform, and customer support.

The Army's current contract with FedBid expires on September 30, 2017. Recommend that the Army solicit its follow-on requirement for RA services with fees based on a percentage of savings achieved through the auction or a flat fee for the use of the platform. For example, the contractor would earn the full fee on RAs that result in savings of 10% or greater. As the percentage of savings decreases, the fee earned also decreases. For flat fees, the contract would simply be a FFP contract with the Army paying a flat fee for services rather than a variable fee based on total dollars spent within the platform. Of course, this recommendation assumes that the Army intends to re-compete and award a follow-on contract for a fully managed RA marketplace.

2. Finding and Recommendation 2

Three RA types include the fully managed RA marketplace, the event-based software RA, and the self-service RA. Each type presents a continuum of services and

[12] Personal communication with Jennifer Staggs, ACC procurement analyst, via email correspondence containing an excel spreadsheet of all ACC's RAs completed from August 8, 2015 through February 19 2016.

options tailored to meet agency needs. The Army previously explored the use of alternative RA types resulting in the development of its VCE-RA tool. However, VCE-RA lacked the policy to support its use, and the tool is no longer in use by ACC. The fully managed marketplace currently employed through the Army's contract with FedBid enables the full suite of RA services. Unfortunately, FedBid online platform fails to interface directly with SPS/PD2.

Recommend that the ACC conduct a cost–benefit analysis (CBA) and establish alternatives to a fully managed RA marketplace, including the development of its own platform compatible with the Army's contract writing system. If the ACC is to maximize the benefits of RAs, it is critical to select or design the appropriate platform tailored to achieve organizational goals and objectives. Furthermore, the exploration of RA types and platforms could reveal the possibility for expanding the use of RAs into procurements that are more complex and beyond the acquisition for simple supplies and services. Effectively streamlining processes and generating hard savings means exploring the possibilities for different reverse auction types and platforms while implementing the policy to best support its use.

3. Finding and Recommendation 3

Within the ACC, the MICC is easily the largest user of RAs, having executed approximately 83% of ACC's total RA buys for FY2015 (J. Staggs, personal communication, July 1, 2016). It is logical to assume that the MICC is the biggest buyer of recurring commodities, simple services, and other procurements that serve as the best candidates for RAs due primarily to the nature of its mission and its supported customers. Although the MICC certainly contracts for large, complex buys, it purchases a larger amount of requirements necessary for base operations support (BOS) when compared to the ACC Centers and the ECC. Consequently, larger portions of MICC procurements are better suited for RAs when compared to its ECC and ACC counterparts. However, MICC's RA policy is also the most prescriptive and mainly responsible for its large volumes of RA purchases. As Wyld (2010) states, greater quantities and amounts of RA buys also generate greater savings for the agency, the government, and ultimately the taxpayer.

Recommend that the ACC implement policy mandating the use of RAs for specified product and service codes on procurements greater than $25,000. This recommendation updates ACC Center policy and slightly amends MICC's current policy by enabling contracting officers to solicit orally for procurements up to $25,000 in accordance with FAR protocols. Contracting officers with established sources of supply are now empowered to leverage relationships and their business acumen to achieve maximum cost savings. Soliciting orally for small purchases also reduces the administrative burden on contracting officers, required by some agencies' procedures, to review draft buys before contracting specialists post their requirements to FedBid. It also relieves the contract specialist of doing "double-work" by building the buy once within FedBid for solicitation and again within SPS/PD2 for contract award.

4. Finding and Recommendation 4

Clear policy and instruction are the keys to the effective employment of RAs. The MICC has leveraged the value of RAs to increase procurement savings and organizational efficiency through its policy. The existing MICC policy mandates the use of RA for specific product and service codes selected because of market research that identified those areas as being best suited for RAs (J. Staggs, personal communication, July 1, 2016).[13] The prescriptive nature of MICC's current policy is responsible for its increased use and additional savings.

Data supports that RAs generate significant savings and process efficiencies. Recommend the ACC update its market research on RAs seeking to expand the use of RAs to additional product and service codes.

D. AREAS OF FURTHER RESEARCH

Areas of further research will add additional value to the existing findings and recommendations outlined in this research report. Proposals for further research focus on competition, small business concerns, and inherently government functions as related to RAs.

[13] Information provided via email correspondence on July 1, 2016. Interview questions discussed background information pertinent to ACC.

1. Adequate Competition and the Reverse Auction Marketplace

Additional research is necessary to determine the amount of actual competition experienced during each RA and its effects on hard dollar cost savings. The RA platform leverages competition to decrease price to generate maximum cost savings, but in FY2012, the GAO reported that over one-third of RAs had no competition to drive down prices (GAO, 2013, p. i). What are the effects of the number of bids and bids received on cost savings achieved during RAs? Is there a correlation? How are the benefits and efficiencies gained through the use RAs diminished when there is not adequate competition?

2. The Effects of RAs on Small Businesses

Future research is necessary to determine the effects of RAs on small businesses. Research conducted by Wyld witnessed an increase in the volume of dollars awarded to small business through RAs from FY2011 through FY2015. Do RAs benefit small businesses? How do small businesses compare against their larger, better-established counterparts when competing for federal contracts through RAs? Can federal agencies use RAs to achieve their SB utilization goals?

3. Inherently Governmental Functions and Reverse Auctions

As the federal government continues to outsource critical organizational functions, it is necessary to monitor the Army's reliance on third-party contractors like FedBid, which perform functions "closely associated" to inherently governmental. FedBid vets vendors into its marketplace and assists contracting professionals in drafting buys for RAs. Is the government outsourcing inherently governmental functions through its contract for RA services? Further analysis is necessary to address the implications of outsourcing RA services to third-party contractors and to determine the effects on the contracting workforce.

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LIST OF REFERENCES

Army Contract Writing System (ACWS). (2016). Program Executive Office Enterprise Information Systems (PEO EIS): The Army's technology leader. Retrieved from http://www.eis.army.mil/programs/acws

Bass, J. L. (2013, April 24). *Reverse auction policy* [Memorandum]. Washington, DC: Office of the Deputy Assistant Secretary of the Army for Procurement (DASA[P]).

Burton, R. A. (2004, May 12). *Utilization of commercially available online procurement services* [Memorandum]. Washington, DC: Office of Management and Budget (OMB).

Carl Levin and Howard P. 'Buck' Mckeon National Defense Authorization Action for Fiscal Year 2015, H.R. 3979; Public Law 113-291 (2014).

Clinton, W. (1993, October 26). *Streamlining procurement through electronic commerce* [Memorandum]. Washington, DC: The White House.

Compte, O., & Jehiel, P. (2007). Auctions and information acquisition: Sealed bid or dynamic formats? *RAND Journal of Economics, 38*(2), 355–372.

Defense Acquisition University (DAU). (2010). DOD acquisition career field certification facts and not so frequent questions. Retrieved from http://icatalog.dau.mil/onlinecatalog/faq_catalog.asp

Defense Acquisition University (DAU). (2014). CLC 031 Reverse Auctioning. Retrieved October 17, 2016, from http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=440

Defense Acquisition University (DAU). (2015). Meeting experience standards. Retrieved from http://icatalog.dau.mil/onlinecatalog/Meeting.aspx

Defense Acquisition University (DAU). (2016). DAWIA certification & core plus development guides. Retrieved from http://icatalog.dau.mil/onlinecatalog/CareerLvl.aspx

Drelicharz, J. A. (1994). Highlights of the Federal Acquisition Streamlining Act of 1994: Lowering government's cost of doing business. Retrieved from http://www.dau.mil/pubscats/pubscats/PM/articles94/drelicha.pdf

Effective. (2016). In *Merriam-Webster's dictionary* (11th ed.). Springfield, MA: Merriam-Webster.

Efficiency. (2016). In *Merriam-Webster's dictionary* (11th ed.). Springfield, MA: Merriam-Webster.

Engelbrecht-Wiggans, R., Shubik, M., & Stark, R. M. (1983). *Auctions, bidding, and contracting: Uses and theory*. New York, NY: New York University Press.

Federal Acquisition Regulation (FAR), 48 C.F.R. 15.404-1(b)(2)(i) (2016a).

Federal Acquisition Regulation (FAR), 48 C.F.R. 6.1 (2016b).

Federal Acquisition Regulation (FAR), 48 C.F.R. 19.502-2 (2016c).

FedBid wins work with U.S. Army Contracting Agency. (2007). Retrieved from http://www.FedBid.com/news/pr/FedBid-wins-work-with-us-army-contracting-agency

FedBid. (2016a). House committee on veterans' affairs. Retrieved from https://veterans.house.gov/submission-for-the-record/fedbid-inc

FedBid. (2016b). FedBid homepage. Retrieved from http://www.FedBid.com

Fleischacker, S. (2009). *On Adam Smith's* Wealth of Nations. Princeton, NJ: Princeton University Press. Retrieved from ProQuest Ebook Central.

Gansler, J. S., Berteau, D. J., Maddox, D. M., Oliver, D. R., Salomon, L. E., & Singley, G. T. (2007). *Urgent reform required: Army expeditionary contracting*. Retrieved from https://acc.dau.mil/CommunityBrowser.aspx?id=180366&lang=en-US

Garrett, G. A., & Williams, J. (2009, January). Cost estimating and contract pricing, part 3: Strategies, methods, and best practices. *Contract Management, 49*, 24–34. Retrieved from http://libproxy.nps.edu/login?url=http://search.proquest.com/docview/196313436?accountid=12702

Garrett, G. A. (2007). *World class contracting* (4th ed.). Chicago: CCH.

Gimpel, H. (2008). *Negotiation, auctions, and market engineering: International seminar Dagstuhl Castle, Germany, November 12-17, 2006, revised selected papers*. Berlin; New York: Springer.

Government Accountability Office (GAO). (2005, February). *MTB Group, Inc.* (B-295463). Retrieved from http://www.gao.gov/products/A18456

Government Accountability Office (GAO). (2013, December). *Reverse auctions: Guidance is needed to maximize competition and achieve cost savings* (GAO-14-108). Retrieved from http://www.gao.gov/assets/660/659530.pdf

Government Executive. (2001). Buyers.gov. Retrieved from http://www.govexec.com/magazine/2001/05/buyersgov/8988/

Harris, S. (2001). Bestbuy.gov. *Government Executive*, *33*, 29. Retrieved from http://web.b.ebscohost.com.libproxy.nps.edu/ehost/detail/detail?sid=67592875-63b7-4ae2-9b2b-4101570b2b4f%40sessionmgr103&vid=0&hid=118&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=5110554&db=bth

Hawkins, T. G., Coyne, A. V., & Hudgens, B. J. (2010). Electronic reverse auctions: Removing barriers to unleash savings in federal procurement. *Air Force Journal of Logistics*, *34*(3/4), 1–15.

Hinterhuber, A., & Liozu, S. (2012). Is it time to rethink your pricing strategy? *MIT Sloan Management Review*, *53*(4), 69–77. Retrieved from http://libproxy.nps.edu/login?url=http://search.proquest.com/docview/1023762001?accountid=12702

Kelman, S. (1999). Auctions: The next tool for the federal buyer. FCW. Retrieved from https://fcw.com/articles/1999/07/25/auctions-the-next-tool-for-the-federal-buyer.aspx

Klemperer, P. (2004). *Auctions: Theory and practice*. Princeton, NJ: Princeton University Press.

Koehler, E. (2011). GSA's Reverse Auctions platform celebrates 3rd anniversary by adding new features. [Blog post]. Retrieved from https://gsablogs.gsa.gov/gsablog/2016/07/11/gsas-reverseauctions-platform-celebrates-3rd-anniversary-by-adding-new-features/

Krishna, V. (2010). *Auction theory* (2nd ed.). Burlington, MA: Academic Press/Elsevier.

Kuo, C., Rogers, P., & White, R. E. (2004). Reverse auctions: An overview. Acquisition Directions Advisory. Retrieved October 16, 2016, from http://scholarworks.lib.csusb.edu/cgi/viewcontent.cgi?article=1171&context=jiim

Lin, K. Y. (2006). Dynamic pricing with real-time demand learning. *European Journal of Operational Research*, *174*(1), 522–538. doi:10.1016/j.ejor.2005.01.041

Mankiw, N. (2012). *Principles of macroeconomics*. Mason, OH: South-Western Cengage Learning.

Mission and Installation Contracting Command (MICC). (2012, November). Market research guide. Retrieved from https://docs.google.com/a/usarmyjrotc.com/viewer?a=v&pid=sites&srcid=dXNhcm15anJvdGMuY29tfGpyb3RjLXN1cHBseXxneDo1OTM2ZWM5MWFhM2ZmNjdm

Murphy, J. E. (2005). *Guide to contract pricing: Cost and price analysis for contractors, subcontractors, and government agencies*. Vienna, VA: Management Concepts.

Murray, B. (2000). Navy, Army find savings in initial reverse auctions. GCN. Retrieved from https://gcn.com/articles/2000/06/09/navy-army-find-savings-in-initial-reverse-auctions.aspx

Nichols, C. M. (2013, February 7). *Use of reverse auctioning* (Command Policy Memorandum [CPM] 13-20). Redstone Arsenal, AL: U.S. Army Contracting Command.

Rung, A. E. (2015, June 1). *Effective use of reverse auctions* [Memorandum]. Washington, DC: Executive Office of the President, Office of Management and Budget (OMB).

U.S. Department of the Army. (2011, June 23). *Army online reverse auction tools—When to use them* (Information Paper #11-04). Redstone Arsenal, AL: Army Contracting Command.

U.S. Department of the Army. (2012, September 10). Stand Form 1449—Solicitation/Contract/Order for Commercial Items (REV 3/2005 ed.; Contract No. W91ZLK-12-P-0699). Aberdeen Proving Ground, MD: Army Contracting Command.

U.S. Office of Personnel Management (OPM). (1983). Position Classification Standard for Contracting Series, GS-1102. Retrieved October 17, 2016, from https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/standards/1100/gs1102.pdf

Vollmecke, K. F. (2012, August 28). *Use of reverse auctions* (Command Policy Memorandum [CPM] 12-15). Fort Sam Houston, TX: U.S. Army Mission and Installation Contracting Command.

Wheaton, G. (2010, July 27). Government reverse auctions. Retrieved from EPIQ website: http://www.epiqtech.com/government-reverse-auctions.htm

Wyld, D. C. (2000). *The auction model: How the public sector can leverage the power of e-commerce through dynamic pricing* [Grant report]. Arlington, VA: The PriceWaterhouseCoopers Endowment for the Business of Government. Retrieved from http://media.wix.com/ugd//8ea413_4320edc8059459768943e9790afad90d.pdf

Wyld, D. C. (2010). Procuring dollar and time savings: A case study of the implementation of reverse auctions in the federal government. *International Journal of Managing Value and Supply Chains, 1*(2), 1–25. Retrieved from http://airccse.org/journal/mvsc/papers/1210ijmvsc01.pdf

Wyld, D. C. (2011a, September). Current research on reverse auctions: Part I—Understanding the nature of reverse auctions and the price and process savings associated with competitive bidding. *International Journal of Managing Value and Supply Chains, 2*(3), 11–23.

Wyld, D. C. (2011b, December). Current research on reverse auctions: Part II—Implementation issues associated with putting competitive bidding to work. *International Journal of Managing Value and Supply Chains*, *2*(4), 1–15.

Wyld, D. C. (2012). Reverse auctioning—Producing solid, defensible savings in military acquisition: An analysis of the experience of the Army Contracting Command (ACC). Retrieved from Reverse Auction Research website: http://www.reverseauctionresearch.com

Wyld, D. C. (2013). Reverse auctions: Creating winners through acquisition innovation. *Contract Management*, *53*(1), 36–47.

Wyld, D. C. (2014). A comparison of the three models for reverse auctioning for public sector agencies [Briefing]. Retrieved from Reverse Auction Research website: http://www.reverseauctionresearch.com/comparison-of-the-three-models

Yoder, E. C. (2010). *Phase zero operations for contingency and expeditionary contracting—Keys to fully integrating contracting into operational planning and execution* (NPS-CM-10-160). Monterey, CA: Naval Postgraduate School.

Yoder, C. (2016, Spring). Frameworks for analyzing acquisition & contracting policy [MN3315: Acquisition Management and Contract Administration]. Retrieved from https://cle.nps.edu/xsl-portal/site/db1c1d20-b245-4507-9f9b-60ca9668d10e/page/b611a799-779f-4df0-867a-feb5b8f65dbe

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