

2018

# Strategies for Improving Contractors' Defense Acquisition Cost Estimates

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*Walden University*

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# Walden University

College of Management and Technology

This is to certify that the doctoral study by

Kenneth G. Peters

has been found to be complete and satisfactory in all respects,  
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2018

Abstract

Strategies for Improving Contractors' Defense Acquisition Cost Estimates

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MBA, Walden University, 2008

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

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## Abstract

In 2015, private sector Department of Defense (DoD) contractors experienced decreasing profit margins by approximately 8% and an increase in estimated costs of approximately 250%. The purpose of this multicase study was to explore strategies used by business leaders of private sector contractors for DoD capacity-building projects to accurately estimate program costs to improve profitability. The target population for this study was business leaders of DoD capacity-building program contractors with successful experience improving cost-estimation processes and strategies in Southeast Asia and the former Soviet Union. The conceptual framework for this study was business process quality management with a supporting framework of game theory. The data collection process comprised semistructured virtual interviews and a review of government and corporate documents. The data analysis process consisted of compiling data, disassembling data, reassembling data into groups and themes, and interpreting data, including methodological triangulation. Through data analysis, 5 themes were identified: enhanced customer relationships, increasing ability to innovate, improved project awareness, acquisition policy and political environments, and identification of labor rates and pricing. The implications for social change include the potential for DoD private industry business leaders to develop business strategies that result in improved profitability, creating opportunities to increase local economic impact and wage scales for local employees, higher levels of employment, and increased local technical knowledge.

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## Dedication

I dedicate this study to my amazing wife Shari, who supported me through this journey and the long nights and weekends of work. I also dedicate this study to my little boys Liam and Landon who did their best at being patient and quiet while I studied. Lastly, to Jaxson who wasn't here for much of my doctoral study but who blessed us near the end of the journey. Any journey has hurdles and boundaries but the four of you have helped me overcome them.

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## Section 1: Foundation of the Study

History has shown the average cost overrun for a Department of Defense (DoD) contract will be approximately 40% (Christensen, 2015). With an increase in inaccurate cost estimates in DoD acquisitions, the DoD and private sector businesses require more accurate and realistic cost estimates (Christensen, 2015). Section 1 of this study includes the background of the problem, problem and purpose of the study, nature of the study, and conceptual framework. Furthermore, this section includes the research question, assumptions, limitations, and delimitations. Finally, the section closes with a review of academic literature related to this study.

### **Background of the Problem**

Increased lifecycle costs in DoD acquisitions are due, in large part, to complex acquisition processes and ineffective management of systems engineering and contracts (Levenson, 2014; Lipow & Plessner, 2011). The problems with rising costs in defense programs have driven the creation of an office to oversee the cost analysis of programs incurring a Nunn-McCurdy breach, where costs pass a predetermined threshold (Blickstein, Nemfakos, & Sollinger, 2013). Costs exceeding the Nunn-McCurdy threshold highlight the inaccuracy of initial costs estimates to the government and private industry. However, the highly complex and dynamic nature of defense projects make cost estimating difficult for government project managers and private industry (Cantwell, Sarkani, & Mazzuchi, 2013).

Rising costs of DoD acquisition are a challenge to business development for industry leaders as they struggle to maintain a competitive advantage with industry rivals.

Researchers conduct several studies to determine the cause of the cost increases and the impacts on private industry and business leaders (Blickstein et al., 2013; Harrison, 2012; Takano, Ishii, & Muraki, 2014). Researchers also study cost estimating methodologies to determine the most effective strategies for decreasing cost overruns, increasing the likelihood of success, and minimizing the impact on the commercial industry (Blickstein et al., 2013). The rising cost of DoD acquisitions coupled with difficulties maintaining a competitive advantage may create a private sector profitability challenge.

### **Problem Statement**

The DoD paid over \$274 billion to private sector defense contractors with contracts experiencing over 250% increase in estimated costs in 2015 (U.S. DoD, 2016). For the same year, 2015, defense contractors experienced decreases in profit margin of 8% and more than \$20 million per contract, primarily due to increased costs (U.S. Government Accountability Office [GAO], 2017b). The general business problem is that inaccurately estimated defense program costs contribute to lower profitability for some industry contractors. The specific business problem is that some business leaders of private sector contractors for DoD international capacity-building projects lack strategies to accurately estimate program costs to improve profitability.

### **Purpose Statement**

The purpose of this qualitative multicase study was to explore strategies used by business leaders of private sector contractors for DoD international capacity-building projects to accurately estimate program costs to improve profitability. Corporate business leaders of four distinct DoD international capacity-building program contractors

with successful experience with improving cost estimation processes and strategies were the target population for this study. The geographical locations of the programs were Southeast Asia and the former Soviet Union. The contribution to positive social change may be the potential for sustained or increased employment by defense contractors in local communities.

### **Nature of the Study**

The research method chosen for this study was qualitative. A researcher uses the qualitative method to explore the experiences of participants within a collectivistic setting (Øye, Sørensen, & Glasdam, 2016). Qualitative research was the ideal method for this study because I explored the experience of business leaders and their contributions to accurate cost estimation of DoD international capacity-building programs. A researcher applies the quantitative method to study the relationships among multiple variables and test hypotheses for truth (Gaskin, 2014). Examining relationships among variables by testing hypotheses was not the focus of this study. Mixed methods research is a combination of qualitative and quantitative research components (Turner, Cardinal, & Burton, 2017). Mixed methods research was not appropriate for this study because the study did not involve the use of statistical data.

The business problem warranted a multicase study as the research design. Researchers using the case study design to collect data and information about specific programs or processes (Dasgupta, 2015). With a multicase study research design, the researcher analyzes data from and across multiple situations or scenarios (Gustafsson, 2017). Case study design was appropriate because I explored the views and experiences

of multiple individuals at various offices and agencies. The phenomenological researcher explores the lived experiences of others to address the business problem (Yüksel & Yıldırım, 2015). Phenomenological design was not appropriate for this study because the lived experience of others would not answer the research question. A researcher applying narrative design explores participants' spoken stories or written accounts and occurrences (Adler et al., 2017). Narrative research was not appropriate for this study because stories were not a desired outcome of this study. Ethnographic design involves primarily sociological research, the direct observation of behaviors, and events associated with those behaviors (Jerolmack & Khan, 2014). A study of how people live did not support this study's research question and, therefore, was not appropriate.

### **Research Question**

The overarching research question was:

RQ: What strategies do business leaders of DoD international capacity building projects use to accurately estimate program costs to improve profitability?

### **Interview Questions**

1. What is your role and involvement in the cost estimating process and the assessment of its influence on corporate profitability?
2. What challenges has your business faced in developing accurate cost estimates?
3. What strategies or internal best practices to address your challenges with developing accurate cost estimates have worked for you, and why?

4. What strategies or internal best practices to address your challenges with developing accurate costs estimates have not worked for you?
5. Why did the strategies or internal best practices to address your challenges with developing accurate cost estimates work or not work?
6. What were the key barriers to implementing your successful strategies for developing accurate cost estimates?
7. How did you address the key barriers to implementing your successful strategies for developing accurate cost estimates?
8. How did you assess the effectiveness of your strategies for developing accurate cost estimates?
9. How do you assess the impact of your relationship with DoD counterparts on the development of accurate cost estimates?
10. What additional information would you like to share about the strategies you have used to develop accurate cost estimates to improve corporate profitability?

### **Conceptual Framework**

The conceptual framework for this study was business process quality management (BPQM). As early as 1911, Frederick Taylor introduced the fundamental concepts of BPQM, including operational efficiency and minimized costs to increase profit (Lusk, Paley, & Spanyi, 2005). A critical element of BPQM is the understanding of business processes and strategies to maximize quality, minimize waste, and align processes' capabilities with requirements of customers and clients (Reijers, Mendling,

Recker, 2010). Business leaders implementing business process management use the behavior of individuals and systems to understand the behavior of the full system process (Chang, Srirama, & Buyya, 2017). BPQM provided a framework to study the individual behavior, systems, efficiency, and processes behind the strategies for improving the accuracy of cost estimates. The complex relationship between the U.S. Government and private industry, with its unique cost estimating processes and strategies, make BPQM an appropriate conceptual framework for this study.

With BPQM as an overarching framework, game theory aided in the understanding of relationships and interactions between stakeholders. Game theory uses the relationships and rationale of decision makers to understand the potential outcome, or the winner of the game (von Neumann, 1928). Game theory uses interactions, decisions, conflict, and cooperation to determine the reasons for decisions and the outcomes (Martínez-Martínez, 2014). The use of game theory as a supplemental framework enabled me to expand on understanding the decisions and interactions among stakeholders and how the interactions influence cost estimates and corporate profitability.

### **Operational Definitions**

*Defense acquisition industry:* The procurement of goods or service by the United States Government from contractors, including security, aircraft, commercial off-the-shelf items, and weapons systems (Shaffer & Snider, 2014).

*Defense contractor:* Company providing goods or services to the U.S. Government DoD through contracting avenues (Wang & San Miguel, 2012).

*Earned value management*: A method of determining the amount of work currently completed and the forecasted cost of a project at completion, based on the value of the work to be completed (Caron, Ruggeri, & Merli, 2013).

*Independent government cost estimate (IGCE)*: A detailed cost estimate completed by the government to evaluate contractor bids and cost estimates while determining which bid is the best value for the government (McBride & Paret, 2010).

### **Assumptions, Limitations, and Delimitations**

#### **Assumptions**

Assumptions in a research study are aspects that cannot be confirmed as fact (Leedy & Ormrod, 2015). A common assumption in qualitative research is participants in the study will answer the interview questions truthfully and to the best of their knowledge. For this study, I assumed that participants would provide answers representative of the experiences of other individuals with similar responsibilities within their organization. Upon completion of data collection and analysis, findings indicated this assumption was accurate. All literature reviewed, interviews conducted, and data collected and analyzed showed the experiences of the individuals interviewed for this study were representative of others' experiences.

#### **Limitations**

Limitations are as those characteristics over which the researcher has no control, which may influence or challenge the validity of the results of a given study (Leedy & Ormrod, 2015). Restrictions on company data and confidentiality of information limited access to some managers as well as access to cost estimation documents and data. The

resulting small sample size may have had undesirable impacts on the study including the inability to generalize the data across a larger population (Tipton, Hallberg, Hedges & Chan, 2017). The business leaders interviewed for this study were employed by companies with readily available cost estimation documents, data, and information, reducing the significance this limitation. As an active duty service member, I may have had bias regarding government cost estimates and influenced the willingness of participants to answer interview questions openly and honestly. I minimized this limitation during data collection by providing a clear introduction to all participants about the nature of the study and my role as the researcher, helping ensure I received open and honest answers to interview questions. The limitations of this study provide areas for future researchers to expand upon the results of the study.

### **Delimitations**

The researcher determines intentional boundaries, or delimitations, framing the study (Bartoska & Subrt, 2012; Guni, 2012). The first delimitation was the study only considered cost estimating strategies within the defense market. There was no comparison with other markets and no data collected from other industries. The second delimitation was that the study population consisted of international defense contractors. The resulting interviews and data collection may not be relevant to domestic projects because the data were for international projects. The third delimitation was the study did not explore issues with IGCE. While the IGCE may influence DoD acquisition, independent government estimates are not a business problem and were not a focus of this study. These delimitations did not impact the results of this study; however, the

delimitations provide areas for potential future research identified in Section 3 of this study.

### **Significance of the Study**

The low-cost bids required of businesses in the consolidated defense market have caused performance delays and overall project cost increases (Meier, 2010). The findings of this research may benefit private industry business leaders and government procurement experts by identifying strategies and processes used to estimate program costs more accurately and improve corporate profitability. Accurate estimates may lead to a decrease in performance delays and overall project costs, positively contributing to business practice and social change.

### **Contribution to Business Practice**

Findings from the study may help industry experts to better understand the influences of their decision-making and collaboration with government procurement experts on the development of accurate procurement cost estimates. On average, the DoD generates approximately 19% of the revenue for companies specializing in DoD contracts (Wang, 2014). Due to the significant revenue generated by DoD contracts, the findings of this study may also generate an increase in corporate growth and profit rates driven by more accurate cost estimates.

### **Contribution to Positive Social Change**

Positive social change may come as the result of improved economic conditions in local communities supported by defense contracts because accurate cost estimates contribute to profit and investment in employment. Spending in the DoD assists local

communities due to the large volume of employment opportunities, the use of private sector equipment and supplies, and the expenditure of military and civilian wages on local goods (National Conference of State Legislatures, 2017). More accurate cost estimates will increase corporate profit margins, resulting in sustained or increased employment by major defense contractors and improved economic conditions within local communities where defense projects are implemented.

### **A Review of the Professional and Academic Literature**

This section is a review of the professional and academic literature on the conceptual framework and research related to the topic of this study. The Walden University Library and Google Scholar were the primary sources used to identify peer-reviewed and published literature, government reports, books, dissertations, and doctoral studies relevant to the research question. The online databases in the Walden University Library searched included Academic Search Complete, Business Source Complete, Emerald Insight, SAGE Journals, ScienceDirect, and Thoreau Multi-Disciplinary Search. The key search terms used in this literature review included *business process quality management, business process management, game theory, government acquisitions, cost estimating, corporate profit, acquisition trends, and contract competition*. The theories of BPQM and game theory drove the discussion of the literature review.

The literature review consisted of 149 sources of which 135 (90.60%) of the publications were between 2014 and 2018 and 139 (93.29%) of the publications were peer reviewed. Additionally, I synthesized, through this literature review, data and information found in government reports from the DoD and the GAO. The government

reports provided supplemental information to the peer-reviewed journals, books, and periodicals also synthesized as part of the literature review. The government reports and scholarly sources in the literature review provided an in-depth inquiry of the topics relating to the research question and enabled a synthesis of academic and government literature.

### **Business Process Quality Management**

The early stage of the study of process management, beginning with Frederick Taylor in the late 1800s and early 1900s, led to the development of Business Process Management (BPM) and eventually BPQM (Grzibowska & Islam, 2011). Frederick Taylor theorized the basic concepts of BPQM as early as 1911 by identifying the importance of, and relationship between, operational and business management efficiency, minimized costs, and increased profit (Lusk et al., 2005). The transition of process management theory from Frederick Taylor's of scientific management to Total Quality Management (TQM) and Six Sigma during the 1980s and Lean Six Sigma in the 1990s generated the need for more in-depth process and quality management methodologies such as BPM and BPQM (Grzibowska & Islam, 2011). BPQM is a derivative of BPM and the predecessor methodologies with an increasing focus on quality management (Lohrman, 2015). Understanding the history of BPQM aids in understanding why BPQM is the conceptual framework for this study.

One of the first iterations of BPQM is TQM (Lohrman, 2015). The production and provision of quality goods and services while improving company performance based on customer expectations is a primary focus of TQM (Schachter, 2017). First

developed in the 1950s and becoming prevalent in the 1980s, TQM is unique because it was the first BPM methodology to involve stakeholders, specifically customers, in performance improvement (Schacter, 2017). Shahmohammadi (2017) presented an example of process improvement using TQM in teacher job performance. TQM methods concentrating on process improvement, process design, stakeholder participation, and customer-focused behaviors has been shown statistically to improve teacher job performance in Iran (Shahmohammadi, 2017). In addition to process improvement, TQM methods also aid in the competitiveness of industries (Wang, 2017). The management of goods and services in Chinese department store using a TQM methodology increased value to the customer in targeted markets and enhanced the competitiveness of Chinese department stores as an industry (Wang, 2017). TQM is also a proven methodology for the improvement of innovations and learning within an organization; however, it may not always improve employee and organizational performance (Al-Dhaafri & Al-Swidi, 2017).

The Six Sigma and Lean Six Sigma methodologies for business process management are examples of the historical development of TQM (Lohrman, 2015). The use of process improvement techniques such as Lean Six Sigma, made popular by Toyota, has become increasingly prevalent over the past 30 years (Antony, Snee, & Hoerl, 2016). The foundation for Six Sigma and Lean Six Sigma is the TQM approach to process improvement (Antony et al., 2016). The blend of Six Sigma process improvement with lean manufacturing methods drove the innovation of Lean Six Sigma to match an improvement strategy with a specific problem or process requiring

improvement (Antony et al., 2016). The reduction and elimination of unneeded processes in the global supply chain management industry improves the global supply chain production and distribution activities by optimizing processes and reducing defects and waste (Jayaram, 2016). Lean Six Sigma process improvement in children's hospital waiting rooms led to a decrease in surgical turnaround time from 81.5 minutes to 71 minutes by improving process design and operating room efficiency (Tagge, Thirumoorthi, Lenart, Garberoglio, & Mitchell, 2017).

As TQM, Six Sigma, and Lean Six Sigma progressed, BPM became a more well-known and well used process and quality improvement methodology (Lohrman, 2015). In recent decades, corporations began a transition from focusing solely on eliminating waste and process improvement to business process optimization using BPM (Delias, 2017). BPM, and eventually BPQM, highlight the need for continual transformation and improvement of business processes (Lusk et al., 2005). BPQM is the study of operational efficiency, reduced costs, and increased profit (Lusk et al., 2005). Through management of corporate processes and strategies, the three primary outcomes of effective business process management are clear strategic direction, resource alignment, and operational discipline (Rock & Dwyer, 2016). Embedding quality management and knowledge management into business processes to increase process efficiencies and reduce process waste are tenets of the BPQM theory (Massingham & Al Holaibi, 2017). Businesses implementing BPM and specifically BPQM align processes, activities, and customer and client goals to attain organizational objectives in the most efficient manner (Alotaibi & Liu, 2017). BPQM processes are aimed to enhance performance of a corporation by

managing the entirety of business management processes (Yu, Wang, Su, & Huang, 2016). By enhancing the performance of a corporation through the management of business processes, businesses become more efficient, cost effective, and profitable (Yu et al., 2016; Kasim, Haracic, & Haracic, 2018). Companies dedicating more resources to BPQM can not only improve efficiency but also improve their market competitiveness (Kasim et al., 2018).

The key tenets of BPQM allow the use of BPQM throughout several industries. For example, BPQM software allows for the quality control, improved quality management processes, and enhanced quality of work output at the University of Split School of Medicine in Croatia (Sapunar, Grkovic, Luksic, & Marusic, 2016). Furthering the use of BPQM in the medical industry, Andellini et al. (2017) identified business process management technologies and processes suitable for use with pediatric kidney transplantation, specifically for assisting personnel with increasing time and resource management efficiency. Business leaders may use BPQM systems to manage the Internet of Things, or the vast amount of interconnected smart devices in the logistics, manufacturing, home automation, and computing domains to understand how to efficiently manage and optimize the system resources and management processes (Chang et al., 2017). By adding social and cultural aspects to typical BPQM, business leaders can more effectively control process changes while optimizing resources and desired output in information technology systems (Vukšić, Vugec, & Lovrić, 2017).

Business leaders also use BPQM for the real time monitoring of business processes. Using a BPQM approach, business leaders can analyze events throughout the

execution of a business process to monitor constraints and goal achievement (Maggi, di Francescomarino, Dumas, & Ghidini, 2014). The ability to constantly monitor business process execution enables real time monitoring of activities, to predict and prevent anomalies in the process, and to ensure effective quality in the output product (Maggi et al., 2014). Businesses predictively monitor the multimodal logistical supply chain using smart logistics through a BPQM process enabling more efficient business strategy and process modeling (Cabanilla, Di Ciccio, Mendling, & Baumgrass, 2014). Tax, Verenich, La Rosa, and Dumas (2017) used BPQM to predict processes associated with long short-term memory neural network systems. In addition, Giacosa, Mazzoleni, and Usai (2018) found companies utilizing sound BPQM processes are capable of monitoring, analyzing, and acclimatizing their company to real-time change. The multiple uses of BPQM throughout numerous industries highlight the importance of corporations utilizing business process management.

### **Game Theory**

The basic principle of game theory is the study of relationships between two or more players of a game where rational decisions by the players influence the outcome of the game (von Neumann, 1928). The relationships between private sector business leaders, defense program managers, private industry cost estimates, and corporate profitability make game theory an appropriate and complementary conceptual framework for this study because game theory enables the researcher to explore how the decisions of two or more entities influence outcomes. Within the concept of game theory, each player of the game is incentivized to make decisions multilaterally with other players to ensure

the ideal outcome of the game (Riedel, 2017). Researchers applying game theory assume players will be consistent in their decisions and preferences and that the behavior of an individual explains the complex relationships of multiple individuals (Samuelson, 2016).

Decisions and interactions between stakeholders, such as corporate business leaders, customers, and DoD leaders, will influence cost estimates and, therefore, corporate profitability. Researchers may use game theory to understand the interactions of stakeholders in a complex project environment, especially where there are increased variables, equations, and inequalities (Cristóba, 2014). Through the lens of game theory, interactions and decisions made over time will continually influence all future interactions and decisions (Leoni, 2014). The role of various players, their interactions, and decisions will influence the outcome of each situation, such as the interactions in a chess match (Daye, 2012).

The interactions of stakeholders in a multifaceted defense contract influence the price, schedule, and performance of the project. Public-private partnerships are often the basis for defense contracts. Javed, Lam, and Chan (2014) simulated four separate scenarios covering various management strategies in which a public-private partnership shared additional life-cycle costs based on strategy alterations through change management. Researchers use game theory to explore the relationships between the public and private sector and how their interactions may influence program life-cycle costs (Javed et al., 2014).

Researchers can also use game theory to explore risk-sharing impacts in early budget estimation. Using a game theory approach, Gavius, Greenberg, Hammerman,

and Segev (2014) applied a risk-sharing model to produce better cost estimates, increase payer reimbursements, and create budget surplus for prescription drug companies in Israel. To improve early cost estimation, researchers use game theory for the development of a risk-sharing model resulting in both players of the “game” adjusting budget estimates towards a middle ground (Gavious et al., 2014). Game theory also applies to the effects of competition on contractor pricing. Game theory models show that defense contractors may find incentive to bid higher and increase overall costs based on the structure of competition (Harrison, 2012). While some competition may reduce costs, game theory model highlights potential scenarios where competition may increase costs. The approach to developing a risk-sharing model and incentivized higher bids using game theory may also be applicable to early programmatic budget estimates because of the similarities in interactions and decisions of various system stakeholders.

An important aspect of cost estimation and overall government-contractor interactions is defense resource allocation. Game theory can model a unique relationship for defense resource allocation. Defining a game as the interactions between decision makers guided by specific interests and consciousness, the game theory concept supports understanding of emerging phenomena of decision maker interaction (Nedelcu, 2014). Using a game theory model, Nedelcu (2014) allocated defense resources to projects to achieve the best defense-related response to a crisis event, highlighting the importance of interactions between decision makers, resource managers, and project stakeholders.

A common application of game theory is in the field of economics. Through the application of game theory, Dedov (2015) found a correlation between human interactions and psychology with economic behavior where the instability in human interactions and decisions can lead to economic calamities. Expanding upon the impact of human behavior in economics, Chen, Yu, and Su (2014) formulated a game theory model identifying that the relationships between local governments in the Hercynian economic zone leads to maximum economic impacts and cooperation. An additional use of game theory in regional economics is in the analysis of the regional economic decisions such as household locations, transportation, regional infrastructure, communication, economic policy, and labor markets (Mota, Silva, & Grilo, 2015). Using game theory, Mota et al. (2015) showed decisions and processes from macro- and microeconomic standpoints influence the overall economic features of a region. Furthermore, Lazaroiu, Dumbrava, Costoia, and Roscia (2017) applied game theory to demonstrate economic efficiency through a supplier and consumer relationship in the utilities industry. In a similar fashion, the principles of game theory aided in the identification of how local public facilities, such as utilities, are more efficient when the government prioritizes public needs (Gauteplass & Hopland, 2017). On a broader scale, Xu and Wang (2018) identified the need to use game theory for economic global stability and global dynamics. Jožičić, Kostelić, and Škare (2018) used game theory with a global and international perspective by tying the tenets of game theory to the benefits and consequences of the Croatian Fiscalization Law as it pertained to businesses and tax evasion.

Frameworks and theories like game theory illustrate similar thoughts on interactions and decisions amongst game players. The Nash equilibrium theory provides an understanding of human interactions and commonly predicts rush hour traffic patterns (Fudenberg & Levin, 2016). Menshikov, Shklover, Babkina, and Myagkov (2017) showed the Nash equilibrium theory is ideal for exploring situations involving social behaviors such as the Prisoner's dilemma. The Prisoner's dilemma considers two participants with two competing strategies, competition for a small gain or defection for a large gain. The Nash equilibrium theory postulates the two participants in the Prisoner's dilemma will compete but eventually attempt establishing cooperation for smaller gain (Menshikov et al., 2017).

Agent-based modeling may have comparable results as game theory; however, the agent-based modeling theory uses descriptive modeling and analysis to model the behaviors of individuals of the experiment (Wang et al., 2016). For example, Darabi and Mansouri (2017) studied complex network systems such as the U.S. Air Transportation Network and used agent-based modeling to describe the interconnected nature of the air transportation industry. The agent-based model connects the economic behavior of the system to the physical structure of the system (Darabi & Mansouri, 2017). In contrast to game theory, Rass, Konig, and Schauer (2017) introduced a theory that allows the researcher to understand the full uncertainty of a situation and leave no variables undetermined. Rass et al.'s modification to game theory expands upon game theory based on advanced persistent threats and ensures studies explore all interactions and uncertainties (Rass et al., 2017). While several theories were applicable to this study,

game theory provides the most comprehensive conceptual framework to explore this study's business problem under the framework of BPQM. For example, program managers use the concepts of BPQM and game theory to develop cost estimating techniques leading to a cheaper and more effective cost estimating process as well as more predictable long-term costs (Goswami, Pratap, & Kumar, 2016; Young Hoon, Rudy, & Frank, 2008).

### **Trends in Department of Defense Acquisitions**

The DoD uses more than one third of its budget, more than \$150 billion per year since 2005, to purchase materials, systems, and services (Undersecretary of Defense, Comptroller, 2014). With the numerous and complex systems provided by the defense market, it is imperative to ensure the government and business leaders update and reform the acquisition process to meet market demands. DoD acquisitions have been in constant flux for nearly 10 years and is highlighted in the 2018 National Defense Strategy and the National Defense Authorization Act (Greico, 2018). To improve defense acquisitions, the acquisition workforce has undergone improvements beginning with the Defense Acquisition Workforce Improvement Act (DAWIA) of 1990, followed by numerous subsequent DAWIAs (Eckerd & Snider, 2017). The trends in the National Defense Strategy, National Defense Authorization Act, and DAWIA show the criticality in improving DoD acquisitions and cost estimating processes (Eckerd & Snider, 2017; Greico, 2018).

While DAWIA is focused primarily on the acquisition workforce and program managers, other areas have undergone acquisition reform. The cost of DoD acquisitions

and major weapon systems has been increasing for several years and is an issue for the Pentagon, generating the constant desire for reform (Lipow & Plessner, 2011).

Acquisition and procurement costs may be the cause of high-priced innovations, decreased production, and increased unit costs of major weapons systems. Innovations, production, and unit cost influence the operations of large defense businesses, and thus reform associated with these areas has a unique impact on defense businesses. Over the past 30 years, incentives, standardization, and innovation have been at the forefront of policy decisions and acquisition reform in the DoD (Eckerd & Snider, 2017). However, even with the reforms of the 1990s and 2000s, the GAO (2014, 2015) identified that the policy reforms to acquisitions have not been effective.

Low production runs of major weapons systems create increased unit costs and production costs for defense suppliers (Lipow & Plessner, 2011). Large cost overruns can create Nunn-McCurdy breaches with defense acquisitions. Under a Nunn-McCurdy breach, the Secretary of Defense notifies Congress when an acquisition's cost increases by 15% and terminates when the cost increases by 25% (Blickstein et al., 2013). These Nunn-McCurdy breaches, along with other cost overrun examples such as the U.S. Army's Advanced Attack Helicopter, have generated acquisition reform specifically aimed to reduce cost growth and schedule delays (Lassman, 2013).

As DoD acquisition programs become more technically complex, the risk of variation in acquisition cost increases (Gideon, 2017). An increase in technical complexity of acquisition programs increases the risk of variation in technology and programmatic costs increases (Gallop, 2015). Acquisition programs in the 21st century

will continue to trend towards increasing complexity with the addition of the cyber and space domains to the DoD portfolio. The trend towards a space domain and a space force within the DoD requires acquisition portfolios and force development experts to build upon current acquisition structure and examine areas for improvement in DoD acquisitions (Overton, 2015). This trend further enhances the importance of understanding both technical and cost risks as they relate to DoD acquisitions.

### **Cost Estimating Techniques**

Inaccuracies in cost estimating techniques within the defense industry further increase the potential for cost overruns and threaten the success of the project (Levenson, 2014). It is critical for companies to formulate cost estimating methodologies based on commercial production and commercial production practices to minimize inaccuracies in cost estimates (Blickstein et al., 2013). To minimize process inefficiencies in both acquisitions and cost estimating, as well as reduce overall acquisition costs, the DoD has implemented a Should Cost program where cost estimates are only a baseline and the basis for obligating government funds (Husband, 2014). In addition to Should Cost, probabilistic cost estimates eliminate cost and performance inefficiencies while increasing the level of realism in cost estimates (Dorey, Oehmen, & Valerdi, 2012). Chao and Kuo (2016) used a probabilistic cost estimating model to predict overhead and mark-up rates for construction projects with inputs of direct cost, duration of work, type of work, and location of work. In addition, probabilistic cost estimates provide an avenue for estimating total ownership cost for consumable and economic items such as standard, hybrid, and electric vehicle usage in Italy (Danielis, Giansoldati, & Rotaris, 2018). While

should cost estimates and probabilistic cost estimates are popular strategies many industries use other strategies for cost estimation. The plethora of cost estimating techniques forms a difficult avenue for defense contractors to navigate.

The four cost estimating techniques used for acquisition contracts are analogy, parametric, engineering, and actual costs (“Cost Estimating Methods”, 2018). The individual responsible for developing the cost estimate is responsible for determining the most appropriate estimation technique (DoD, 2015). An analogous cost estimate compares previous projects with the current project and focuses on the estimation of what will occur based on what has previously occurred in other similar projects (Schwabe, Shehab, & Erkoyunca, 2016). Shanker, Jaya, and Thanushkodi (2015) utilize an analogy-based estimating approach for software cost estimation and the development of new software, software reliability, and the productivity of software programmers. Cost estimators typically use more complex estimation techniques as more current and relevant data becomes available (Schwabe et al., 2016). The cost estimator researches the relevant and comparable cost drivers and bases the estimate on this comparison leading to an analogous cost estimate.

Analogous cost estimating considers previous projects and systems while parametric cost estimating offers a more mathematically detailed cost estimate through parametric equations. Through various forms of regression analysis, a parametric cost estimate offers highly accurate life cycle cost analysis (Swei, Gregory, & Kirchain, 2017). Salam and Bhuiyan (2016) found parametric cost estimating model accurately estimates the design of compressor fans in the \$20 billion Canadian aerospace industry.

Unfortunately, this accuracy relies heavily on the factors input into the mathematical equations, which are often difficult to quantify (Swei et al., 2017). The initial analogous cost estimate is a major contributor to the final life cycle cost estimate and skewed initial data within the analogy estimate can cause inaccuracies in the full life cycle cost estimate (Bebu, Luta, Mathew, Kennedy, & Agan, 2016).

The engineering estimating technique is a mathematic and detailed version of cost estimation attempting to build program cost from the lowest level or component up to the full system (“Cost Estimating”, 2018). A variety of knowledge-based engineering techniques and estimates determine the lowest level component cost before developing the system level cost estimate (Zhao, Verhagen, & Curran, 2015). This technique provides a highly detailed cost estimate with traceability to the component level; however, the estimate does not necessarily consider all the component interactions. Furthermore, it would be difficult to know the detailed component costs without extensive and costly research. Several industries use the engineering methodology to accurately estimate and manage investment and production costs (Didkovskaya, Mamayeva, & Ilyina, 2016). The construction industry experiences extreme cost overruns and implements an engineering-based estimation technique to evaluate construction and engineering costs (Alhassan, 2017). A lack of cost estimating experience, late estimator interactions, unreliable cost data, and inaccurate project schedules are common factors impacting cost estimates developed with the engineering estimating technique in the construction industry (Alhassan, 2017).

When a program is far enough along in its life cycle and an engineering cost estimate is overly cumbersome, an actual cost estimate may be useful. An actual cost estimate uses current program costs and is accurate only when the estimate extrapolates current costs over the entire program (GAO, 2017b). The actual cost estimate technique, while often the most accurate, is difficult to implement due to the lack of actual cost data, which is relevant and accurate (GAO, 2017b). For example, many international road construction projects use the actual cost estimating technique leading to the average cost overrun in international road construction projects of 135% (Chong & Hopkins, 2016). The actual cost estimating technique is sensitive to cost variability and requires accurate input data; therefore, it is difficult to utilize, especially in the road construction industry (Chong & Hopkins, 2016).

### **Impacts of Competition in Department of Defense Acquisition**

Consumer markets experience reduced costs and increased innovation with competition; however, competition within the defense market does not consistently translate to reduced costs and innovation (Levenson, 2014). The perception of a small market with limited competition in the defense industry can drive costs higher and reduce potential innovation (Levenson, 2014). Competition may benefit new entrants into the defense market because of the opportunity for new entrants to provide optimistic cost estimates compared to accurate cost estimates of the lower cost incumbent contract (Levenson, 2014). Furthermore, awarding contracts without the use of full and open competition will impact the level of intellectual property associated with the program. The lack of intellectual property rights, through diminished competition, cost the DoD

approximately \$6 billion between fiscal years 2008 and 2015 (Berardi, Cameron, & Crawley, 2017).

The risks of competition, stemming from inaccurate cost estimates, increase when the acquisitions are major programs spanning ten or more years and more than \$100 million (Dobriansky, 2010). These acquisitions experience risks in cost, schedule, scope, and performance and the potential inaccurate costs estimates weigh heavily on competition in a dwindling major defense market (Dobriansky, 2010). The competition created by major defense programs fosters efficient industry performance and may reduce overall cost (Wylder, Chang, & Schultz, 2013). This contrasts with work completed by Levenson (2014), which shows competition may not reduce overall costs. The lack of agreement on this topic shows combining inaccurate cost estimates with competitive contracts has wide-ranging impacts on industry cost performance.

In a broader sense, competition has impacts on numerous markets and economies. An increase in market competition may press firms to produce or acquire less information and capital investments leading to market inefficiencies (Stoughton, Kit, & Long, 2017). An increase in market competition can lead to overall market investment inefficiencies, especially when there are large numbers of competitors in a weak industry (Stoughton et al., 2017). Conversely, an increase in international market competition coupled with the enhancement of export products will improve international import and export markets (Song & Wang, 2017). It is also possible to reduce or eliminate potential competition by through cost sharing contracts which are mutually beneficial to all parties (Zhou, Guo, & Zhou, 2018). Furthering the concept of market competition, Wang and Mogi (2017)

found a correlation between market competition, expenditures, and product quality within the Japanese utility industry. As market competition and corporate deregulation increase, expenditures decrease and product quality increase (Wang & Mogi, 2017).

### **Fiscal Stewardship and Responsibility**

According to GAO (2007), fiscal stewardship is the enhancement of financial and budgetary transparency, enactment and betterment of budget controls, and program and activity oversight. Prewitt (2014) identified the key priorities of a fiscally responsible corporations as a sustained ability to reduce costs, protection of financial margins, and increased growth. Enhancing fiscal stewardship and responsibility creates a positive influence on corporate financial estimating and forecasting (Carabotta, Paluzie, & Ramos, 2017). Fiscal responsibility within a corporation will not only increase the rate of economic growth but also increase the ability of corporations to turn profits into real capital investment (Hubbard, 2017).

While corporations have an increasing need to improve fiscal stewardship, it is imperative for business leaders to consider the government's fiscal responsibility when interacting with government officials through contracts (Gavriluta, 2017). Fiscal legislation in India improves business revenue, reduces fiscal deficits, and improves the ability of corporations to monitor fiscal compliance (Badaik, 2017). Conversely, some nations do not see fiscal improvement due to an increase in fiscal responsibility regulations. Italian regulations and increased fiscal policies have not improved the fiscal process for government and public forecasters (Carabotta et al., 2017). Brazilian researchers do not find a correlation between the Brazilian Fiscal Responsibility Act and

an improvement in the fiscal environment (de Medeiros, de Albuquerque, de Souza, & Wanderley Tavares, 2017). Specifically, within the health care industry, financial stewardship and fiscal environment do not improve with an increase in Brazilian fiscal responsibility regulations (de Medeiros et al., 2017). Additionally, fiscal responsibility improvements in Romania often fail to improve the economic and fiscal conditions of the nation (Ciumara, 2016).

Fiscal stewardship and responsibility are especially unique in the defense industry. As early as 1980, cost growth and a lack of fiscal stewardship and responsibility was a concern within the defense industry (Jordan, 2015). Increasing fiscal stewardship is critical because it creates better forecast accuracy and, therefore, a more capable product (Jordan, 2015). Fiscal stewardship within the U.S. Government is also mutually beneficial to the defense sector for several reasons (Hensel, 2016). More stable funding sources will create a stable, or potentially increasing, demand for defense sector businesses (Hensel, 2016). Furthermore, government fiscal stewardship will prevent the elimination of large defense programs ensuring stable income for the defense sector (Hensel, 2016).

Numerous acts and legislation initiatives within the U.S. Government require fiscal stewardship and responsibility and appropriate accounting standards for both public and private firms. Repealing the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982, the Bipartisan Budget Act of 2015 holds large corporations and partnerships responsible for their financial and tax auditing processes (Pilato, 2016). The TEFRA of 1982 and Bipartisan Budget Act of 2015 mandate corporations and partnerships to pay

taxes and penalties as required and are the basis for future fiscal stewardship and responsibility legislation (August, 2016). The Sarbanes-Oxley Act of 2002 is the result of several corporate financial scandals of the early 2000s (Kecskes, 2016). Corporations, especially the information technology sector, became excessively profitable in the 1990s and, when coupled with increasing consumer confidence, corporate business leaders began maximizing corporate profits with inaccurate or misleading financial statements (Kecskes, 2016). As a means to protect investors, the Sarbanes-Oxley Act ensures corporations accurately report reliable financial data and are legally penalized if they conduct inappropriate fiscal stewardship and fiscal responsibility practices (Kecskes, 2016). Implementing the regulations of the Sarbanes-Oxley Act is more difficult and costly for smaller companies because larger companies committed the crimes creating the Act (Kecskes, 2017). The result of more efficient and transparent fiscal stewards and responsibility initiatives drive the current cost, benefit, and profit environment.

### **Cost, Benefit, and Profit Environment**

One of the main drivers of corporate costs, benefits, and financial performance is corporate social responsibility (CSR). Companies utilizing CSR can positively impact financial performance and fiscal responsibility (Remund & McKeever, 2018). Depending on the level of competition within an industry, CSR can have a positive or negative affect on financial performance (Kwang-Ho, MinChung, & Cuili, 2018; Remund & McKeever, 2018). Industries with more competition will improve financial performance with effective CSR metrics (Kwang-Ho et al., 2018). Business leaders implementing CSR initiatives in their decision-making processes and strategies improve

overall corporate financial performance (Andonov, Mihajloski, Davitkovska, & Majovski, 2015). While many firms experience an improvement in financial performance using CSR, the implementation of CSR can also disrupt normal business operations and potentially threaten profits (Phillips, Harvey, & Bosco, 2015).

Global industries and markets face competing environments and strive for mutually acceptable cost, benefits, and profits. The implementation of CSR in Indian banks improves financial performance when measured through profit after tax, return on assets, return on equity, and market capitalization (Geetika & Shukla, 2017). A survey of Spanish firms shows 78% of the companies believe CSR can reduce operating costs and 76% believe CSR will improve operating income opportunities (Madorran & Garcia, 2016). A quantitative analysis of cement industry firms in Pakistan shows a positive relationship between CSR and financial performance (Kakakhel, Ilyas, Iqbal, & Afeef, 2015). The Pakistan cement industry focuses heavily on CSR aspects such as societal wellbeing and the environment while protecting and enhancing the long term monetary objectives of the company (Rehman, Balock, & Sethi, 2015).

The current cost, benefit, and profit environment of private companies is also focusing on the use of cost-benefit analyses. A cost-benefit analysis is a systematic method of assigning values to costs and benefits to determine if a business or project is valuable or profitable (Watkins, 2018). A cost-benefit analysis for a global environmental cleaning program at hospitals quantifies the value of the program by identifying more than a \$5 million decrease in hospital costs (Everett, Stitton, & Wilson, 2017). A cost-benefit analysis proves the New York Cross-Bronx Expressway is

profitable by identifying cost savings in more than 84% of analysis simulations as well as decreased costs to society in the long term (Sooyoung, Zafari, Bellanger, & Muennig, 2018). Australia mandates the use of cost-benefit analysis to determine to value of costs and benefits for corporate decision making in the private sector (Argyrous, 2017).

While CSR activities and cost-benefit analysis impact corporate profits, economic growth may have a more direct relationship with corporate profits. Profits and economic growth are closely related because economic growth may lead to increasing profits while higher profits may also contribute to some level of economic growth (Thompson, 2018). Efficiency of banking operations and financial institutions in Bangladesh is a significant contributor to long-term economic growth in the country (Rahman, 2017). Similarly, declining corporate profits and a slowing rate of profit growth was a leading contributor to weakening economic growth and recession in the U.S. in 2007-2009 and 2015 (Namvar, 2016). Future corporate profit rate fluctuations are predictable based upon the expected long term economic growth rates of the U.S. and China (Minqi, 2016). An expectation for future economic growth sluggishness may predict a subsequent stagnation of corporate profits (Minqi, 2016).

The predictability of corporate profits within the realm of economic growth highlights the criticality of understanding the current financial environment of corporations. There are numerous factors influencing the current financial environment and profitability of corporations. Combining a value-based pricing strategy with higher price levels increases corporate profitability while low price levels will negatively impact profitability (De Toni, Milan, Saciloto, & Larentis, 2017). A leading indicator of

profitability beyond price levels are working capital levels (Madhou, Moosa, & Ramiah, 2015). Madhou et al. (2015) find a positive correlation between profitability and accounts receivable and a negative correlation between profitability and accounts payable where accounts payable and receivable make up the working capital of a corporation. Similarly, larger companies with longer cash stores and more available working capital are significantly more profitable than smaller firms or those companies with less working capital (Shrivastava, Kumar, & Kumar, 2017).

The current cost, benefit, and profit environment for corporations is complex and involves many variables. Corporate social responsibility, cost-benefit analysis, economic growth indicators, value-based pricing, and working capital levels influence corporate profitability (Argyrous, 2017; De Toni et al., 2017; Madhou et al., 2015; Rehman et al., 2015; Thompson, 2018). The linkage between CSR and corporate profitability creates a negative or positive financial impact depending upon the effectiveness of CSR activities (Kwang-Ho et al., 2018)

### **Causes and Impacts of Cost Overruns on Businesses**

Global industries and markets face competing environments and strive for mutually acceptable cost, benefits, and profits. Many industries target a reduction in cost and schedule overruns to lower prices, increase the quality and benefits of products, reduce the cost of new projects, and potentially increase profitability (Al-keim, 2017). The reasons for cost overruns are numerous and widely understood; however, cost overruns remain. Ineffective project management is a proven, leading cause of cost overruns (Adam, Josephson, & Lindahl, 2017). Utilizing industry-wide heuristics in

project management may aid in the reduction in cost overruns; however, the use of heuristics requires an improvement in the knowledge and experience of public and private project managers (Cole, 2015). Additionally, experienced project managers often change employment during projects spanning multiple years causing a lack of management continuity (Bruggen & Luft, 2016). Lack of project management continuity causes an understatement of cost estimates from the previous regime and eventual cost overruns (Bruggen & Luft, 2016). Vitharana, Zahedi, and Jain (2016) identified a need for improvement in the requirement elicitation process because inaccuracies in system-level requirements drive cost overruns and project delays. Improving the early step of requirements elicitation will drive the overall system level requirements and, thus, fewer project cost overruns (Vitharana et al., 2016).

Additional causes of industry cost overruns is a lack of defined requirements or inaccurately defined requirements and inaccurate cost estimates (Markgraf, 2018; Rosenfeld, 2014). Employing immature technologies requires the generation of aggressive new requirements to counter the effects of the immature technology (Pennock, 2015). Ill and hastily defined requirements lead to cost overruns, schedule delays, and a lack of performance on contracts (Pennock, 2015). Inaccurate cost estimates also create cost overruns because business leaders are not prepared for the totality of project costs (Markgraf, 2018). Assuring the quality and accuracy of cost estimates leads to fewer cost overruns for projects of all sizes from many industries (Odeck, Welde, & Volden, 2015).

Understanding the impacts of cost overruns is equally as important as the causes of cost overruns. Cost overruns in the Norwegian petroleum industry have far reaching

negative impacts on the industry and economy (Dahl, Lorentzen, Oglend, & Osmundsen, 2017). Cost overruns in this industry reduce the competitive nature of the industry, increase overall petroleum prices, and impact the number of employees hired by the industry (Dahl et al., 2017). Within the defense industry, as projects exceed their expected costs the government will begin reducing production quantities which will leave a significant financial burden on the corporation (Lavelle, 2017). A cost overrun in a megaproject such as the Olympic Games will have impacts reaching far beyond the corporation and into the environment and society in which the project takes place (Tinoco, Sato, & Hasan, 2016). While numerous factors can cause cost overruns on projects, it is important to ensure mitigations measures are in place to limit the significance of the overrun (Sohu et al., 2018).

### **Role of the Financial Manager**

The Chief Financial Officer (CFO) is the primary and lead financial manager of an organization. The CFO assists the Chief Executive Officer (CEO) in corporate policy with a specific focus on the financial operations of the business (Dittmar & Duchin, 2016). The CFO also plays a direct role in determining the financial policies to enhance the profitability and corporate financial success of an organization (Dittmar & Duchin, 2016). In coordination with the CEO, the CFO focuses primarily on a firm's financial and investment decisions (Dittmar & Duchin, 2016). In developing a firm's financial strategies, the CFO and financial management team will standardize financial reporting to aid in accurate cost tracking and work productivity (Heitman, 2017). Like BPQM

methodology, the group of financial leaders will work to identify and eliminate the root causes of financial waste (Heitman, 2017).

Financial managers also play a critical role in the development of cost estimates. A team of financial managers conducts both cost estimating activities and the justification of expected or incurred costs (“Financial and Cost Management”, 2017). The cost estimates initially completed by the financial management team are modified throughout the planning and execution of a project to increase the fidelity of the estimate (“Financial and Cost Management”, 2017). Financial leaders and their teams are also responsible for the development of life-cycle cost estimates where the estimates must consider all phases of the project through disposal (Swei et al., 2017). A key capability of corporate financial managers is their skills in advising corporate decision makers on the impacts of business decisions as they relate to the project cost estimate (Spruill, 2018). To effectively accomplish the task of developing an accurate cost estimate, financial leaders require accurate and detailed historical cost and project information (Huang & Zhao, 2016). Financial leaders risk developing cost estimates which will lead to project cost overruns if the historical data used to develop their cost estimate is insufficient (Huang & Zhao, 2016).

Vollmer (2017) identified four challenges for the CFO and all financial management leaders. Financial leaders should focus on understanding the new digital age, data analysis, risk management, and increasing scrutiny from stakeholders (Vollmer, 2017). To combat these challenges, financial leaders support innovation, deliver agile capable of adapting to dynamic environments, identify manageable risk areas for long-

term growth, inspire through ethical leaderships, and support the broadening digital landscape (Vollmer, 2017). Financial leaders can use the digital age to their advantage in risk management strategies (Boshkov & Drakulevski, 2017). New digital technologies, especially within financial services and cost distribution, allow financial leaders to improve their financial risk management practices (Boshkov & Drakulevski, 2017). CFOs and their leadership teams should also enhance and broaden their ethical financial management skills (Beaudoin, Cianci, & Tsakumis, 2015). Ethical financial reporting and earning management continue to concern investors of large and small corporations (Beaudoin et al., 2015). Low financial management ethics lead to higher expenses and typically conflict with overall corporate financial transparency (Beaudoin et al., 2015).

The role of the financial manager in cost estimating and ethics highlights the influential nature of managers with this responsibility. The financial decision-making skills of the financial manager are influential in the broader strategic decisions of the corporation (Calopa, 2017). The financial manager's expertise in collecting and analyzed financial data, cost estimation, financial planning, and leadership help evaluate the corporation's financial sustainability and thus, profitability (Calopa, 2017). Klapper, Lusardi, and Panos (2015) also highlighted the importance of financial management and literacy and the influence this literacy has on overall business performance. Higher financial literacy leads to positive business performance (Klapper et al, 2015).

A secondary influence of financial managers is measuring or estimating financial impacts of decisions (Jan & Pavla, 2017). After a financial manager completes the project's cost estimate, they identify the financial impacts of project performance, and

thus play a critical and influential role in the profitability of the company (“Financial”, 2017; Jan & Pavla, 2017; Klapper et al., 2015). Furthermore, financial managers provide key financial metrics and data which, when presented to corporate leadership, will impact strategic decision making and profit increasing initiatives (Enz & Lambert, 2015). The decisions of the financial managers impact the financial performance of the firm and the financial manager must understand these implications in their strategic decisions (Teirlinck, 2017). Furthermore, the financial manager within the DoD can play a critical role in the financial performance of programs, auditability of those programs, and in the overall reform of business practices (Sather, 2018).

The relationship between game theory and the role of the financial manager lies within how the interactions of the financial manager and other stakeholders impact financial decisions, corporate strategy, and company profitability. The principles of game theory are applicable to complex stakeholder relationships and financial management interactions in DoD acquisitions. The financial manager plays a critical role in the development of cost estimates and the strategic decisions made based upon cost estimates (Swei et al., 2017). A tenet of game theory is all interactions between stakeholders influence the outcome of the game (Riedel, 2017). The interactions between the financial manager, other corporate managers, and external stakeholders impact the strategic decisions made by the corporation (Calopa, 2017). Furthermore, game theory assumes stakeholder will be consistent and that individual behavior can explain the overall relationship between all stakeholders (Samuelson, 2016). The behavior of the individual financial manager related to budgeting concepts and budget planning is a core

factor in the relationships between the financial manager and other budget stakeholders. A positive relationship and interaction between budgetary stakeholders will improve organizational performance (Mohammad Hadi, Mohammad Sadeigh, & Zohreh, 2018).

Game theory's focus on interactions also plays a pivotal role in the competing priorities between functional managers (Enz & Lambert, 2015). For example, the priority of the financial manager is to provide reliable and accurate financial data and one priority of senior management is financial results (Enz & Lambert, 2015). The interactions and relationships between cross-functional managers and senior managers influences the behaviors of individuals (Enz & Lambert, 2015). Organizations with effective internal and external relationships or interactions are generally more profitable (Enz & Lambert, 2015). An additional example of the application of game theory to the role of the financial manager is the relationship between marketing managers, research and development teams, and financial managers (Shin, Shin, Yoo, Song, & Kim, 2015). A game theory approach to understanding the level of interactions between various managers highlights the importance of the strategic financial decisions of the financial manager and how the interactions influence a firm's financial performance (Shin et al., 2015).

### **Synthesis of Literature**

A synthesis of the review of professional literature offers insight into how existing research and practices align to the specific business problem and the research question. The conceptual framework of BPQM and elements of game theory is relevant to the development of business strategies and cost estimates (Lusk et al., 2005). BPQM is a

framework relating business process efficiency and improvement to cost estimate processes and efficiencies while study of the interactions of game theory relates to the relationships between stakeholders in the cost estimating process (Chang et al., 2017; Gavious et al., 2014). Exploring the interactions and relationships of stakeholders through game theory and business processes through BPQM provided a unique ability to understand corporate business strategies and cost estimation.

The many changes and trends in DoD acquisitions heavily impacts the cost estimating process. For example, as unit production runs for large weapons decrease in DoD contracts, business may begin using alternative cost forecasting and estimating techniques such as the analogy method (Blickstein et al., 2013; Lipow & Plessner, 2011). Constant changes in the direction of the DoD acquisition framework will force constant change and modification in the method of cost estimating by the private sector (Levenson, 2014). Similarly, the relationship between production quantity and cost estimating methodology is also closely linked to broader market competition where an increase in competition can improve product quality and quantity, cost efficiency, and thus drive a modification to cost methodology (Wang & Mogi, 2017).

A global increase in fiscal stewardship is a driving force behind the current cost, benefit, and profit environment, especially through the lens of CSR (Geetika & Shukla, 2017; Prewitt, 2014). With a strong focus on profits and fiscal transparency financial managers and CFOs pay close attention to a firm's level of engagement in CSR through cost-benefit analysis (Dittmar & Duchin, 2016; Kwang-Ho et al., 2018; Watkins, 2018). The financial manager provides a unique influence on corporate performance. Financial

managers influence cost estimation, financial performance and reporting, profitability, and the overall strategic decisions made by business leaders (“Financial and Cost Management”, 2017; Jan & Pavla, 2017; Klapper et al., 2015). The relationship between the process improvement methods of BPQM, interactions and relationships of game theory, role of the financial manager in corporate profitability, and cost estimating methodologies link directly with this study’s research question. Also, through the lens of game theory and stakeholder interactions, the trends in DoD acquisitions and contract competition aided in the understanding of the complex nature DoD private industry cost estimation and profitability.

### **Transition**

In Section 1, I presented the background of the business problem, the nature of the study, conceptual framework and a review of professional and academic literature relating to the business problem of this study. This qualitative, multicase study explored the strategies business leaders use to accurately estimate the costs of international DoD construction projects to improve profitability. The topics discussed in the literature review begin with the conceptual framework of BPQM and game theory and continue through the impacts of inaccurate cost estimates and the role of the financial manager. A brief synthesis of the literature review combines understanding and observations of the theoretical concepts. Section 2 will discuss the project plan with the following subsections: (a) role of the researcher, (b) participants, (c) research method and design, (d) population and sampling, (e) ethical research, (f) data collection instruments and technique, (g) data organization, (h) data analysis, and (i) reliability and validity. Section

3 will identify applications for professional practice and implications for social change by presenting the findings of the study and recommending action and further research.

## Section 2: The Project

Section 2 of the study provides details on the methods I used to complete the project. This section introduces the role of the researcher, participants, research method and design, population and sampling, and a description of ethical research. In addition, in Section 2 I outline the data collection instrument and techniques, data organization technique, data analysis methods, and the study's reliability and validity methods.

### **Purpose Statement**

The purpose of this qualitative multicase study was to explore strategies used by business leaders of private sector contractors for DoD international capacity-building projects to accurately estimate program costs to improve profitability. Corporate business leaders of four distinct DoD international capacity-building program contractors with successful experience with improving cost estimation processes and strategies were the target population for this study. The geographical locations of the programs were Southeast Asia and the former Soviet Union. The contribution to positive social change may be the potential for sustained or increased employment by defense contractors in local communities.

### **Role of the Researcher**

My role as the researcher was to identify possible biases that existed from my experience and personal knowledge of DoD acquisitions, contracts, and private industry. I have experience in the professions of project management and cost estimation, with more than 13 years managing DoD acquisitions projects. In addition, I have 4 years of experience working in Southeast Asia and the former Soviet Union on technical services

and construction projects. Because of my extensive experience working with private industry in the DoD market, the largest challenge I faced during my research was reducing potential prejudice and preconceived notions regarding DoD and private industry cost estimations. Increasing my awareness of potential personal biases and perceptions ensured they did not appear in the research results. Bracketing and ethical research allowed for effective interviews, obtaining the details relevant to the research topic, obtaining saturation, and ensuring that as the researcher, I acted without prejudgement (Sorsa, Kiikkala, Astedt-Kurki, 2015). I prepared for all interviews by consciously setting aside my personal experience with cost estimating, project management, and DoD projects.

In accordance with the Belmont Report, all participants received full research details, including a description of the research, what the research involved, and the desired outcome of the research (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 2003). Unconscious bias is prevalent in most research methods; however, the researcher's ability to identify the biases early in the project aid in the elimination of bias in the results of the research (East, 2016). An interview protocol ensures the researcher conducts the same guided interview with each participant and confirms the interviewer and interviewee understand the goal of the interview (Patton, 2015). The interview questions and interview protocol are in the Appendix. Field notes were taken throughout the interview process. The field notes included the interview protocol and all notes taken during interviews.

To mitigate potential researcher bias, I selected participants from a variety of companies. During the interview process I used active listening skills to ensure I heard and understood participant answers and feedback. Individuals using active listening skills are commonly more effective during their interactions than those not using active listening skills (Fischer-Lokou, Lamy, Guéguen, & Dubarry, 2016). A successful interview process was the result of a combination of active listening, due diligence to preemptively reflect on personal biases, and the interview protocol, shown in the Appendix. Interview protocol in qualitative research helps the researcher collect quality and unbiased data (Castillo-Montoya, 2016).

### **Participants**

The participants in this study were from DoD private industry with construction or capacity building contracts in the former Soviet Union and Southeast Asia. As a multicase study, business leaders from four separate organizations were the research participants. The experiences of individuals are important when selecting interview participants (Wolgemuth et al., 2015). Interview participants must have the knowledge and ability to articulate a meaningful response to the interview questions (Park, Sha, & Olmsted, 2016). Participants for this study were business leaders with recent experience managing programs, creating cost estimates, and successfully improving cost estimation processes and strategies for DoD acquisition projects. Participants with experience and a broad depth of knowledge in the research area will help the research obtain authentic interview information (Saunders & Townsend, 2016). I ensured research participants

understood their company's programs, cost estimates, and the impacts of cost estimate strategies on company performance.

Finding and obtaining access to research participants is one of the most difficult obstacles to overcome for researchers (Johl & Renganathan, 2010). Furthermore, participant accessibility is a key driver for the quality of interview participants and the interview protocol developed for the research (Knox & Burkard, 2009). The researcher must also be sure to access participants in the correct quantity with adequate experience to ensure the final pool of participants meets the intent of the study's research (Li, 2015). Publicly available DoD contracts, accessed from [www.fedbizopps.gov](http://www.fedbizopps.gov), were the primary access point for participants. I initially gained access to participants through an introductory e-mail. Following the introductory e-mail, I made an initial phone call or follow-up e-mail to further establish a preliminary relationship.

To ensure a smooth transition into the interview process and to establish a relationship with interview participants, I conducted preinterview telephone calls or e-mail exchanges with all participants. The preinterview telephone calls and e-mails established the initial relationship between the researcher and the participant and confirmed the participants understood their role in the data collection process. Establishing the relationship between the interviewer and the participant early in the process and prior to the interview ensures a results-driven interview process (Merriam & Tisdell, 2016). Additionally, early identification of the role of the researcher and participant provides the participant with the researcher's expectations (Sanjari, Bahramnezhad, Fomani, Shoghi & Cheraghi, 2014). Early and quick rapport building

between the researcher and participants empowers the researcher to conduct an effective interview (Sivell et al., 2015).

## **Research Method and Design**

### **Research Method**

The research method for this study was qualitative. A researcher using qualitative research methods aims to provide an account of the experiences of an individual or group of individuals with a goal of understanding their experiences in a social context shaped by culture, language, and environment (Granek, 2017; Griffith, Shelton, & Kegler, 2017; Peck & Mummery, 2018). Through this study, I explored the strategies used by DoD private industry business leaders to accurately estimate program costs and improve profitability while incorporating impacts from the business leaders' social and external environment. Researchers use quantitative research methods when they require harder, factual data and less subjective data (Barnham, 2015). Quantitative research requires the collection and analysis of numerical data, which can more effectively answer direct and measurable research questions, often using multiple variables (Goertzen, 2017; Onen, 2016). Quantitative research was not appropriate for this study because the study did not require or use numerical data with statistical analysis and did not employ multiple variables to answer the research question. A researcher conducting a mixed method study will collect and utilize both qualitative and quantitative data (Skalidou & Oya, 2018). Mixed method research was not appropriate for this study because I did not require or use numerical data and statistical analysis to answer the research question.

## **Research Design**

Multicase study design is one of many qualitative research designs including ethnography, phenomenology, narrative studies, and qualitative descriptive research design (Adams & van Manen, 2017; Baskerville & Myers, 2015; Cordoba-Pachon, 2015; Khan, 2014; Kim, Sefcik, & Bradway, 2017). A researcher using the case study design attempts to provide historical accounts of phenomena based on the real-life context of the case or situation (Cordoba-Pachon, 2015; Morgan, Pullon, Macdonald, McKinlay, & Gray, 2017; Villarreal Larrinaga, 2017). The research design for this study was a multicase study design. The experiences of business leaders with involvement in cost estimation at four DoD private industry companies served as the case participants. Using single case study, a researcher explores one situation based on numerous interviews or observations, while in a multicase study the researcher explores several situations and analyzes the similarities and differences of the situations to formulate an answer to the research question (Gustafsson, 2017). I explored business leaders' strategies and decisions in a real-life context. Furthermore, a multicase study was more fitting than a single case study design for this research because multiple businesses and business leaders were the data source. A multicase study design identified where multiple businesses operating in the DoD acquisition environment may have differing cost estimating strategies.

With multicase study chosen as the design for this study, I ensured data saturation by completing four individual case studies. Data saturation occurs when additional information will replicate results (Fusch & Ness, 2015). Data saturation is difficult to

judge but will occur when the researcher judges the information and data obtained is rich and insightful (Saunders et al., 2017). Upon completion of four interviews, I reflected on the data to determine quality, richness, and insightfulness. This process helped ensure data saturation.

### **Population and Sampling**

The population for this study was corporate business leaders of four distinct DoD international capacity-building program contractors with successful experience improving cost estimation processes and strategies. DoD acquisitions consist of numerous private industry corporations and, therefore, required a sampling method to select the appropriate participants. The sampling method for this study was purposeful. Purposeful sampling is the selection of participants who will be most effective at answering the research question as determined by the researcher while remaining flexible to transparently select adequate participants (Charlotte, Karin, & Johan, 2016). Green et al. (2015) defined purposeful sampling as a method with which researchers can select participants with equal and similar knowledge about the subject in question. I used purposeful sampling for this study to ensure the selection of participants with similar experience in DoD acquisitions and contracting. Furthermore, I employed purposeful sampling to ensure participants have similar roles in corporate cost estimating strategies.

Yin (2017) did not specify a required number of participants but recommended finding participants capable of providing adequate and rich data for the study. I selected four participants for this multicase study research. The participants were from four different private industry corporations with similar scope and projects in international

construction projects. The interviews were conducted virtually because all corporate offices of the selected participants were in the Washington, DC area. I selected companies whose primary customer is the DoD to ensure appropriate sampling. The companies will have a minimum of 500 employees if their primary customer is the DoD. The specific participant was required to play a key role in the financial decision-making process and was a CEO or program manager. A researcher able to replicate results with additional information may have achieved data saturation (Fusch & Ness, 2015). Rich and insightful data assists the researcher in judging the achievement of data saturation (Saunders et al., 2017). I reflected on the data to determine quality, richness, and insightfulness to help ensure data saturation.

### **Ethical Research**

I obtained Internal Review Board (IRB) approval before starting the data collection process. The IRB approval number was 06-28-18-0508431. Each participant received and signed the Walden IRB consent form. Informed consent for research participant insures both the comprehension of the study and the voluntariness of the participation (Beskow, Check, & Ammarell, 2014). The consent form included an invitation to participate, background information, participation procedures, a discussion of the voluntary nature of the study, risks and benefits of the study, privacy information, and researcher contact information. Participants signed and returned the consent form, offering consent for participation. There was no compensation or incentive for participating in the study.

Participants were informed of their ability to withdraw from the study at any time. Participants were able to withdraw from the study before or after offering their consent, during the interview process, after the interview process, or at any other time during the study. While no participants withdrew from the study there would have been no repercussions for withdrawal. Participation was voluntary and data remained confidential during collection, analysis, and results presentation. Furthermore, if a participant withdrew from the study, I would have destroyed participant information and data. Participants were allowed to inform me in person or in writing if requesting withdrawal from the study and analysis would not have included their data.

Respect for participant information and data is an important aspect of ethical research (Ross, Iguchi, & Panicker, 2018). I maintained all hard copy files in a locked filing cabinet in my home office to maintain participant confidentiality. I maintained electronic files in a password protected folder on my personal home computer. I will destroy all participant data 5 years after the completion of the study. Furthermore, to maintain participant confidentiality, all participants received alpha-numeric identifiers. Labels P1, P2, P3, and P4 identified the first through fourth participant, respectively. The collected data and study findings will only include the alpha-numeric code and will not include the names of the participants. Company names were also removed from the interview transcripts to provide further anonymity.

### **Data Collection Instruments**

The researcher will be the primary and most important data collection instrument in qualitative research (Bahrami, Ali Soleimani, Yaghoobzadeh, Ranjbar, 2015). I was

the sole data collection instrument for this study, using the interview protocol in the Appendix. A semistructured interview includes a discussion and conversation between the researcher and the participant where the experiences and opinions of the participant guide the interview (Cridland, Jones, Caputi, & Magee, 2015). I implemented the semistructured interview process to collect data. When a qualitative researcher acts as the data collection instrument, the results of the study are subject to the researcher's interpretation of the data (Watts, 2014). Bracketing is a method to reduce the researcher's preconceived notions or biases on the topic by engaging in a self-reflective process to recognize the potential biases (Newman & Tufford, 2012). Through a bracketing process, I coded and analyzed the data to reduce any potential bias during interpretation.

Data will be reliable and valid through triangulation, member checking and transcript review (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014; Ivari, 2018; Yin, 2017). A researcher can increase the validity of data through triangulation, which ensures the researcher develops a full and complete understanding of the research topic (Carter et al., 2014). Member checking provides an opportunity for the researcher to validate the interpretation of the data (Ivari, 2018). Upon completion of data collection, participants received interview transcripts and a brief synopsis of information interpretation to ensure the interpretation was accurate and valid. Participants informed me the information I collected and interpreted was accurate. The interview protocol for this study is in the Appendix and ensured each participant received the same questions and interview process. I used triangulation, member checking, and transcript review to

aid in the reliability and validity of data. In addition to the interview process, I collected company and government documents to aid in the triangulation process. The company and government documents provided information relating to the accuracy of cost estimates and the profitability of the companies.

### **Data Collection Technique**

The overarching research question for this study was: What strategies do business leaders of DoD international capacity building projects use to accurately estimate program costs to improve profitability? A semistructured interview was the technique for data collection to answer the research question. A researcher will have an open dialogue, encouraging reliable and understandable data collection, with the participant when using the interview data collection method (Windsong, 2016). Interviews are beneficial because the researcher has an open, yet semistructured conversation surrounding the research question (Arsel, 2017). The individual interview also provides the researcher a method of collecting numerous data points and details relevant to the study by enabling open dialogue (Guest, Namey, Taylor, Eley, & McKenna, 2017). The interview protocol for this study (Appendix) ensured I introduced the interview and set the appropriate stage for the interview. Non-verbal cues and probing questions assisted in data collection; however, I focused on the interview questions identified in Section 1 and in the interview protocol. The interview protocol ensured all participants take part in the same semistructured interview process. After completion of the interview, member checking and transcript review confirmed my interpretation of the collected and analyzed data.

While interviews were conducted via telephone, my office and the participant's office were the physical location for data collection. Telephone conversations were the primary collection technique because in-person interviews were not possible. The recording function on my personal computer was capable of recording interview sessions and was be the data collection method for virtual interviews. While the researcher must overcome the challenges of interviewing remotely, computers offer a unique capability to conduct and record interviews when an in in-person interview is not possible (Janghorban, Roudsari, & Taghipour, 2014; Seitz, 2016). A researcher can use interviews to collect information to answer how and what questions and are effective for qualitative case studies (Yin, 2017). A semistructured interview dialogue with participants provides the researcher with focused and clear information which will be free from barriers (Myers, 2014). Interviews can be more difficult to analyze than methods such as questionnaires and surveys because of the open nature of the interview, the limited amount of potential data collection, and opportunities for misinterpretation (Baškarada, 2014). While interviews allow more control of the interview process and observation of participant reactions, interviews are also time consuming, have the potential to highlight participant bias, and are offer limited sample sizes (Krall, Wambolt, & Lohse, 2014).

Collecting documents as a secondary source of information is beneficial because company documents can include substantial amounts of detailed information relating to the research topic (Peyrefitte & Lazar, 2018). Company documents can be difficult to locate and obtain and can include misleading company information meant to appease

stakeholders (Wieland et al., 2014). I collected and reviewed company documents relating to cost estimation, program cost estimates, and company financial data. I obtained documents from public sources, websites, and government and company archives.

### **Data Organization Technique**

Researchers should ensure all participant and source data remains confidential and protected through the research and in the final study (Wall & Pentz, 2015). I organized and stored data in a manner preserving participant confidentiality. Researchers should preserve the confidentiality of participants by making data anonymous (Kitzinger, Saunders, Kitzinger, & Kitzinger, 2015). Referencing participants with assigned numbers will help the researcher achieve confidentiality (Wagstaff & Williams, 2014). Participants received alpha-numeric codes from P1 to P4. I tracked and logged all data using the NVivo 12 software. The database, within NVivo 12, will include a catalogue of participant alpha-numeric codes. The database tracked and aligned codes with interview transcripts, interview logs, member-checking results, and interview interpretations. When required, I supplemented the NVivo 12 database with a Microsoft excel database. A field journal supplemented the NVivo 12 and Microsoft Excel databases. I organized the field log with page numbers and included the page numbers within the electronic database to increase the fidelity of data organization. I maintained electronic files in a password protected electronic folder on my personal computer and hard copy files in a locked filing cabinet in my home office. I will destroy all data 5 years after the approval

of this study. I will delete electronic files from my computer and shred compact discs and hard copy files to ensure the destruction of data.

### **Data Analysis**

I employed methodological triangulation for data analysis. Interviews and documents were the methods for data collection for this study. Methodological triangulation involves the use of data from two types of sources such as interviews and documents (Patton, 1999). Using two types of data collection methods, methodological triangulation allows the researcher to compare to results from multiple sources and improve the validity of the data (Olsen, 2004). I first analyzed the data from the semistructured interview process. Using methodological triangulation, I correlated the interview data with data from collected documents. Information obtained from the collection of company and government documents assisted in data triangulation. Company information included cost estimating techniques, profit and financial information, and corporate cost strategies. A correlation between the two collection methods improves the validity of the data.

Yin (2017) recommended the following steps as part of the data analysis process: (a) compiling data; (b) disassembling data; (c) reassembling data into groups and themes; (d) interpreting data; and (e) concluding. The data analysis process begins when the researcher starts compiling field notes, interview transcripts, and other collected data. Sorting data through classic data analysis is a method the researcher may use to organize and understand the themes within qualitative research (Chowdhury, 2015). I sorted data using the classical data analysis method by organizing clusters of concepts on a large

whiteboard and also within NVivo 12. The researcher identifies themes by reassembling the data through coding and clustering (Yin, 2017). The organization of data on a large white board enables critical analysis of the concept clusters and the identification of themes. Theme identification is one of the most critical parts of a qualitative study (Ryan, 2003). After theme identification, I used the NVivo 12 software to create an electronic database of all themes, incorporate theme labels, and reassemble the themes into sequences and groups. Data organization and theme identification leads to data interpretation and the conclusion of data analysis (Yin, 2017). I transformed the sequences and groups of themes into a complete data analysis conclusion.

Data were entered into the NVivo 12 software for data organization and analysis. Researchers can use the NVivo software in case study data analysis and data management (Houghton, Murphy, Shaw, & Casey, 2014). I used the NVivo 12 software to assemble themes in sequences and groups. The key themes were then correlated with the conceptual framework of BPQM and game theory. The correlation of themes through the lens of the conceptual framework aided in my theme analysis focus, data analysis, and research conclusion. An in-depth qualitative thematic analysis approach enables a full description of the phenomenon identified during a study (Cassol et al., 2018).

### **Reliability and Validity**

#### **Reliability**

Dependability is the primary component of reliability in qualitative research (Guba & Lincoln, 1989; Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). Case study interview protocol, detailed interview and data collection procedures,

and guided data transcription are important steps in research reliability and dependability (Yin, 2017). The researcher increases dependability by conducting transparent research and documenting the research methods and data collection processes (Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). To ensure research reliability and dependability, I maintained a field log. The field log included all research processes, interview observations and field notes, and afterthoughts upon the conclusion of interviews. Member checking is a process the interviewer follows to follow-up with participants after the conclusion of the interview to ensure the collected data is correctly interpreted and represented (Merriam & Tisdell, 2016). I provided participants with the results of the interview and my interpretation of the results allowing the opportunity for feedback from the participant to increase the dependability of the results.

### **Validity**

**Confirmability.** Confirmability is the repeatability of the research and its results through clear and replicable processes as well as through multiple techniques (Merriam & Tisdell, 2016; Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). Audit trails are a common method to achieve confirmability in qualitative research (Cutcliffe & McKenna, 2004). To achieve confirmability, the researcher can use and maintain a case study interview protocol allowing future researchers to replicate the results (Yin, 2017). I used an interview protocol and maintained an audit trail of all research methods and data collection processes to increase the confirmability of the research.

**Credibility.** Credibility ensures the research is consistent, measures the intent of the study, is grounded, and is a critical step in providing a strong qualitative research

inquiry (Liao & Hitchcock, 2018; Merriam & Tisdell, 2016). Triangulation is a popular and effective method to increase the credibility of a study (Abdalla, Oliveira, Azevedo, & Gonzalez, 2018; Liao & Hitchcock, 2018). The study employed methodological triangulation for data analysis. Methodological triangulation involves the use of data from two types of sources such as interviews and documents (Patton, 1999). I used the data from interviews and documents to triangulate the results and improve the credibility of the study. Triangulation occurred when the results of the interviews were corroborated with document findings.

**Transferability.** Transferability refers to the potential for original research findings to transfer to a different context or individuals (Morse, 2015). Future researchers and readers will transfer the results of a study to their own setting (Korstjens & Moser, 2018). A researcher improves transferability with a detailed and rich description of the participants and setting of the study (Korstjens & Moser, 2018). The study included a detailed description of the population, participants, research setting, and data analysis. The detailed research information and data organization techniques presented in this section improved the transferability of this study's results.

**Data Saturation.** Data saturation occurs when the quantity, quality, and adequacy of the research data fully supports the study and enough information is collected to replicate the study (Fusch, 2015). There is no specific number of interviews which will ensure data saturation (Bernard, 2012). To ensure data saturation, I conducted four interviews using the same interview questions. Conducting interviews with the same interview questions allows the researcher to achieve data saturation (Fusch, 2015).

### **Transition and Summary**

This section provided the study's research method and design details. I employed a qualitative research method and multicase study design for this study. I was the primary data collection instrument and used multiple data collection, organization, and analysis techniques to enhance the reliability and validity of the research results. I identified the tools and methods I used to improve the reliability and validity of research results. Section 3 includes a presentation of the findings, application to professional practice, implications for social change, and recommendations for action and further research.

### Section 3: Application to Professional Practice and Implications for Change

#### **Introduction**

The purpose of this qualitative multicase study was to explore strategies DoD contractors use to improve defense acquisition cost estimates and corporate profitability. The data collection process was semistructured interviews with private industry business leaders and a review of corporate and government documents and financial statements. The findings identified the strategies business leaders use to improve defense acquisition cost estimates with a focus on profitability. These strategies included enhanced customer relationships, improved project awareness, increasing ability to innovate, acquisition policy and political environments, and identification of labor rates and pricing. In this section I present the findings of the study, highlight the applications to professional practice and implications for social change, recommend areas for action and further research, and present reflections on the research and an overall research conclusion.

#### **Presentation of the Findings**

The overarching research question was: What strategies do business leaders of DoD international capacity building projects use to accurately estimate program costs to improve profitability? Data collection included semistructured interviews with four business leaders and the review of corporate documents and GAO reports. The corporate documents and GAO reports support the methodological triangulation of the data and findings. BPQM was the conceptual framework for this qualitative multicase study with game theory as a supporting conceptual framework. The five themes that emerged from the study supported BPQM and game theory as the conceptual framework. BPQM and

game theory support process management and efficiencies, waste reduction, increased profit, and the importance of stakeholder interactions (Lusk et al., 2005; von Neumann, 1928). The five emerging themes from this study were: (a) enhanced customer relationships, (b) increasing ability to innovate, (c) improved project awareness, (d) acquisition policy and political environments, and (e) identification of labor rates and pricing. The minor themes for enhanced customer relationships were: (a) communication and flexibility, (b) conflicting contractor and customer goals, and (c) increased transparency. The minor themes for improved project awareness were: (a) domain awareness and (b) understanding of project requirements. The minor themes for acquisition policy and political environments were: (a) change within DoD acquisitions and (b) international and domestic political environments. There were no minor themes identified for increasing ability to innovate and understanding of labor rates and pricing. Table 1 shows the major themes, percentage of respondents identifying the theme, and number of instances the theme appeared during data collection. Table 2 shows the minor themes, percentage of respondents identifying the theme, and number of instances the theme appeared during data collection.

Table 1

*Major Themes, Respondents Identifying the Theme, & Number of Instances*

Theme	Respondents identifying the theme	Number of instances
Enhanced customer relationships	4	20
Increasing ability to innovate	4	8
Improved project awareness	4	18
Acquisition policy and political environments	4	16
Identification of labor rates and pricing	3	8

Table 2

*Minor Themes, Respondents Identifying the Theme, & Number of Instances*

Theme	Respondents identifying the theme	Number of instances
Communication and flexibility	3	6
Contractor and customer goals	2	4
Transparency	3	5
Domain awareness	4	9
Understanding of project requirements	3	8
Change within DoD acquisitions	3	7
International and domestic political environments	3	9

Methodological triangulation substantiated the findings upon completion of interviews and analysis of interview data. One corporate document and one GAO report were the secondary data sources for methodological triangulation. Codes D1 and D2 identify GAO Report 17-398 and a 2017 corporate annual report, respectively. D1 identified potential cost estimating improvements and strategies including: (a) guidance and policy clarification, (b) innovative practices and tools in preparing and developing cost estimates, (c) enhanced information and communication flows between government parties and partner industries, and (d) understanding of data source and methodologies

including labor rates (GAO, 2017c). D2 identified several impacts to changing costs estimates, including: (a) specific liabilities under federal, state, local, and foreign statutes; (b) evolutionary and innovative technologies; and (c) evolving external environmental conditions such as policies and labor rates. The two supporting documents, D1 and D2, directly align with the five major themes of: (a) enhanced customer relationships, (b) increasing ability to innovate, (c) improved project awareness, (d) acquisition policy and political environments, and (e) identification of labor rates and pricing. Additionally, the documents and themes directly correlate to the principals of BPQM and game theory, highlighted in the following subsections.

### **Theme 1: Enhanced Customer Relationships**

Theme 1 revealed the importance of enhancing customer relationships in the development of accurate cost estimates. All four participants identified this theme, with twenty total instances. Within the major theme of enhancing customer relationships, the data presented three minor themes of (a) communication and flexibility; (b) contractor and customer goals; and (c) transparency. Table 3 shows the minor themes, frequency, and percentage of occurrence.

Table 3

*Enhanced Customer Relationships Minor Themes*

Minor theme	Frequency of occurrence	Percentage of occurrence
Communication and flexibility	3	75%
Contractor and customer goals	2	50%
Transparency	3	75%

P2, P3, and P4 identified communication and flexibility in 6 instances. P2 expressed concerns over the willingness of both the government and the contractor to take the time to maintain open communication while developing relationships. Expanding upon this difficulty, P2 stated, “You have to maintain open communications. The contractor has to be flexible and it makes it a lot easier if the government is more flexible as well.” Furthermore, P3 related open communications and flexibility to the contractor’s ability to understand government needs. P3 followed by stating the lack of communication and flexibility often occurs when the two sides are not talking enough. P4 said, “We have been doing this for almost 30 years and keep growing. That is from customer relationships and communication.” D1 also annotated the need for communication between parties to ensure all stakeholders understand funding needs for acquiring a service and D2 discussed the importance of a close relationship and transparent dialogue to continue business success. BPQM and game theory identify communications as a key focus area for improved interactions and performance (Chang et

al., 2017; Riedel, 2017). Enz and Lambert (2015) highlighted the importance of relationships and communication between cross-functional areas both internal and external to the organization.

P1 and P3 identified contractor and customer goals in four instances. P1 said, “Realize the contractor is in it for money, but if it is a balanced approach, the cost estimating and end results are always much better.” Conversely, P3 stated, “Your mission is your mission, and it is our job to help you succeed in that mission.” During contract discussions, P3 aimed to ensure the company adequately communicated the government’s mission and requirements to his teammates. Aligning customer and client goals is one of the unique tenets of BPQM (Alotaibi & Liu, 2017). Numerous previous studies corroborated this minor theme, which identified the importance of understanding the difference between customer and client goals and how this focus assists with process and organizational performance (Reijers et al., 2010; Schacter, 2010; Shahmohammadi, 2017).

The third minor theme under enhanced customer relationships is transparency. P1, P3, and P4 identified transparency on 5 occasions. P1 tied an increasing level of transparency with the ability to provide a more realistic solution to a problem and a better overall cost estimate. P3 and P4 focused on the transparency of the government when providing project proposal feedback. Speaking of proposal feedback, P3 said, “You use that to improve. That recently came out in some guidance and it is incredibly powerful feedback.” P4 added, “I think there is a lot of feedback between our technical folks and the contracting officer representative.” Transparency and feedback between internal and

external stakeholders are directly linked to positive fiscal stewardship, fiscal responsibility, corporate social responsibility, and specifically cost estimation (Beaudoin et al., 2015; GAO, 2017a; Remund & McKeever, 2018; Watkins, 2007).

The major theme of enhanced customer relationships presented itself through the three minor themes identified above. The ability for contractors to build positive relationships through communication and flexibility, contractor and customer goals, and transparency increases their ability to develop accurate cost estimates. D2 stated the importance of customer relationships and how those relationships relate to financial performance. Each of the four participants linked the development of accurate cost estimates to their strategies for enhancement of customer relationships and their interactions with customers. This further supports the conceptual frameworks of BPQM and game theory in this study.

### **Theme 2: Increasing Ability to Innovate**

Theme 2 was an increasing need to innovate. All four participants identified this major theme. There were multiple methods cited for innovation as it relates to the accuracy of cost estimates. P1 highlighted the struggles for Congress and the DoD in dealing with innovation in commercial models and best practices. P1's innovative practices, including country strategies, landed companies, regional partners, and cost estimating strategies, correlate to an international revenue goal of 40%-50% of total corporate revenue. P1 defined landed companies as those companies sharing a large corporate name but with independent operating structures in overseas locations. P2 added to the innovation theme when stating, "We need to find innovative approaches to

pricing based on our strategy.” P2’s company was able to operate in a foreign country and implement an innovative approach to pricing to win a contract and achieve their desired outcome in the most cost-effective way possible. D1 and D2 related the importance of innovation in addressing the unique requirements of the DoD and improving the reliability of cost estimates. The tenets of TQM, one of the precursor theories to BPQM, do not always drive performance improvement but commonly drive innovation (Al-Dhaafri & Al-Swidi, 2017). Furthermore, several previous studies support the use of innovation and agility for financial strategies and improvement (Vollmer, 2017).

Participants also supported this theme with numerous examples of innovation as it relates to cost estimation. P1 emphasized the rapid acquisition approach of “try, break, fix, and try again” to remain agile and pushing forward fast. P2 looked carefully within requests for proposals for areas to innovate where the government allowed “leeway or wiggle room for innovation.” While not a completely innovative solution, P3 looked to parametric pricing for cost estimates. P3 stated their organization had not been successful at parametric pricing in the past but the company looked to remain agile and innovative in the parametric pricing strategy. The downside to innovation, according to P3, is innovative strategies provide less information to the government, which makes it more difficult to evaluate the bid. While parametric estimating is a highly accurate technique, it requires a fast amount of data and history, making it difficult to implement (Bebu et al., 2016; Swei et al., 2017).

P4 identified an additional innovative strategy from his experience. P4 said, “Some companies have pricers that are not full time pricers. I think that makes it hard. Estimators have other jobs and are not as effective.” P4’s company attempts to hire full time pricers because the pricers are able to maintain expertise without being stretched too thin. To maintain profits and cut costs, other companies tend to utilize their pricers for multiple functions, according to P4. The company authoring D2 used innovation to drive performance and growth. The ability to innovate in large defense business impacts operations of the business and the ability to adapt to acquisition reforms (Eckerd & Snider, 2017). Numerous reforms and changes in acquisition strategies highlighted in the National Defense Strategy and Authorization Act also hamper the ability to innovate (Grieco, 2018). As the defense market continues to shrink, the potential to innovate also shrinks (Levenson, 2014). This reduced ability to innovate highlights the importance of theme 2, ability to innovate. It will be critical for defense contractors to find unique ways to innovate and remain competitive in the marketplace.

### **Theme 3: Improved Project Awareness**

All four participants identified major theme 3, improved project awareness. Two minor themes of domain awareness and understanding of project requirements break down theme 3. Table 4 shows the minor themes, frequency, and percentage of occurrence. The domain awareness minor theme corresponds to the understanding of the domain in which the contractor operates. P1 summarized a domain awareness example by saying “it is difficult to try to estimate how you get an indigenous population to do your project. This is a big challenge. We used to just subcontract out and localization

starts with no industry complex to choose from.” P1 furthered this statement by explaining how the company looks to gain an enhanced level of domain awareness by finding people that know the local economy, the local requirements, and the local environment. P2 said “the most difficult thing to do is come up with good pricing in a country where you do not have a presence and you have not operated in before.” P3 and P4 added differences in geography and locality are prime contributors to the domain expertise challenge. Domain awareness, as showcased in D2, is particularly important when expanding into new and unique business segments.

Table 4

*Improved Project Awareness Minor Themes*

Minor theme	Frequency of occurrence	Percentage of occurrence
Domain awareness	4	100%
Understanding of project requirements	3	75%

The second minor theme to improved project awareness is understanding of project requirements. P2 and P3 identified areas where they did not anticipate project requirements or changes in project requirements, making it increasingly difficult to both estimate and maintain project costs. Specifically, P2 said “there is always going to be those points where it just wasn’t anticipated until you implement the contract.” P1 added “if we all truly know the requirements and risk for each party and have a balanced view of the end objective, that is what both parties want to get to.” All four participants

discussed and both documents included information of the unanticipated, unknown, or difficult to measure requirements inherent to DoD acquisitions and how the lack of a common understanding of requirements is a lynchpin to cost estimation. D1 and D2 were highly critical of unknown or fluctuating requirements and stressed the importance of firm requirements when trying to avoid cost overruns.

This major theme is highly annotated in literature, especially the understanding of project requirements. Requirements are also essential elements of BPQM as a method to align processes with customer and client requirements (Reijers et al., 2010). As confirmed by all four participants, the identification of requirements is an area for constant improvement. Vitharana et al. (2016) also identified a need for improvement in the requirements due to the potential for a change in requirements to drive cost overruns. Additional research also confirms the importance of understanding and improving project requirements to minimize cost estimation inaccuracies and cost overruns (Markgraf, 2018; Pennock, 2015; Rosenfeld, 2014; Sohu, Abdullah, Nagapan, Jhatial, Ullah, & Bhatti, 2018).

#### **Theme 4: Acquisition Policy and Political Environments**

All four participants identified major theme 4, acquisition policy and political environments. Two minor themes emerged from theme 4, change within DoD acquisitions and international and domestic political environments. Table 5 shows the minor themes, frequency, and percentage of occurrence. The participants referenced this major theme sixteen times throughout the data collection process.

Table 5

*Acquisition Policy and Political Environments Minor Themes*

Minor theme	Frequency of occurrence	Percentage of occurrence
Change within DoD acquisitions	3	75%
International and domestic political environments	3	75%

P1 stated “there is a lot of change happening in the DoD right now” followed by “there is a push through the National Defense Strategy for everyone to go fast on commercial practices.” P1, P3, and P4 made note of the DoD and Congress pushing rapid and agile process changes through the National Defense Strategy, Federal Acquisition Regulations (FAR), or technical and cost proposal submission guidelines. P3 specifically mentioned the potential for contractors to help enact positive change through industry groups. According to P3, these groups can assist in pushing for further change and improvement in acquisition regulations, assisting in the improvement in cost estimation. To counter the impacts of change in DoD acquisitions, D1 and D2 highlighted strategic improvements in relationships with policymakers. An obstacle for innovation is FAR requirements for contract proposals, linking aspects of major theme 4 with major theme 2. Policy changes and defense acquisition reform are constant discussions within the United States Government and the topic of numerous research studies with the goal of embracing change throughout DoD acquisitions (Eckerd &

Snider, 2017; Grieco, 2018; Lipow & Plessner, 2011; Overton, 2015). Process improvements and acquisition changes are evident throughout this minor theme. One of the primary and most influential tenets of BPQM is process improvement (Chang et al., 2017; Riedel, 2017)

P1, P2, P3, and D2 recognized the second minor theme of international and domestic political environments. P1 focused on both international and political environments by identifying the policy interpretations of the Trump administration. According to P1, each DoD agency and business unit will interpret major changes in domestic and foreign policy differently, creating disconnects in pricing decisions. P2, through the lens of labor pricing, also discussed the disconnects between policy interpretations. Understanding and interpreting the international political environment and working with U.S. Embassies in foreign countries can assist in developing accurate pricing strategies, according to P2. Furthermore, P3 highlights the changes in the National Defense Authorization Act and how those changes, from the Trump Administration, have brought about the need to ensure contractors are appropriately interpreting the new acquisition direction. P1, P2, P3, and D2 brought into focus the need for a common understanding of international and political laws and environments to ensure contractors price and estimate appropriately for a given situation. As the political environment changes, the contractor must also change. The political environment is constantly changing, evolving and reforming, much like the acquisition environment, and contractors must adapt to those changes (Eckerd & Snider, 2017; Grieco, 2018).

**Theme 5: Identification of Labor Rates and Pricing**

P2, P3, P4, and D1 highlighted concepts linked to major theme 5, identification of labor rate and pricing. The participants identified numerous areas where it was important to ensure labor rates and pricing were accurate. Cost estimates suffered in areas where labor rates and pricing were difficult to obtain. P2 used the strategy of traveling to the country or region where the project would take place to speak with a labor broker or other local experts. This strategy allowed P2 to base labor rates off the local national or local company quotes. P2 also stated “the most difficult thing to do is come up with good pricing in a country where you do not have a presence and you have not operating in before. Labor markets differ.” In a similar manner, P3 adjusted rates for different areas of the close ensuring each project had a comparable labor rate and pricing strategy. P4 added “if you buy subscriptions to rate surveys you can have a better chance at putting together more realistic rates for specific geographic areas.” The three participants identifying labor rates and pricing strategies as critical to their cost estimating strategies were clear in identifying geographic rate differences as a major obstacle. D1 includes multiple references to need for a better understanding of labor pricing while completing government cost estimates. D2 specified labor costs as a driver to overall pricing decisions, especially in the international market. Chao and Kuo (2016) predicted overhead and mark-up rates for construction projects with inputs of direct cost, duration of work, type of work, and location of work. This potential use of predict rates for various location ties to major theme 5 and supports the identification of labor rates and pricing as a major theme for this study. Through the lens of game theory, researchers

frequently study regional economics and labor rate decisions (Mota, Silva, & Grilo, 2015; Xu & Wang, 2018). Game theory can be an important framework when considering the multiple interactions between various internal and external stakeholders and environments.

### **Summary of Major Themes**

Through this study, I identified five major themes, including: (a) enhanced customer relationships; (b) increasing ability to innovate; (c) improved project awareness, (d) acquisition policy and political environments; and (e) identification of labor rates and pricing. The 5 major themes frequently link together through various concepts and examples. For example, the participants identified the use of innovation several times throughout data collection. While an increasing ability to innovate is a major theme, enhanced customer relationships and acquisition policy and political environments use the concept of innovation. Multiple participants also believed the identification of labor rates and pricing linked directly to improved project awareness, and especially domain awareness. Understanding the domain in which the contractor will operate allows for an improved identification of labor rates and pricing. The conceptual frameworks of BPQM and game theory aided in the identification, analysis, and synthesis of the 5 major themes. The key tenets of BPQM and game theory, such as goal alignment, process improvement, standardization, minimized waste, process optimization, and stakeholder interactions, were highlighted throughout the five major themes (Al-Dhaafri & Al-Swidi, 2017; Alotaibi & Liu, 2017; Chang et al., 2017; Riedel, 2017; Xu & Wang, 2018).

### **Applications to Professional Practice**

The purpose of this qualitative multicase study was to explore strategies used by business leaders of private sector contractors for DoD international capacity-building projects to accurately estimate program costs to improve profitability. Accurately estimating program costs in DoD international capacity-building projects is a critical factor in improving corporate profitability. The strategies identified in this study to improve corporate cost estimates may have a direct, immediate, and lasting impact on the professional practice of contracting in DoD international capacity-building efforts. Cost estimating strategies directly impact corporate profit generating strategies (Takano, Ishii, & Muraki, 2017). Challenges and barriers to accurate cost estimates are prevalent for business leaders within the DoD industry. Through this study, business leaders identified numerous behaviors and best practices correlating to five thematic strategies for improving cost estimates, which may add significant improvement to cost estimating and future profitability of DoD corporate industry.

A wide variety of corporations attempt various strategies to improve revenue and corporate profitability (Hughes, Hodgkinson, Hughes, & Elliot, 2018; Zatta & Kolisch, 2014). This study identified five strategies which business leaders may use to improve cost estimates, including: (a) enhanced customer relationships, (b) increasing ability to innovate, (c) improved project awareness, (d) acquisition policy and political environments, and (e) identification of labor rates and pricing. By applying any of these strategies, or a combination, to their projects, business leaders may realize both improved cost estimates, higher profit rates, and an increase in business or contracts awarded.

The relationships between the government and contractor, their interactions, and an understanding of their unique interests may influence program life-cycle costs (Javed et al., 2014; Nedelcu, 2014). Innovative practices and continuous innovation strategies help enhance overall corporate profits in the long-term (Sood & Kumar, 2017). The findings of this study indicate enhancing the relationship between the contractor and the government customer is a critical strategy for improving accuracy of cost estimates for DoD international capacity-building projects. By improving communication and flexibility, adjusting and understanding the conflicting contractor and customer goals, enhancing the level of transparency between the contractor and the government customer, and ensuring innovative business and technical solutions, cost estimate accuracy over the program's life cycle may improve. Maintaining an open line of communication, especially after a contractor loses a contract bid, improve customer and client communications as well as enriching the level of transparency. In areas where these relationships degrade, and businesses are unable to effectively innovate, DoD private industry business leaders are often unable to improve upon their cost estimating strategies.

It is important to integrate project awareness and the management of acquisition policy and political environments into strategic cost estimation decisions (Levenson, 2014; Lipow & Plessner, 2011; Vitharana et al., 2016). DoD private industry business leaders should incorporate this study's findings into their cost estimating best practices. A full and detailed awareness of project scope, requirements, and domain, coupled with an in-depth cognizance of acquisition policy and politics, is quintessential for business

leader cost estimating strategies. The professional practice of DoD private industry focuses heavily on acquisition policy and political environments. A focus on enhanced project awareness and political environments while driving change in acquisition policy can further develop improved cost life cycle cost estimates. While acquisition policy may be slow to change, DoD private industry business leaders can be at the front of this change. In addition to project awareness, acquisition policy, and political environments, labor rates and labor pricing decision are closely related and heavily tied to the accuracy of cost estimates (Waclawik & Couture, 2013). Projects differ by requirements and geographical region and this study showed the criticality of understanding labor rates and pricing decisions based upon the uniqueness of the project.

The findings of this study are applicable and relevant to the professional practice. The five themes identified in this study may assist business leaders in employing effective cost estimating strategies and, therefore, improving the accuracy of corporate cost estimates and improving corporate profitability. When considered holistically, the five themes can enhance current business leader strategies for cost estimation with an increased focus on simultaneously improving estimates and profitability. The findings of this study indicate business leaders applying the strategic themes identified in this study would see improvement in not only the accuracy of cost estimates but also corporate profitability and business ventures.

### **Implications for Social Change**

Profitable DoD private industry corporations are critical and influential for focusing efforts on the improvement of social concerns domestically and internationally.

Industry is also a valuable government partner for addressing social concerns in the geographic region of the project (Jung, Malatesta, & LaLonde, 2018). Small and medium businesses with government contracts in Africa, Asia, and the Middle East have generated an increase in employment and employee wages (Maksimov, Wang, & Luo, 2017). The implications for social change include the ability of DoD private industry business leaders to develop business strategies aimed at increasing fidelity of cost estimates and, thus, profitability and increased business. Profitability creates more market capabilities and opportunities for businesses (Osakwe, Chovancova, & Ogbonna, 2016). Furthermore, DoD private industry contractors increase the level of expatriates as business increases and the expatriates directly contribute to the transfer of technical knowledge to the local community (Ahrens, Oehmichen, & Wolff, 2018). The direct and indirect implications for social change, resulting from this study, could be an increased local economic impact, higher wage scales for local employees, higher levels of employment, and an increased level of local technical knowledge.

### **Recommendations for Action**

DoD private industry business leaders consistently struggle with developing accurate cost estimates (Blickstein et al., 2013; Christensen, 2015; Harrison, 2012; Takano, Ishii, & Muraki, 2014). Business leaders can use the specific cost estimation improvement strategies from this study to drive discussion with industry groups, business partners, and government stakeholders. The discussion should include an in-depth look at how these strategies correlate to improved and enduring partnerships with local communities and how the strategies can positively impact the industry.

The results of this study may impact numerous individuals and groups. These individuals and groups should pay close attention to the results. DoD private industry, government stakeholders, industry groups, local economies, and foreign companies and governments should pay attention to the results of this study. The most prevalent and readily available dissemination point for this information is through industry groups. Business leaders should identify the strategies presented in this study to DoD industry groups with familiarity and access to government stakeholders. Using the industry groups' relationships will provide a solid foundation for furthering the acceptance of these business strategies across the industry. Furthermore, industry groups may be able to influence acquisition policy and political environments to ensure government stakeholders recognize and consider these cost estimate improvement strategies. Focused meetings with industry groups and direct meetings with government stakeholders and industry counterparts are the best methods to present this study's results and findings.

### **Recommendations for Further Research**

Restrictions on company data and confidentiality of information limited the sample size for the current study. A limited sample size may produce the inability to generalize data across a larger population (Tipton, Hallberg, Hedges, & Chan, 2017). Researchers conducting further studies in this area can counter this limitation by reducing the restrictions on company size. Companies of a smaller size are more numerous and may have less restrictions on data and confidentiality allowing for an increased sample size. While minimized, my bias with government cost estimates could have influenced the willingness of participants to answer interview questions openly and honestly. To

mitigate bias, future researchers without a military background or current active duty military service could conduct a similar study. Future researchers can compare the results of future studies with the current study to determine the potential impact of this bias and limitation.

In addition to addressing the study's limitations, the following topics are a list of recommendations for future research related to improved business practice:

1. Future researchers could expand the geographically area of influence to include other international regions and the continental United States.
2. Future researchers could explore the impacts of vast political changes and acquisitions policies on the accuracy of cost estimates and corporate profitability.
3. Finally, future researches could explore the impact of IGCE, and the sharing of IGCE information, on the accuracy of cost estimates and corporate profitability.

### **Reflections**

The doctoral study process was more than just a process, it was a journey. While the difficulty and challenges associated with the doctoral study process were well known, they were not always well-understood. Throughout the process I found myself learning new techniques and strategies for time management, classroom management, interacting in a virtual environment, connecting with and interviewing individuals I was not familiar with, and ensuring I reach my ultimate goal even through some very difficult challenges. I found the process to be straightforward; however, there were numerous areas where I,

and many of my peer scholars, get stuck, such as the literature review and data collection. Knowing what I know now, I would not stress as much when encountering these obstacles but better plan my approach to conquer them.

My 14 years in the Air Force and previous involvement with project cost estimating had the potential to create a bias during the conduct of this study. Upon completion, I learned my potential bias did not present itself and impact the study. I actively tried to mitigate the bias by selecting individuals and contractors I had no previous knowledge of. In addition, I used an interview protocol to help drive the discussion for each individual participant. My previous experience with DoD contractors and working knowledge of their cost estimating practices did not influence the participants, research situation, or the completion of the study.

### **Conclusion**

The purpose of this qualitative multicase study was to explore strategies DoD contractors use to improve defense acquisition cost estimates and corporate profitability. This study identified potential strategies for DoD private industry business leaders to use to not only improve their cost estimates but also increase corporate profitability. The strategies identified by this study include: (a) enhancing the relationships between contractor and customer; (b) increasing ability to innovate in project execution and proposal development; (c) improved project awareness and understanding of the domain environment; (d) identifying change in, and utilizing, acquisition policy and political environments; and (e) identification of labor rates and pricing during the bidding process.

The findings from this study show there are areas where DoD private industry contractors can improve their cost estimating strategies. By combating the challenges to developing accurate cost estimates and implementing the recommended improvement strategies, improved cost estimating practices and policies can provide a positive impact on corporate profitability. Furthermore, the enhanced fidelity in cost estimating, increased profitability, and potential increased business performance drive improvement in social conditions such as employment rates, wages, and local technical knowledge.

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## Appendix: Interview Protocol

Strategies for Improving Contractors' Defense Acquisition Cost Estimates		
Date, time, and location of interview		
Interviewee/Participant identification number		
Step 1	Introduction	Introduce myself and thank the participant for taking part in the study.
Step 2	Purpose	Identify the purpose of the study to research strategies to improve contractor cost estimates in the Department of Defense.
Step 3	Description of why the interviewee is participating	Explain the participant is selected based on their qualifications and experience in Department of Defense acquisition programs and cost estimating. The information they provide will be beneficial in answering the research question and partially fulfilling my Doctor of Business Administration degree requirements.
Step 4	Description of the benefit of participation	Business leaders may use the results of the study to improve cost estimating strategies and interactions with government stakeholders.
Step 5	Ethics	Ethical standards will be maintained before, during, and after the interview. Request permission to take notes during the interview, to include the opening discussion.
Step 6	Confidentiality	Explain all information will be confidential and will be recorded without the use of a company name or participant name. All hard copies will remain in a locked filing cabinet in my home office and electronic copies will remain password protected for 5 years after the approval of the study. I will destroy all data 5 years after approval of the study.

Step 7	Participant questions	Do you have any questions or concerns regarding this study or the interview process we have just discussed?
Step 8	Interview transition	Identify the transition into the interview questions using a semi-structured approach.
Step 9	Conduct the interview while taking note of body language and verbal cues. Ask probing and additional questions as necessary throughout the open discussion.	<ol style="list-style-type: none"> <li>1. What is your role and involvement in the cost estimating process and the assessment of its influence on corporate profitability?</li> <li>2. What challenges has your business faced in developing accurate cost estimates?</li> <li>3. What strategies or internal best practices to address your challenges with developing accurate cost estimates have worked for you, and why?</li> <li>4. What strategies or internal best practices to address your challenges with developing accurate costs estimates have not worked for you?</li> <li>5. Why did the strategies or internal best practices to address your challenges with developing accurate cost estimates work or not work?</li> <li>6. What were the key barriers to implementing your successful strategies for developing accurate cost estimates?</li> <li>7. How did you address the key barriers to implementing your successful strategies for developing accurate cost estimates?</li> <li>8. How did you assess the effectiveness of your strategies for developing accurate cost estimates?</li> <li>9. How do you assess the impact of your relationship with DoD counterparts on the development of accurate cost estimates?</li> <li>10. What additional information would you like to share about the strategies you have used to develop accurate</li> </ol>

		cost estimates to improve corporate profitability?
Step 10	Closing	Thank the participant for their time and ask if follow-up interviews, discussions, or questions are acceptable. Ask the participant their preferred method of communication.