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A BETTER BUYING POWER ANALYSIS OF THE JAVELIN PROGRAM

September 2018

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A BETTER BUYING POWER ANALYSIS OF THE JAVELIN PROGRAM

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

This research report provides a strengths, weaknesses, opportunities, and threats (SWOT) analysis of the Javelin anti-tank weapon system program's adherence to our Better Buying Power (BBP) best practices. This report used the BBP mandates as a standard to judge and analyze the Javelin program. The history and development of both Javelin and the BBP were thoroughly researched, and the efficacy of the BBP mandates was explored by comparison to real-world acquisition.

It was found that the Javelin program's internal strength is its highly successful implementation of performance-based logistics. An internal weakness is its overdependence on large contractors in lieu of increasing opportunities for small businesses. The current environment has provided the opportunity for Foreign Military Sales, and the Javelin's exportability has been able to take great advantage of these sales. The current outside environment, however, threatens the program; the marketplace lacks competitive small businesses, which hampers effective competition. The current environment has seen increasingly effective countermeasures on competitor nations' armored vehicles. This threatens the Javelin's overmatch capabilities.

Past programs can provide today's acquisition workforce with applicable lessons learned. Our current BBP initiatives do provide real-world benefits.

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Table 1. Better Buying Power 2.0 focus areas. Adapted from Kendall (2012).13

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LIST OF ACRONYMS AND ABBREVIATIONS

AAWS-M	Advanced Anti-Armor Weapon System–Medium
ACAT	Acquisition Category
AMCOM	Aviation and Missile Command
BBP	Better Buying Power
BST	Basic Skills Trainer
CCWS	Close Combat Weapon Systems
CLU	Command Launch Unit
DARPA	Defense Advanced Research Project Agency
DCAA	Defense Contract Audit Agency
DoD	Department of Defense
DOT&E	Director, Operational Test and Evaluation
DSCA	Defense Security Cooperation Agency
EMD	Engineering and Manufacturing Development
EPBST	Enhanced Performance Basic Skills Trainer
ERA	Explosive Reactive Armor
FTT	Field Tactical Trainer
FPI	Fixed Price Incentive
FPIFT	Fixed Price Incentive Firm Target
FRP	Full Rate Production
FMS	Foreign Military Sales
IOT&E	Initial Operational Test and Evaluation
JAP	joint applied project
JJV	Javelin Joint Venture
LCCS	Lifecycle Contractor Support
LPTA	Lowest Price Technically Acceptable
LRIP	Low Rate Initial Production
LTA	Launch Tube Assembly
MDE	Major Defense Equipment
MSR	Missile Simulation Round
NPS	Naval Postgraduate School

OSD	Office of the Secretary of Defense
PBL	Performance Based Logistics
PEO	Program Executive Office
SWOT	strengths, weaknesses, opportunities, and threats
TD	Technology Development
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

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I. INTRODUCTION

This joint applied project (JAP) analyzes the Javelin anti-tank weapon system program and that program's adherence to our current Better Buying Power (BBP) best practices.

The BBP plan was introduced in 2010 by Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) Ashton Carter (Carter, 2010a) and Principal Deputy Under Secretary Frank Kendall to improve the Department of Defense's (DoD's) acquisition processes (Serbu, 2017). There had been a decline in the DoD's yearly budget growth rate around this time and defense acquisition leaders were seeking ways to do more with less; BBP laid out a number of initiatives to improve defense procurement productivity (Serbu, 2017). Initiatives included should-cost management, methods to improve competition, affordability mandates, and other strategies to increase defense buying power (Serbu, 2017). Over the following years, BBP was updated with newer iterations of mandates, BBP 2.0 in 2012, and BBP 3.0 in 2014 (Serbu, 2017).

The Javelin, shown in Figure 1, is a man-portable, shoulder-fired anti-tank missile system (Whitmore, 2009). The system has two main components, the Command Launch Unit (CLU) and the Launch Tube Assembly (LTA). The CLU is reusable and the LTA, which contains the fire-and-forget guided missile, is for one-time use (Whitmore, 2009). The Javelin missile employs an infrared seeker that guides the missile to destroy vehicles, tanks, helicopters, or buildings (Duddu, 2014). With a maximum range of 2,500 meters, the Javelin is considered to be one of the world's best man-portable anti-tank weapon systems (Duddu, 2014).

The Javelin system went through its acquisition process before any implementation of the BBP initiatives. The first development contract was awarded in 1989 to the Javelin Joint Venture (JJV) by the U.S. Army Aviation and Missile Command (AMCOM); it was to be the replacement for the older M47 Dragon anti-tank missile system (Whitmore, 2009). The Javelin's development was managed by the Close Combat Weapons System (CCWS) Project Office under Program Executive Office (PEO) Missiles and Space (Whitmore,

2009). Low Rate Initial Production (LRIP) began in 1994; the Javelin was fielded to some select U.S. Army units in 1996, and Full Rate Production (FRP) started in May of 1997 (Whitmore, 2009). Today the Javelin is managed by the CCWS Project Office and the two main contractors of the JJV are Lockheed Martin and Raytheon (Whitmore, 2009).



Figure 1. Soldier readies the Javelin system. Source: Hawkins (2016).

Past programs can provide today’s acquisition workforce with applicable “lessons learned”. This JAP uses the BBP mandates as a standard to judge and analyze the Javelin program. The history and development of the Javelin along with the BBP were thoroughly researched for this report. The efficacy of the BBP mandates are explored by comparison to real-world defense acquisition.

II. BACKGROUND

A. BETTER BUYING POWER

The BBP initiative was introduced by USD(AT&L) Ashton B. Carter on 28 June 2010. His BBP memo was a proclamation to the acquisition workforce on ways to increase efficiency and affordability in the acquisition process at a time when the defense budget was tightening. At the time, \$400 billion of the DoD's \$700 billion yearly budget was spent on contracts to outside entities for the acquisition of services and materiel, an efficient DoD ought to focus on the affordability of these buys (Carter, 2010a).

1. BBP 1.0

The original BBP core objectives at introduction were:

- Deliver the warfighting capability we need for the dollars we have
- Get better buying power for warfighter and taxpayer
- Restore affordability to defense goods and services
- Improve defense industry productivity
- Remove government impediments to leanness
- Avoid program turbulence
- Maintain a vibrant and financially healthy defense industry. (Carter, 2010a)

A point continually stressed by the early BBP initiatives is that more than half of the DoD's annual budget is spent on contracts for services and goods (Carter, 2010b). In Carter's memo to the acquisition workforce he called upon them to "DO MORE WITHOUT MORE" (2010b). Internally improving the procurement practices could have the potential for great cost savings while still delivering needed capabilities to the

warfighter. The early BBP memos were not to be viewed as set in stone mandates, but as the beginning of an implementation and refinement process (Carter, 2010b).

The last 2010 Ashton Carter BBP memo emphasized controlling cost growth, mandating affordability, and it became required that all Acquisition Category (ACAT) I programs will have their affordability reviewed at every milestone decision review (Carter, 2010c). It was expected that acquisition professionals shall start implementation of the initiatives. At this time ACAT I programs were also mandated to establish Should-Cost management tools, set up affordability targets for milestones, increase use of Fixed Price Incentive Firm Target (FPIFT) contracts, strategize to improve real competition opportunities, and improve the acquisition workforce's tradecraft abilities (Carter, 2010c).

2. BBP 2.0

Two years later, in 2012, the new USD(AT&L) Frank Kendall introduced the next iteration with *Better Buying Power 2.0: Continuing the pursuit for greater efficiency and productivity in defense spending*. Kendall's 2012 BBP 2.0 memo to the acquisition workforce introduced 36 initiatives and organized them into seven focus areas, it was emphasized again that BBP will continue to be a process of continuous improvement and never a permanent policy set. There was evidence that the original BBP implementation has already started to show improvement in the acquisition process and this newest iteration would address potential gaps (Kendall, 2012). This JAP report explores a number of the focus areas and their mandates.

One focus area of BBP 2.0, "Eliminate Unproductive Processes and Bureaucracy," is streamlining the bureaucracy (Kendall, 2013). The initiatives under this focus area want to reduce the frequency of Office of Secretary of Defense (OSD)-level reviews and to re-emphasize program manager responsibility (Kendall, 2012). Clean and clear lines of responsibility can entropy over time so program manager accountability always has to be emphasized (Kendall, 2013). Requirements where the costs outweigh the benefits should be eliminated and cycle times should be reduced (Kendall, 2012). DoD bureaucracies can suffer from creep, both in requirements on industry, and in the size of its organizations. To increase buying power superfluous industry requirements, the kind that do not add value

or performance, have to be identified and eliminated. The root causes for delays in the life cycle process also have to be identified and fixed (Kendall, 2012).

The “Improve Tradecraft in Acquisition of Services” focus area has initiatives aimed at improving the acquisition of services because this is an area that has a great potential for improved efficiencies and opportunities for cost savings (Kendall, 2012). Kendall’s (2012) memo mandated that senior managers shall be assigned to contracts that manage the acquisition of services. Next, these services should be segmented into six categories and these segments have to be uniform across the DoD. He advised that requirement definitions should be improved and their creep prevented. Also, acquisition tradecraft is strengthened by market research and its increased use by the workforce (Kendall, 2012). Program managers are mandated to take steps to increase the participation of small businesses in service contracts (Kendall, 2012). Small businesses that provide services are an area where the DoD could find cost reductions. His memo further noted that contract management should be strengthened outside the standard acquisition chain because a large number of service contracts happen outside of this area and occur all over the DoD, such as in small installations. This focus area also calls for the expanded use of requirements review boards along with tripwires to better manage service contracts (Kendall, 2012).

The “Improve the Professionalism of the Total Acquisition Workforce” focus area seeks to improve the overall capabilities of the workforce; their professionalism is arguably the most important area of the BBP (Kendall, 2012). The defense acquisition system should establish high standards for its leadership positions. In the past leaders were not held to sufficiently high standards; it should now be required that potential acquisition leaders have stronger professional qualifications and real-world experience before being promoted into key positions (Kendall, 2012). DoD does but can do more to increase the recognition of acquisition managers, as the requirement to manage large programs and service contracts takes significant skill (Kendall, 2012). Anything the DoD can do to raise the prestige of this workforce will improve morale and defense buying power. The workforce must also be more cost conscious; costs matter and a workforce with increased cost consciousness has the ability to stop needless budget growth (Kendall, 2012).

3. BBP 3.0

The Office of the USD(AT&L) collected data from the beginning with implementation of BBP, through BBP 2.0, and in September of 2014 released the BBP 3.0 White Paper that reviewed the progress of the last several years and laid out plans for the future (Kendall, 2014). Kendall's white paper (2014) explained that there had been sufficient time since the first BBP mandates had been put into place that it was now possible to review the workforce's experiences and analyze how procurement conditions have changed. According to Kendall, many of the initiatives such as improving the professionalism of the workforce, mandating affordability, and increasing competition opportunity were highly successful and would continue to be emphasized. The new area that drew the most concern was the increase in competitor nation capabilities, the United States was losing its overmatch dominance and BBP 3.0 was formed with this in mind (Kendall, 2014).

The BBP 3.0 implementation memo was released in April of the following year, 2015, there were seven focus areas as in BBP 2.0 but the emphasis had been shifted towards technical innovation and excellence (Kendall, 2015a). Most of the original core initiatives, affordability caps, effective incentives, should-cost management, and workforce professionalism were still a part of the BBP 3.0 implementation memo (Kendall, 2015a). The initiative "Anticipate and plan for responsive and emerging threats by building stronger partnerships of acquisition, intelligence and requirements communities" (Kendall, 2015a, p. 3) called for better working relationships with the intelligence community. The initiative, acknowledged that building cooperation between the acquisition workforce and the requirement writers has always been an area that needed work. The BBP 3.0 implementation memo wants to expand this and include the intelligence community to better plan for future acquisitions (Kendall, 2015a).

B. THE JAVELIN WEAPON SYSTEM

The Javelin, shown in Figure 2, is a man-portable anti-tank weapon system, used by warfighters in the U.S. Army, U.S. Marine Corps, and 15 foreign nations (Close Combat Weapon Systems [CCWS] Project Office, n.d.). The Javelin anti-armor missile system is

currently supplied by Raytheon and Lockheed Martin's JJV Team (Raytheon, 2016). It is composed of two sub-systems: the standalone CLU and the expendable Javelin LTA, which contains the Javelin missile (Northrop Grumman, 2018). The reusable CLU is used for day and night target acquisition and can also be used for surveillance (CCWS Project Office, n.d.). The Javelin missile is a fire-and-forget projectile that soft launches from its expendable LTA and flies to the CLU designated target directly or by top attack; the missile has a qualified range of 2500 meters (CCWS Project Office, n.d.). The Javelin Weapon System is managed by the U.S. Army's CCWS Project Office under the Program Executive Office (PEO) Missiles and Space (Program Executive Office [PEO] Missiles and Space, n.d.).



Figure 2. Javelin Block 0. Source: CCWS Project Office (n.d.).

1. Operating the Javelin

The Javelin system is capable of being fired by only one soldier and is designed to operate in most environments (Raytheon, 2016). The Javelin missile projectile is guided by infrared (Roblin, 2016). The Javelin's CLU is the reusable part of the system; the CLU

has optical zoom and thermal view targeting capabilities (Roblin, 2016). The CLU and loaded LTA weigh in at a combined 50 pounds, making the Javelin man-portable (Roblin, 2016). Operators will usually fire the weapon while seated or crouched; the operator will sight through the CLU, shown in Figure 3, to identify a target and lock on the infrared seeker (Roblin, 2016).



Figure 3. Marine holding a Javelin CLU. Source: Whitmore (2009).

When fired, the Javelin missiles will soft launch out of the LTA to a safe distance away from the operator and then the main missile engine will function, taking the missile to the target (Roblin, 2016). This soft launch function was designed into the system to protect the operator by minimizing back blast. In Roblin's 2016 article he describes another key feature of the Javelin system is its fire-and-forget capability. Once the missile is fired, the operator does not have to direct it as the Javelin missile guides itself to the target (Roblin, 2016).

2. Javelin Development History

Anti-tank and anti-armor systems have been an important part of the U.S. military's materiel acquisition ever since armored vehicles started to appear on the battlefield (Angelis, Dillard, & Ford, 2013). The Javelin was the replacement for the M47 Dragon anti-tank weapon system; the Dragon was first introduced in the 1970s (Angelis et al., 2013). It was optically navigated by a command wire connecting the missile to the operator's control unit (Angelis et al., 2013). Military users at the time considered the Dragon lacking in range, usability, lethality, and reliability (Angelis et al., 2013). The effort to replace the Dragon was called the Advanced Anti-armor Weapon System–Medium (AAWS–M) project which eventually led to the current Javelin program (Angelis et al., 2013).

The AAWS-M program started with the intent to bring a man-portable anti-tank weapon that would improve and replace the existing Dragon (Jane's by IHS Markit, 2018). The Anti-armor Mission Need statement was issued in January 1978 and articulated the underperformance issues the Army was having with its Dragon system (Pike & Sherman, 1999). The AAWS-M was going to be able to defeat enemy tanks at any time of day and also in degraded visual situations due to smoke or dust (Jane's by IHS Markit, 2018). By 1986, U.S. Army Missile Command awarded three technical demonstration contracts to the three most promising technology offerors: Ford Aerospace, Hughes Aircraft Missile Systems Group, and Texas Instruments Defense Systems & Electronics Group (Jane's by IHS Markit, 2018). The Army wanted these contractors to deliver an operational system for a comparison shoot-off (Jane's by IHS Markit, 2018).

Defense Advanced Research Project Agency (DARPA) also assisted anti-tank weapon development starting in the 1970s with their Tank Breaker program (Defense Advanced Research Projects Agency [DARPA], n.d.). The U.S. Army conducted its AAWS-M comparison shoot-off testing in 1987 to 1988, between the industry options that were developed in the DARPA Tank Breaker Program (DARPA, n.d.). The Texas Instruments solution won and would go on to full scale development with the AAWS-M program. The Army eventually renamed the AAWS-M to the Javelin (DARPA, n.d.).

The Engineering and Manufacturing Development (EMD) phase contract for the Javelin was awarded in 1989 (Pike & Sherman, 1999). The Army completed the Javelin's Initial Operational Test and Evaluation (IOT&E) by the end of 1993 and milestone III was passed in 1997 along with the FRP decision (Pike & Sherman, 1999).

III. RESEARCH QUESTIONS AND METHODOLOGY

The objective of this research project is to do a qualitative analysis of an acquisition program's adherence to our current BBP best practices. The Javelin development program was chosen for analysis because all phases of the development took place before the first release of BBP.

A. PRIMARY RESEARCH QUESTIONS

The research questions of this project compare our current BBP best practices to the Javelin anti-tank weapon program's development and fielding.

Primary Research Question 1: What were the internal strengths and weaknesses of the Javelin program according to the BBP standard?

Primary Research Question 2: What were the external opportunities and threats to the Javelin program according to the BBP standard? How has the Javelin program responded?

B. SECONDARY RESEARCH QUESTION

Using the BBP standard to analyze a legacy development program and currently fielded item provides insights into the defense acquisition process. While past performance is not a guarantee of future performance, past events can increase the knowledge base that personnel currently have.

Secondary Research Question: What are the most relevant and useful "lessons learned" from this BBP analysis to the current acquisition workforce?

C. PURPOSE AND BENEFIT

The BBP initiative has been the one of the largest defense acquisition strategy updates in recent history. "Testing" the applicability of the BBP on past completed programs may reveal the current relevance of today's initiatives.

The Javelin program was, and still is a large Army acquisition effort. Research on past programs is always important because the acquisition workforce can learn much from real life examples.

The benefits of this JAP research expand and improve the understanding of the BBP. This JAP is a low cost simulator where the author compared our abstract acquisition ideals of the BBP with past real-world acquisition programs. Applying the BBP to a past program improve the author and reader’s understanding of the BBP and glean “lessons learned” from past programs.

D. METHODOLOGY

The author of this JAP conducted the research in two parts. The first part of the research collected information on the formation, history, and current usage of the BBP initiative. The second part was a historical research of the Javelin program. This JAP drew heavily from the U.S. government, U.S. Army program information, Naval Postgraduate School (NPS) theses and projects, the BBP initiative, Defense Acquisition University, and many online sources. No data were collected from interviews.

The primary analysis method used was a strengths, weaknesses, opportunities, and threats (SWOT) analysis. SWOT analysis is commonly applied in business and program management. This JAP analyzed the internal strengths and internal weaknesses of the Javelin program. Also analyzed were the external opportunities and threats to the Javelin program from the wider world and how the Javelin program has responded. These strengths, weaknesses, opportunities, and threats are all viewed from a BBP standard.

The author of this JAP used programmatic management skills as taught by the NPS to address the research questions.

IV. DATA AND ANALYSIS

The primary analysis method used for this project is a SWOT analysis. The first primary research question being answered is: What were the internal strengths and weaknesses of the Javelin program according to the BBP standard? The second primary research question is: What were the external opportunities and threats to the Javelin program according to the BBP standard and how has the Javelin program responded? After these questions are answered, this project answers the secondary research question: What are the most relevant and useful “lessons learned” from this BBP analysis to the current acquisition workforce?

This report used the initiatives from BBP 2.0 and BBP 3.0 for analysis. BBP 2.0 was released on 13 November 2012 by USD(AT&L) Frank Kendall. The memo, *Better Buying Power 2.0: Continuing the Pursuit for Greater Efficiency and Productivity in Defense Spending*, revised the original core objectives into seven focus areas covering 36 specific initiatives. For the reader’s convenience those seven BBP 2.0 focus areas along with their specific initiatives are shown in Table 1.

Table 1. Better Buying Power 2.0 focus areas. Adapted from Kendall (2012).

Number	BBP Focus Area	Specific Initiatives
1	Achieve Affordable Programs	<ul style="list-style-type: none"> • Mandate affordability as a requirement. • Institute a system of investment planning to derive affordability caps. • Enforce affordability caps.
2	Control Costs Throughout the Product Lifecycle	<ul style="list-style-type: none"> • Implement “should cost based management. • Eliminate redundancy within Warfighter portfolios. • Institute a system to measure the cost performance of programs and institutions and to assess the effectiveness of acquisition policies. • Build stronger partnerships with the requirements community to control costs. • Increase the incorporation of defense exportability features in initial designs.
3	Incentivize Productivity and Innovation in	<ul style="list-style-type: none"> • Align profitability more tightly with Department goals. • Employ appropriate contract types. • Increase use of Fixed Price Incentive contracts in Low Rate Initial Production.

Number	BBP Focus Area	Specific Initiatives
	Industry and Government	<ul style="list-style-type: none"> • Better define value in “best value” competitions. • When LPTA is used, define Technically Acceptable to ensure needed quality. • Institute a superior supplier incentive program. • Increase effective use of Performance-Based Logistics. • Reduce backlog of DCAA Audits without compromising effectiveness. • Expand programs to leverage industry’s IR&D.
4	Eliminate Unproductive Process and Bureaucracy	<ul style="list-style-type: none"> • Reduce frequency of OSD-level reviews. • Re-emphasize AE, PEO, and PM responsibility and accountability. • Eliminate requirements imposed on industry where costs outweigh benefits. • Reduce cycle times while ensuring sound investment decisions.
5	Promote Effective Competition	<ul style="list-style-type: none"> • Emphasizing competition strategies and creating and maintaining competitive environments. • Enforce open system architectures and effectively manage technical data rights. • Increase small business roles and opportunities. • Use the Technology Development phase for true risk reduction.
6	Improve Tradecraft in Acquisition of Services	<ul style="list-style-type: none"> • Assign senior managers for acquisition of services. • Adopt uniform services market segmentation. • Improve requirements definition; prevent requirements creep. • Increase use of market research. • Increase small business participation. • Strengthen contract management outside the normal acquisition chain. • Expand use of requirements review boards and tripwires.
7	Improve the Professionalism of the Total Acquisition Workforce	<ul style="list-style-type: none"> • Establish higher standards for key leadership positions; establish stronger professional qualification requirements for all acquisition specialties. • Increase the recognition of excellence in acquisition management. • Continue to increase the cost consciousness of the acquisition workforce.

For the purposes of this report, the focus areas have been numbered and the text formatted into a table.

A. STRENGTHS

1. Incentivize Productivity and Innovation in Industry and Government

The BBP 2.0 initiatives in focus area three, “Incentivize Productivity and Innovation in Industry and Government” (Kendall, 2012) increase government buying power by working smarter with industry. The first way to do this, according to Kendall, is to align industry profitability with DoD goals, competent program managers should be able to cost effectively motivate industry with the right contract types and incentives. Employing the appropriate contract type is necessary because defense acquisition is never a one size fits all environment, management must learn to take advantage of the many contract types available in federal regulations (Kendall, 2012).

According to Kendall (2012), the LRIP phase should increase the use of Fixed Price Incentive (FPI) contracts. A FPI contract, sometimes called a firm target contract, is when specific targets are negotiated at the outset and then awarded with an incentive when the contractor performance meets them (Fixed price incentive firm target contracts, 1994). Frank Kendall wrote in 2012 that FPI contracts are most applicable for the LRIP acquisition phase.

The government, Kendall (2012) says, should better define value when using a best value competition contract. He explains that different contractors will submit products with varying levels of performance to a competitive bid, when the government is confronted with these different choices of performance, someone has to better define the performance-to-cost tradeoffs to make a best value acquisition decision. Lowest Price Technically Acceptable (LPTA) contracts have a similar problem with too much subjectivity and not enough specificity, this focus area mandates that when LPTA is used, what is technically acceptable has to be very well defined (Kendall, 2012).

This focus area has several logistics related initiatives. A supplier incentive program should be instituted and programs should increase their use of Performance Based Logistics (PBL) (Kendall, 2012). Traditional logistics would measure outcomes by raw product outputs such as number of items produced or total work hours provided by the contractor (Spring, 2010). Spring explains that PBL measures logistics by a performance

outcome; industry is compensated not for producing repair items or billing support hours, but by keeping a system performing at a required level. There is a preponderance of evidence that effectively implemented PBL will improve support performance while reducing costs (Kendall, 2012).

The Defense Contract Audit Agency (DCAA) is responsible for providing DoD with financial advisory and auditing services (Defense Contract Audit Agency [DCAA], 2018). BBP mandates that DCAA reduce its backlog of audits without compromising the agency's effectiveness (Kendall, 2012).

Focus area three from BBP 2.0 also mandates that programs be initiated and expanded to leverage private industry's research and development efforts (Kendall, 2012).

2. Javelin Performance-Based Logistics

U.S. Army AMCOM reported in a 2016 article that the Javelin had one of the highest tactical operational readiness levels in the DoD (Hawkins, 2016). According to Hawkins, from 2008 through 2015, the Javelin's tactical operational readiness rate was greater than 99 percent. She further noted that a 99 percent readiness rate surpasses the contract requirements and exceeded the Army's expectations. The contract only required a readiness of 90 percent (Kendall, 2015b). Well executed PBL were credited with this level of readiness success (Hawkins, 2016).

Life cycle support is performed by the Javelin Lifecycle Contractor Support (LCCS) PBL team (Kendall, 2015b). The LCCS PBL team is made up of the U.S. Army CCWS Project Office and the JJV; a contractor partnership between Lockheed Martin and Raytheon (Kendall, 2015b). This team works with Fort Benning Training Support Center, Letterkenny Army Depot, and DHL Global Forwarding to support the Javelin LCCS PBL goal of providing Javelin material reliability and availability to the Warfighter (Kendall, 2015b).

The Office of the Assistant Secretary of Defense for Logistics & Readiness administers the multiple yearly awards for outstanding PBL performance (Office of the Assistant Secretary of Defense for Logistics & Materiel Readiness, n.d.). There are three

award categories in the Secretary of Defense PBL Awards Program. One for the Component Level, the Sub-system Level, and System Level; the System Level award is named the Gerald R. “Jerry” Beck after the man that initiated the award program (Office of the Assistant Secretary of Defense for Logistics & Materiel Readiness, n.d.). Gerald Beck is honored due to his long and distinguished government career in defense logistics and he had a significant role in the early implementation of PBL (Office of the Assistant Secretary of Defense for Logistics & Materiel Readiness, n.d.).

The U.S. Army JJV PBL Team won the System Level Gerald R. “Jerry” Beck Award for the 2015 cycle (Kendall, 2015b). The JJV PBL Team was recognized for setting up a successful solution for the Government customer, Army CCWS Project Office (Kendall, 2015b). Kendall’s PBL Award memo (2015b) noted that this PBL team was able to reduce the per-year contractor support cost by 48 percent, from \$62 million to \$32 million. Even with this reduction in costs, the Javelin LCCS PBL team was still able to maintain tactical operation readiness levels of greater than 99 percent for eight years straight from 2008 to 2015 (Kendall, 2015b).

The Office of Secretary of Defense collects the explanation of accomplishments information for each PBL annual award winner, this nomination paper goes into more details (Office of the Secretary of Defense [OSD], 2015). The 2015 cycle system level accomplishments paper reported that logistics support for the CLU was able to maintain an operation readiness level of greater than 99%, higher than the 90% contract requirement. It was further reported that the one- to two-day replenishment fill rate was greater than 99% for support of depot repairs and Army Brigade Level Authorized Stockage Levels. The Javelin’s Field Tactical Trainer (FTT) had a repair induction increase to 56 per month from 15 per month, which is a 3.73 times increase (OSD, 2015).

3. Organizational Strengths Analysis

This project found that an internal strength of the Javelin program was its successful implementation of effective PBL. Effective use of PBL is an initiative mandated in both BBP 2.0 (Kendall, 2012) and BBP 3.0 (Kendall, 2015a). BBP recognizes that effective PBL can incentivize productivity in industry and Government (Kendall, 2015a). The

Javelin PBL team was so successful that it was recognized by the Office of Secretary of Defense with the Beck System Level award for outstanding PBL performance. The government-industry partnership between the CCWS Project Office and the JJV, Lockheed Martin and Raytheon, were able to maintain several consecutive years of high operational readiness levels while at the same time reducing costs.

B. WEAKNESSES

1. Promote Effective Competition

The BBP mandates that program managers seek ways promote effective competition, this focus area suggests that program managers take advantage of acquisition strategies that emphasize competition and create a competitive environment (Kendall, 2012). When developing systems, program managers should be effective at managing technical data rights and enforce on systems an open architecture design (Kendall, 2012). The Technology Development (TD) phase must be used to reduce risk for the program; competitive designs can be thoroughly tested against each other in the TD at less cost to the government instead of making changes in later more expensive phases (Kendall, 2012). Opportunities and roles for small businesses should also be increased because these smaller contractors are often an inexpensive source of innovation (Kendall, 2012).

2. Achieve Affordable Programs

Achieving affordable programs is accomplished by setting up affordability caps before the program is even initiated (Kendall, 2015a). This BBP focus area calls on the OSD and the Service leadership to determine if future budgets can afford a proposed program. Kendall (2015a) observed that in the past new programs were proposed and implemented without proper analysis of their affordability on future defense budgets. Also mandated is an affordability analysis on each proposed program and then the establishment of an affordability cap to keep costs in line. These affordability caps are now reviewed at milestone decisions (Kendall, 2015a).

The affordability caps will be derived from a system of investment planning; BBP asserts that service and component leadership view their capabilities as a capital investment

(Kendall, 2012). Kendall (2012) holds that when leadership makes future acquisition decisions, it will have to be done within a capital investment portfolio framework that plans out system life cycles up to four decades. This will limit the unnecessary expenditure on programs that are already covered in the existing portfolio (Kendall, 2012).

3. Javelin and Industry

The Javelin anti-tank weapon system is supplied by the JJV which is a contractor partnership between Lockheed Martin and Raytheon (Crews, 2018). Some parts of the Javelin are subcontracted by the JJV out to other companies. Northrop Grumman is the latest producer of the Javelin LTA (Northrop Grumman, 2018). The U.S. government considers the two major contractors of the JJV to be Raytheon and Lockheed Martin (Director, Operational Test and Evaluation [DOT&E], 2018).

Raytheon is based in Waltham Massachusetts and employs around 64,000 workers (Raytheon, 2018). This large defense contractor has been in business since 1922, supports customers in at least 80 countries, and made \$25 billion in sales in 2017, their headquarters for the missile systems branch is in Tucson Arizona (Raytheon, 2018). The Tucson Arizona location is the point of contact for the government (DOT&E, 2018). Raytheon is a publically traded company on the New York Stock Exchange (Wichner, 2018).

Lockheed Martin has its headquarters in Bethesda Maryland and employs around 100,000 workers (Lockheed Martin, 2018). Lockheed Martin, same as Raytheon, is a publicly traded company on the New York Stock Exchange, they support customers in at least 70 nations and made \$51 billion in sales in 2017 (Lockheed Martin, 2018). Of their 100,000 employees Lockheed Martin claims around 49,000 of them are information technology professionals, engineers, or scientists. Lockheed Martin also claims that in 2017 it committed \$4.4 billion in contract money to around 9,000 small businesses (Lockheed Martin, 2018).

4. Javelin Affordability

In December 2017, a Javelin Foreign Military Sales (FMS) to Ukraine was approved for \$47 million of materiel (Brown, 2018). This \$47 million deal would provide Ukraine with 37 CLUs and 210 Javelin anti-tank missiles (Brown, 2018).

The Javelin is considered one of the most effective man-portable anti-tank missile systems in the world, but also considered “an expensive piece of kit, with each missile typically costing more than the targets it eliminates” (Roblin, 2016, p. 1). It has been reported that Javelin missile assemblies each cost around \$80,000 (Roblin, 2016). Each CLU costs around \$126,000 (Matishak, 2016).

5. Organizational Weakness Analysis

An internal organizational weakness of the Javelin program is its overdependence on large contractors instead of increasing opportunities for small businesses. BBP mandates that managers make an effort to increase small business participation when possible. Increasing small business participation is vital for promoting effective competition and reducing costs. Raytheon and Lockheed Martin are both companies with multi-billion-dollar-a-year sales and that employ tens of thousands of employees. The Javelin system is viewed as effective but also expensive. Each missile can cost around \$80,000 each, sometimes costing more than the vehicle targets it destroys (Roblin, 2016). This research project could not find evidence that the CCWS Project Office made an effort to increase small business opportunities. By the BBP initiatives this is an area that needs improvement.

C. OPPORTUNITIES

1. Control Costs throughout the Product Life Cycle

To control costs throughout the product life cycle, focus area two of BBP 2.0 mandates that management will have a “should cost” strategy (Kendall, 2012). Should cost implementation means that managers will target their costs below existing independent estimates and strive to achieve these lower target costs (Kendall, 2012). The chain of command should prioritize proactive cost control and reward subordinates that implement

it (Kendall, 2012). Eliminating warfighter portfolio redundancy controls costs throughout the life cycle, separate acquisition efforts can sometimes duplicate or overlap each other so the constant review of the warfighter portfolio is necessary to prevent redundant efforts (Kendall, 2012).

Acquisition professionals and leadership should also “Institute a system to measure the cost performance of programs and institutions and to assess the effectiveness of acquisition policies” (Kendall, 2012). The DoD requires real data metrics to assess productivity, institutions that are part of the acquisition process have to be judged objectively and to do that metrics first have to be developed (Kendall, 2012). After metrics are developed they will need to be collected and then the acquisition process will be able to make assessments that are objective and data driven (Kendall, 2012).

Controlling costs will need stronger partnerships between the requirements community and the acquisition community (Kendall, 2012). Too often the people writing requirements are not sufficiently communicating with people in acquisition that will ultimately try to fulfill the requirements (Kendall, 2012). Stronger partnerships put all the stakeholders on the same page at the beginning; building and maintaining a strong network provides a feedback loop where both sides can propose and adjust to the current reality (Kendall, 2012).

System designs should incorporate defense exportability when possible (Kendall, 2012). FMS are government to government agreements between the United States and foreign customers for the sale of U.S. defense articles (Defense Security Cooperation Agency [DSCA], n.d.). These FMS bring in funding to our nation’s military industrial base and strengthen our overseas partnerships. BBP views international cooperation as a win-win for both partners and mandated system design exportability in the initiatives (Kendall, 2012).

2. Javelin Foreign Military Sales

The Javelin is often exported to foreign militaries, according to the U.S. Army the Javelin is used by 15 foreign allies (CCWS Project Office, n.d.). The Defense Security Cooperation Agency (DSCA) administers security agreements between the U.S. and

foreign allied nations (DSCA, 2017b). DSCA focuses on developing allied nation's military capabilities that advance U.S. interests (DSCA, 2017b). The U.S. State Department will make the determination on FMS and then DSCA handles the administration of the exchange; DSCA oversees the FMS of U.S. materiel such as the Javelin system (DSCA, 2018).

In the past years, DSCA has administered many Javelin FMS. When a possible Javelin FMS is approved by the State Department, the DSCA is required by law to publish a notice for each upcoming sale (DSCA, 2018). Ukraine was approved for an FMS of Javelin missiles and Javelin CLUs worth \$47 million in March 2018 (DSCA, 2018). In 2017, Georgia asked for and was approved for \$75 million worth of Javelin system material: 72 CLUs, 10 Basic Skills Trainers (BSTs), and up to 70 simulation rounds (DSCA, 2017a). In 2015, a \$57 million Javelin FMS was approved to the Taipei Economic and Cultural Representative Office (DSCA, 2015a). Qatar was approved for \$122 million Javelin FMS in 2013 (DSCA, 2013). The Kingdom of Saudi Arabia was approved for a \$71 million Javelin FMS in 2010 (DSCA, 2010). Jordan was approved for a \$388 million FMS of Javelin system materiel and support in 2009 (DSCA, 2009).

In regards to the large 2009 FMS proposal to The Hashemite Kingdom of Jordan, the DSCA said the "proposed sale would contribute to the foreign policy and national security of the United States by helping to improve the security of a major non-NATO ally that has been, and continues to be an important force for political stability and economic progress in the Middle East." ("Jordan requests," 2009). This FMS \$388 million proposal to Jordan was for 162 Javelin CLUs with all necessary accessories and logistic support ("Jordan requests," 2009).

Javelin FMS are often full support packages. For example, in 2015, the State Department approved a possible Javelin FMS to Lithuania for an estimated value of \$55 million, the government of Lithuania was interested in purchasing 74 CLUs, 220 Javelin missiles, and 10 Javelin fly-to-buy missiles (DSCA, 2015b). Also included were technical support, logistics support and the transportation of the Major Defense Equipment (MDE) from the United States to Lithuania (DSCA, 2015b). The approved FMS to Qatar in 2013 included training equipment such as the Enhanced Performance Basic Skills Trainer

(EPBST), Missile Simulation Rounds (MSRs), and Javelin weapon effects simulators; with a possible sale of 500 Javelin missiles (DSCA, 2013). This possible FMS to Qatar was estimated to cost up to \$122 million, it included logistics support, 50 CLUs, spare parts, and support items (DSCA, 2013).

3. External Opportunities Analysis

The external environment has provided opportunities for the Javelin program to satisfy initiatives of the BBP. BBP 2.0 mandated that programs “Increase the incorporation of defense exportability features in initial design” (Kendall, 2012). BBP 3.0 further encouraged activities that strengthen international cooperation (Kendall, 2015a). The international defense marketplace has provided an opportunity for the Javelin system to be exported to foreign allies and partnered nations. The relatively light weight design of the Javelin lends itself to exportability. The Javelin does not have a heavy logistics tail as in other systems. The missiles, one-time use, are self-contained in the LTA and easily attach to the CLU unit. Many partnered nations do not have the logistics capabilities of the United States and benefit from simple self-contained weapon systems. Effective anti-tank missile systems can also be a cost effective alternative for partnered nations that cannot field sufficient numbers of tanks on their own but still need to oppose enemy armor.

D. THREATS

1. Achieve Dominant Capabilities

BBP 3.0 acknowledged that U.S. technology superiority is being challenged by the increasing capabilities of near-peer competitor nations (Kendall, 2015a). Since the end of the Cold War the United States has enjoyed global overmatch in combat capability but this difference in power is quickly shrinking (Kendall, 2015a). A focus area of BBP 3.0 is titled “Achieve Dominant Capabilities While Controlling Life cycle Costs” (Kendall, 2015a, p. 2). The initiatives in this focus area encourage the acquisition workforce to improve its long term research and development planning; overmatch capability is highly dependent on an acquisition community that can effectively identify existing and potential technologies (Kendall, 2015a). BBP 3.0 mandates that the U.S. government partners with

domestic industry and foreign allies in the upcoming decades; warfighter capability development has to be a long range planning activity not a short term one (Kendall, 2015a).

2. Javelin and Foreign Armor

The Javelin anti-tank missile system has two different attacks modes (Brown, 2018). First is the direct attack mode. The missile will fly straight from the operator to the target. This mode is typically used for fixed building locations or helicopters. The other mode is the top attack which is used for tanks and armored vehicles. In top attack mode the missile will fly high above the target tank and then come straight down onto the tank where the armor is typically the weakest (Brown, 2018).

The Javelin missile's shaped charged warhead has the ability to defeat 600 to 800 millimeters of steel armor which would not be effective hitting the side of a modern tank but is very effective in top attack mode (Roblin, 2016). There are Explosive Reactive Armor (ERA) systems that do protect the tops of modern tanks; some newer Javelin missile warheads have a tandem charge design that may defeat some ERA systems (Roblin, 2016).

There is sufficient evidence that the Javelin can destroy Russian built T-34 and T-62 tanks (Brown, 2018). Brown acknowledges that it is unconfirmed if the Javelin can destroy newer Russian T-72B3M and T-90 tanks equipped with the Relikt ERA system. It is not known to the public if the Javelin has been tested against Relikt ERA systems (Brown, 2018).

The Javelin system was used in combat against enemy armor during the U.S. invasion of Iraq in 2003 in the Battle of Debecka Pass (Roblin, 2016). U.S. Special Forces armed with the Javelin system were able to destroy enemy MT-LB armored personnel carriers, T-55 tanks, and troop trucks (Gresham, 2015). According to John D. Gresham's 2015 article about the battle, 19 Javelin missiles were fired and 17 scored hits. All 19 missiles were fired at targets greater than 2,200 meters away, which is greater than the Javelin's recommended combat range of 2,000 meters (Gresham, 2015).

3. External Threats Analysis

This research project views two threats from the external environment. One is a marketplace that is dominated by large contractors: Raytheon, Lockheed Martin, and Northrop Grumman. The second external threat is a potential loss of overmatch due to improved vehicle protection technology developed by near-peer competitor nations.

It was mentioned in the internal organizational weaknesses section that the Javelin program does not appear to be making an effort to expand opportunities to small businesses. The external environment may be a contributor to this problem. The Javelin is a technologically advanced anti-tank system and requires a level of expertise and infrastructure that many small businesses may not have. It should be noted that Lockheed Martin did commit \$4.4 billion in sales to around 9,000 small businesses in 2017 (Lockheed Martin, 2018). It would appear that large industry has taken some efforts to increase small business opportunities. BBP sees the increase of small business opportunities as an important part of increasing acquisition buying power. The lack of small businesses in this marketplace may be an external threat to the Javelin program's ability to satisfy our BBP best practices.

The second external threat to the Javelin Program being able to adhere to BBP mandates is the improvement of near-peer competitor nation's armor and anti-tank countermeasures. The newest iteration of BBP mandates that dominant capabilities are achieved while life cycle costs are controlled. Improved foreign anti-tank countermeasures such as the Russia Relikt ERA system may negate the Javelin's current effectiveness.

E. SECONDARY RESEARCH FINDINGS

The main lesson learned for the acquisition workforce is that our current BBP best practices when implemented do provide real-world benefits. Directives coming from the top of a workplace hierarchy may not immediately resonate with the subordinate workforce without sufficient evidence of effectiveness. This project tested the real-world applicability of the BBP mandates. From the findings in this report it appears that the Javelin program implemented effective PBL as mandated by the BBP. The effective implementation of PBL, as mandated, resulted in real measurable improvements to operational readiness

while at the same time reducing costs. The frequency of the Javelin's FMS demonstrates to the acquisition workforce how important it is for programs to design exportability into systems and to take advantage of global partnerships. The research results of this project reinforced the importance of our current BBP best practices.

V. CONCLUSION AND RECOMMENDATIONS

The Better Buying Power initiative began a process of continuing reexamination and improvement in the defense acquisition community. The BBP introduction had been the first large scale effort in recent history to reform the procurement process. BBP 2.0 expanded on this effort with more refined focus areas and specific initiatives. The years of implementation and data collection gave way to BBP 3.0. The third iteration of the Better Buying Power plan maintained the core goals of BBP but somewhat shifted the focus to the outside environment; to the capabilities of near-peer competitor nations and the United States' ability to achieve overmatch.

This report conducted a SWOT analysis to address the primary research questions which is how well the Javelin program has adhered to our current BBP initiatives. It was found that the Javelin program's internal strength was its highly successful implementation of PBL. An internal weakness is its overdependence on large contractors, instead of increasing opportunities for small businesses. The current environment has provided the opportunity for FMS and the Javelin's exportability has been able to take great advantage of it. The current outside environment threatens the Javelin program with a marketplace lacking in competitive small businesses which hampers effective competition. The current environment has seen increasingly effective countermeasures on near-peer competitor nation armored vehicles. This threatens the Javelin's overmatch capabilities.

This JAP "tested" our abstract acquisition ideals of the BBP on past real-world acquisition history. It is recommended that future researchers examine other legacy acquisition programs. It would be best to examine programs that have been fielded and where research material is both copious and accessible. This method of defense program analysis may be used by NPS students and acquisition workforce members to strengthen their knowledge about other programs. This project was educational but limited by being dependent on only publicly released information. A future project with access to classified information about a subject defense program may yield a more thorough analysis.

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