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Procurement Total Cost Analysis: A Supply Chain Strategy for the Aviation Industry

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Abstract

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MBA, Embry Riddle Aeronautical University, 2002

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

In the aviation industry, purchasing departments spend approximately 80% of revenues on procurement. Additionally, 62% of companies experience unforeseen expenses or hidden costs in the procurement process. Grounded in a conceptual framework of activity-based costing, the purpose of this case study was to explore strategies used by 5 upper-level supply chain management leaders at a maintenance repair and overhaul company in the aviation industry in the Southeastern United States to accurately forecast procurement costs. Data collection included 5 semistructured interviews, company documents, and annual reports. Through thematic analysis, the major themes that emerged from the data analysis were accuracy, competitive advantage, improved corporate performance, and improved total cost analysis. The findings may contribute to social change in the Southeastern region of the United States. The aviation industry is experiencing competition from low-cost countries and the economy of the region and hundreds of families and educational institutions depend on the success of the companies in the region for sustainability.

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Dedication

There are many whom to thank for helping me achieve this milestone in my life. First God, then my family and close friends, they understood my commitment to completing the doctoral study and were there for me through the ups and downs of the doctoral process. They provided me with the emotional support needed to make it through. To my colleagues who encouraged me; and helped me stay focused and enthusiastic when I was tired and disappointed. To my students, I could not let them down; I could not quit, I had to be an example to them. To my college leadership team, I could not let them down, they fully supported my DBA goal. Finally, a world of gratitude to the participants of my study; without them, this doctoral study could not have been completed. I dedicate this doctoral study to all who knowingly or unknowingly helped me make this dream come true. I am forever grateful to all who were there for me.

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I am grateful and wish to thank the industry community partner for supporting my research and agreeing to participate in my doctoral study. I would like to thank my chair and committee members, Dr. James Glenn, Dr. Ronald Jones and Dr. Reginald Taylor who were instrumental in my success. I am forever grateful to all. Their support, commitment, and feedback was key every step of the way.

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Section 1: Foundation of the Study

Stakeholders expect positive results in a business value chain. One of the most basic ways to achieve clarity and transparency of results is through a total cost analysis (TCA) mechanism that ensures that channel partners along the supply chain understand the total cost (Terziouglu & Chan, 2013). As businesses expand globally, and as business processes become more complex due to the economic demands of a global business environment, it is prudent to improve TCA mechanisms (Rajeh, Tookey, & Rotimi, 2015). An accurate TCA will provide corporate leaders with the ability to forecast goals. Activity- base costing (ABC) may be a valuable mechanism that can be used in different industries to help leaders ascertain accurate total cost (Moisello, 2012). Stakeholders need to trust the financial information that is provided by corporate leaders. When business leaders have instant and accurate total cost data, they are better prepared to accurately meet stakeholders financial goals.

Background of the Problem

Senior level supply chain management (SCM) leaders at aviation companies have the duty to control or reduce the total cost of operations for their companies. Because procurement department managers' TCA practices may not always consider all costs, and because financial performance is affected by operational costs, improved analysis mechanisms might improve financial outcomes (Rajeh et al., 2015). Decisions by SCM leaders in procurement departments have a significant impact on profitability. Procurement departments can sometimes spend approximately 80% of revenue on procurement (Mishra, Devaraj, & Vaidyanathan, 2013).

During the literature review, I found few peer-reviewed or industry articles on TCA in the aviation industry. The work by Khan, Dong, and Zhang (2015) was one of few studies that addressed TCA and a total cost mechanism. A goal of this doctoral study was to address this lack of literature on TCA in the aviation industry, and perhaps contribute to the literature in other industries.

Some of the strategies that airline leaders pursue to reduce cost include global sourcing and outsourcing. Demirtas (2013) found that outsourcing created opportunities for airlines to focus on core competencies. Since the 1990s, researchers have found that there is a tendency to outsource some aviation processes that require organizational leaders to analyze the pros and cons of outsourcing in relationship to total cost (Quinlan, Hampson, & Gregson, 2013), thus the importance of knowing what the total costs are resulting in better decision making.

China is a major recipient of global sourcing and outsourcing processes. In 2010, the Chinese government decided to allow the yuan to float in relation to other world currencies, which caused the value of the yuan to appreciate (Hilland & Devadoss, 2013). Appreciation of the yuan meant that manufacturing or outsourcing in China would be more expensive (Hilland & Devadoss, 2013). The decision of the Chinese government to allow the yuan to float was not an event that companies that outsourced expected (Hilland & Devadoss, 2013), and the fluctuation of the yuan against the dollar was only one example of the many forces that may affect total costs.

Total cost may fluctuate continually, and therefore a mechanism that accurately quantifies total cost quickly is key to better decision making (Rajeh et al., 2015).

Corporate leaders who decided to outsource based their decision on TCA, although Norreklit (2014) found that the more complex the business process, the less likely corporate leaders would be to evaluate the total cost of the entire supply chain. Also, if corporate leaders performed accurate total quantifications before sourcing or outsourcing globally, they might have found opportunities to keep jobs at their original sites in the United States (U.S. Department of Commerce, Office of Public Affairs, 2014).

Problem Statement

One of the top challenges for companies is accurately assessing procurement costs (Johnson, Sawaya, & Natarajarathinam, 2013); 62% of companies surveyed in the study experienced unforeseen expenses or hidden costs in the procurement process (Handley & Benton, 2013). Procurement departments spend approximately 80% of revenues on procurement (Mishra et al., 2013), making TCA a vital issue in addressing the challenges of total cost procurement (Johnson et al., 2013). The general business problem in this study is that some procurement managers lack costing systems to capture all costs related to procurement, which leads to inaccuracies in total cost calculations. The specific business problem is that some SCM leaders in the aviation industry lack strategies to improve existing costing systems to forecast procurement costs accurately.

Purpose Statement

The purpose of this qualitative, single-case study was to explore strategies some SCM leaders use to improve existing costing systems to forecast procurement costs accurately. The targeted population was five upper-level SCM leaders at a maintenance repair and overhaul (MRO) company in the aviation industry located in the Southeastern

region of the United States, leaders who had successfully implemented strategies to improve existing costing systems to accurately forecast procurement costs. This study has implications for positive social change: decisions that did not lead to outsourcing offshore could maintain job opportunities in the Southeastern region of the United States' aviation market and thus promote a sustainable economy in the region.

Nature of the Study

For this study, a quantitative methodology was not the best method because it did not support open-ended exploratory questions (Bigger, 2014), thus helping the researcher a better use of the time allotted for the interview (Jamshed, 2014). A quantitative researcher draws data from a sample population to explore correlations among phenomena (McCusker & Gunaydin, 2015). A mixed methods strategy, which combines qualitative and quantitative methods to collect and examine various forms of data (Klassen, Creswell, Plano Clark, Clegg Smith, & Meissner, 2012), was not appropriate because the use of a hypothesis introduces preconceptions about issues that might prevent the researcher from keeping an open mind about the research topic (Klassen et al., 2012).

Instead, I used a qualitative methodology to explore how SCM leaders in the aviation industry use total cost strategies in procurement. A qualitative methodology supports personal interactions between the researcher and participants when exploring the phenomenon in the participant's environment (Bigger, 2014). I chose to use a qualitative methodology because, according to Marshall and Rossman (2016), a qualitative research method helps researchers explore business issues through the lens of the personal experiences of the participants in the study.

I used a case study design because it enabled me (a) to explore a program in depth and use a single unit with multiple participants in the same company and (b) to research real-world business issues that companies experience (Yin, 2014).

Unlike a case study, a phenomenological design observes a few participants over an extended period to understand what matters most to them (Leedy & Ormrod, 2016). It was not an appropriate strategy because my intent was to explore an event, not the perception of the event (Leedy & Ormrod, 2016). Ethnography is used to study the culture of a group of participants for an extended time in a natural environment (Leedy & Ormrod, 2016). Ethnography was not an appropriate design because, unlike a case study design, the focus would be on the culture of the group instead of on the business situations that individuals experienced in a particular time frame (Leedy & Ormrod, 2016). A narrative research design, which is used to study the lives of people and eventually make their stories into a narrative (Marshall & Rossman, 2016), was not an appropriate method because my goal was not to combine the views of both participant and researcher (Marshall & Rossman, 2016). A qualitative single case study design was used for this study because a case study can be used to research real-world business issues that companies experience (Yin, 2014).

Research Question

What strategies do some SCM leaders in the aviation industry use to improve costing systems to forecast procurement costs accurately?

Interview Questions

1. What strategies do you use to improve existing costing systems to forecast procurement costs accurately?
2. What strategies do you use to implement a total cost analysis system in procurement?
3. What costing methods do you use to track total costs?
4. How do you track your procurement process?
5. What data do you collect?
6. What categories of cost do you use?
7. What internal controls do you use to identify all the cost associated with the procurement of parts from domestic and international vendors?
8. What automation tools are used to gather the cost information?
9. How do you account for unforeseen or hidden costs when calculating the total cost of procuring a product?
10. What additional information, if any, do you believe pertinent to the study not discussed in the interview questions?

Conceptual Framework

The conceptual framework used in this study was the ABC business model. Staubus (1971) introduced the concept of activity costing and input-output accounting as a way to expand conventional cost-accounting models. Cooper and Kaplan (1987) expanded on the traditional costing methods by creating a hierarchy of cost classification. ABC is a comprehensive method used for calculating and allocating costs to activities

specific to a process (Mahal & Hossain, 2015). The accuracy of cost allocation helped managers make better strategic decisions by reducing inaccuracies in total cost assessment (Johnson et al., 2013; Mahal & Hossain, 2015).

The key tenet of ABC is the accurate assignment of costs to the specific activity of the work process in all business activities consumed by each sector (Mahal & Hossain, 2015). ABC is a platform that identifies and assigns costs by activity, function, and process, and not by the product, channel partner, or customer base (Kannaiah, 2015). ABC applies to this study because it is a strategy that managers in the aviation industry can use to obtain a competitive advantage by accurately identifying total cost. Leaders can use ABC to help improve the process of capturing total cost of procurement when managers are performing a TCA. According to Boukherroub, Ruiz, Guinet, and Fondrevelle (2015), performance measures used in ABC helped managers distinguish the components that could improve corporate performance and maintain a competitive advantage.

Operational Definitions

Because the following technical terms were used repeatedly, they are defined for the reader as follows.

Activity-based costing (ABC): ABC is a comprehensive resource allocation method used for calculating total costs and allocating costs to the activity specific to the process (Mahal & Hossain, 2015).

Costing estimation model: A costing estimation model is a cost management model used to ascertain activity and total cost (Hongzhuan, Kaifeng, & Zhigeng, 2013).

Costing models were adopted based on conventional cost accounting methods coined as ABC (Cooper & Kaplan, 1987).

Hidden costs: Hidden costs refer to unanticipated costs that come up at any stage of strategic decision-making processes (Handley & Benton, 2013).

Maintenance Overhaul and Repair (MRO) facility: An MRO in the aviation industry is a facility where there is movement of parts to repair the aircraft component, and a flow of information that includes the repair plan, verification, and action cycle (Chang & Kora, 2014).

Offshoring: Offshoring refers to the low-cost sourcing of goods and services from developing countries. Offshoring involves the transfer of operations to another country (Foerstl, Kirchoff, & Bals, 2016).

Outsourcing: Outsourcing is a strategy that companies use when they want to focus on core competencies. Leaders will use independent organizations to complete processes a business no longer wants to complete internally (Gunasekaran, Irani, Choy, Filippi, & Papadopoulos, 2015).

Reshoring: Reshoring is the processes in which purchases and operations move back to the country of origin (Foerstl et al., 2016).

Reverse logistics: Reverse logistics is the reverse movement of goods in the supply chain (Govindan, Soleimani, & Kannan, 2015).

Supply chain: A supply chain is a network of companies working together in different processes and activities with the intent to create value in the form of products and services (Mackelprang, Robinson, Bernardes, & Webb, 2014).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions were conditions considered acceptable, and without said conditions, this research would be aimless (Leedy & Ormond, 2016). This study was based on four assumptions. The first assumption was that the phenomenon investigated was not the result of random events. The second assumption was that procurement processes and procedures followed some standard procurement process. The third assumption was that the participants' responses would be truthful and would reveal how each interviewee used TCA at their organization. The fourth assumption was that the use of a case study strategy would offer an opportunity to study the business problem and that the outcome would create documentation that could enhance understanding of the issues central to the problem statement.

Limitations

Simon and Goes (2013) explained that limitations were issues in a study that are out of the researcher's control. The first limitation of this study was the unavailability of the participant for an extended period of time. The participants traveled often and may not always be available for the interview. A second limitation was the use of a single-case study design, which meant that the sample population might not be representative of a larger population. To address this issue, I selected a large local company that implemented an enterprise resource planning (ERP) system and used ABC; also, I focused on the strategy of sourcing processes used within the company. Additionally, the target company was a large MRO that used aviation procurement processes that are

standard in the aviation industry and in compliance with the Federal Aviation Administration.

Delimitations

Delimitations are attributes controlled by the researcher that determined the scope of the study (Simon & Goes, 2013). In this study, the primary delimitation was its focus on one business in the aviation industry in the Southeastern region of the United States. Other delimitations were (a) the focus on TCA and (b) the use of a case study design that allowed follow-up questions to obtain additional data as needed.

Significance of the Study

According to Blakey (2014), the member companies of the Aerospace Industry Association (AIA) employed about 1 million workers, and indirectly supported over 2 million jobs yearly. The aviation, aerospace, and defense industry contributed 2.3% to the U.S. gross domestic product (GDP). Although the aviation industry is key to the U.S. economy, few researchers have carried out academic studies on the total cost of procurement in the industry (Chang & Kora, 2014). A key feature of this study for the industry is the availability of added research based on TCA strategies.

Systems that accurately determine the total cost of procurement would be of value to the aviation industry because the costs of production and repairs in the aviation industry are high when compared to those in other industries (Chang & Kora, 2014). Some company leaders are unaware of the total cost of operations or production, leading managers to make wrong business decisions (Kannaiah, 2015). On average, prices quoted by vendors sometimes include extra costs up to 50%, leading to inaccurate total cost

assessment (Platts & Song, 2010). Some costs are dynamic and sometimes total cost assessment does not take the dynamic nature of the cost into account (Johnson et al., 2013). As a result, greater accuracy in TCA might be valuable to leaders in the aviation industry who set procurement strategies.

Contribution to Business Practice

Florida, with over 470 companies in aviation, has the highest ranking among states for appealing to aerospace manufacturing companies looking to expand (Florida Enterprise, 2017). The implementation of costing systems requires significant additional cost; however, Khan et al. (2015) posited that the benefits of the increase efficiencies, the improvement in speed in response to market changes, and the accuracy of data outweighed implementation costs. The TCA strategy described in this study might help managers accurately identify total costs when sourcing parts for various aviation projects. The improved process might give leaders the ability to respond faster to market changes.

Implications for Social Change

Better TCA could give leaders a decision-making mechanism that could help them decide to keep jobs in America instead of offshoring them, because the TCA demonstrates that procurement costs can be lower when procuring within the United States (U.S. Department of Commerce, Office of Public Affairs, 2014). Similarly, leaders in the aviation industry based in the Southeastern region of the United States might use better costing models that lead them to keep jobs in the region.

A Review of the Professional and Academic Literature

In this study, I explored the processes and mechanisms used to analyze the total cost of procurement in the aviation industry, and the strategies that SCM leaders successfully used when making procurement decisions. I constructed the research's exploratory questions with the intent to find what strategies procurement managers use to determine total costs (Yin, 2014). The questioning process can be of potential benefit to the aviation industry because the responses can uncover improvements in the TCA of procurement methods that managers use, a procedure which is in alignment with the case study methodology discussed by Yin (2014).

A comprehensive literature search helped answer the overreaching question of the study about methods and strategies used in TCA, but peer reviewed articles on TCA specific to ABC in the aviation industry were not available. The lack of literature is unfortunate for the industry because the costs of production and repairs in the aviation industry tend to be higher when compared to those in other industries (Chang & Kora, 2014). The lack of scholarly literature supported the need for literature on strategies that accurately ascertained total cost in the procurement process. Some companies are not always aware of the total cost of procurement, operations or production. Kannaiah (2015) posited that leaders who do not have accurate total cost could make incorrect decisions, costing companies significant losses. Since I did not find articles on TCA in the aviation industry, I had to change the literature search strategy to find articles in other industries that addressed methods used in total cost quantification in general. The existing body of literature regarding the use of ABC in TCA was abundant and diverse. The variation of

application and strategies of ABC applicable to various industries helped to support the validity of the conceptual framework used to support the study.

Seuring and Gold (2012) considered literature reviews the foundation of scholarly writing and mentioned that literature reviews helped to develop theory. Scholars may use literature review as a tool to synthesize and map concepts dispersed in the research process (Seuring & Gold, 2012). To find articles for this literature review, I used the institutional libraries of Walden University and Nova Southeastern University to perform a thorough search of peer reviewed articles to consolidate the articles on the various topics of the sections of the study. The selection of empirical work and other articles chosen may provide a comprehensive representation of TCA supported by ABC and may be of interest to other business scholars. Table 1 depicts the results referenced in the literature review.

Table 1

Detail of Literature Review Sources Search Output

Reference type	Total	< 5 years	> 5
Research-based peer-reviewed journals	123	107	16
Research-based nonpeer-reviewed journals and industry reports	23	19	4

Strategy for Literature Search

The databases used to perform the searches were Business Source Complete, ABI/INFORM, EBSCO, Emerald Insight, Sage Premier, and Google Scholar. I

performed comprehensive searches using the following keywords and combinations: *activity based costing, ABC theory, ABC history, ABC and procurement process, ABC sourcing and procurement matrix, transaction cost, procurement cost, transaction cost optimization, procurement matrix and tools, sum of cost savings, total procurement benefits, procurement and supply chain management, hidden costs, supplier management, quality and procurement, risk in global sourcing, risk of operations,* and *sustainability.* Over 1000 articles came up from the search, but some of the articles were past the 5-year maximum age or did not align well with the purpose of the study. The next step was to restrict the search to within the last 5 years, using the word combinations for each section of the study, and applying a boolean operator to limit the search string accordingly.

A comprehensive examination of peer-reviewed articles included topics related to total cost concepts and ABC within the conceptual framework of procurement, the historical perspectives of procurement and ABC, hidden costs issues, the benefits of ABC, and the implementation concerns of ABC. Other topics outside of ABC included transaction cost economics (TCE), total cost of ownership (TCO), risks in global sourcing, the total cost of offshoring, supplier management, and the limitations of ABC. The goal was to provide the reader with a synthesis of the content by using TCA within an ABC framework and the validity of ABC as a conceptual framework.

Application to the Business Problem

The purpose of this qualitative single-case study is to explore the strategies some SCM leaders use to improve existing costing systems to forecast procurement costs

accurately. Stakeholders' demands for better financial results have pressured top corporate leaders to come up with business strategies focused on maintaining a competitive advantage (Johnson et al., 2013). Competition in a global marketplace and technological advances have left management leaders with no choice but to put in place improvements in cost management processes and cost structures (Kaličanin & Knežević, 2013). Ernst and Young, in cooperation with the Institute of Management Accountants, conducted a survey indicating that in 2012, management considered cost reduction and accuracy in cost information as their top two priorities (Terzioglu & Chan, 2013). Additionally, Terzioglu and Chan (2013) mentioned that costs were often skewed and noted that about 45% of the respondents in their survey thought that cost accuracy was a significant issue, hence the need for more accurate costing methods.

Product costs that do not appear directly associated with procurement, yet might influence it, included payment discounts, delivery cost, reverse logistics costs, financing cost from payment terms, and cost of repairs for products that are under warranty (Kang, 2015). Part of the inventory holding process is warehousing, and logisticians must deal with the accurate quantification of inventory holding cost (Azzi, Battini, Faccio, Persona, & Sgarbossa, 2014). In their paper, Azzi et al. (2014) used ABC to determine the cost in warehouse systems where the cost driver was the cost to hold one unit. Azzi et al. mentioned that inventory holding cost and total cost of inventory are also important to the procurement process; for this reason, procurement processes need to be effective and efficient.

ABC can be a useful mechanism for a procurement manager to plan and budget. Dybvig, Karrenbauer, and Miller (2014), in their study on planning and budgeting using ABC, posited that the Consortium of Advanced Management International (CAM-I) were known supporters of ABC, and used ABC in their publications on planning and budgeting to forecast marketing spend within the framework of enterprise master planning (EMP). The efficacy of using ABC in EMP was indicated because the drivers of ABC were activities key to EMP, which made the process of determining the costs of goods sold, shipping, warehousing, and marketing more effectively (Dybvig et al., 2014). The authors posited that most ABC software providers offer the capability to determine fixed sales forecast and marketing spend from existing operating data. The decisions that managers in procurement departments make can affect the sale price of a good and directly contribute to the bottom line (Pereira, Christopher, & Lago Da Silva, 2015). Dybvig et al. (2013) added that the procurement decision process might affect areas like delivery dates, quality of the product, and supplier selection.

Maintenance is a complex and important component of the airlines business, and the TCA of a maintenance program is full of complexity because parts of the maintenance process is sometimes outsourced, making the total cost process even more cumbersome (P. Phillips, personal communication, March 14, 2017). I was not able to find peer reviewed articles that were specific to maintenance in the aviation industry. I was, however, able to find research about maintenance in the general industrial sector, which included concepts on ABC. Sinkkonen, Marttonen, Tynninen, and Kärri (2013) focused their research on maintenance cost management for industrial equipment in

general. Haroun (2015), along with Sinkkonen et al., mentioned that the research demonstrated that ABC was the preferred costing method for their maintenance processes. The research in this study may demonstrate that ABC will be applicable in the aviation industry since maintenance is a key in the industry.

ABC, as a conceptual framework that emphasizes the importance of TCA; thus, in my study, I examined why ABC is key to conceptualizing leaders' strategies to improve existing costing systems to forecast procurement costs accurately. Hence aligning cost reduction strategies, which business leaders perceived as an area of opportunity in SCM with cost analysis is key to the industry (Johnson et al., 2013; Kaličanin & Knežević, 2013; Pereira et al., 2014; Terzioglu & Chan, 2013). I will now discuss the validity of the conceptual framework, the implementations success, and the concerns and limitations of ABC.

The Total Cost Concept and Activity-Based Costing Model

Traditional cost calculations might lead to flawed profit reporting and total cost inaccuracy of a product (Chen, Wang, & Qiao, 2014). Chen et al. (2014) specified that to improve cost calculation and collect financial information using ABC; activities needed clear identification, cost libraries, and the creation of a measurement basis. Some researchers have posited that ABC models help improve the accuracy of data needed to arrive at TCA and profitability reporting. In this section, I will address some of the claims made on the usefulness of ABC models.

Research on a variety of applications supported by ABC models has continually evolved and are incorporated into different total cost applications and research. Some of

these models are the Dupont Model, the total cost of ownership (TCO), cost of quality, CAM-I modeling, and other models which I will discuss later in the study. I identified various total cost models during the literature review, and ABC often came up as a model used to optimize the TCA process. Besides synthesizing the conceptual framework, I addressed some of the methods and trends related to ABC.

ABC and Total Cost Analysis: How Valid is the Conceptual Framework

The main idea that continually came up during the research on TCA was ABC. Although this study does not aim to recapitulate the history of how ABC came about, I seek to answer the question of why ABC can be a useful mechanism for management leaders. The evolution of purchasing to procurement was a major development of SCM, and total cost assessments helped to achieved said improvements as purchasing evolved to procurement (Hesping & Schiele, 2016). Most noteworthy was the work of Staubus (1971), who was a proponent of activity costing as a means to improve cost accounting methods. Originally the term meant transaction costing (Staubus, 1971). As the procurement process evolved, academic researchers continued to look at ways to optimize the procurement process and accurately ascertain total costs.

Cooper and Kaplan (1987), proponents of total cost optimization, expanded upon traditional costing methods by classifying costs and creating a hierarchy of cost. ABC then supported the possibility that managers could efficiently perform the procurement transaction to reduce overall costs (Boukherroub et al., 2015). According to Moisello (2012), the first era focused on correcting issues in the allocation of cost to overhead. Moisello (2012) posited that studies in the first era did not lead to the spread of ABC. The

term ABC evolved from simply ascertaining the cost of a product for decision making to, later, strategic costing (Moisello, 2012). Cooper and Kaplan (1987) continued to expand the concept of ABC to address time-driven issues. I will discuss time-driven activity based costing (TDABC) later in the study under lean six sigma processes.

As management leaders incorporated ABC into cost management processes, the areas also expanded where ABC helped improve the processes. The Dupont analysis model was an example of the use of ABC by dating back the expense and decomposing an item's cost expenses to solve issues with cost control and accurate cost reporting (Chen et al., 2014); this research used Dupont analysis to provide stakeholders' return on equity (ROE) information. Chen et al. (2014) clarified that Dupont analysis is not totally representative of an organization's operating performance; however, it might help to reduce profit misrepresentations that might occur under traditional methods. Khaled and Murgan (2014) used ABC model to research the cost of quality using data in the industrial process. The authors suggested that quality was a component of customer loyalty. Khaled and Murgan (2014) explained that traditional accounting methods had limitations regarding intangible cost like quality; hence, improved costing methods, like ABC, were needed in costing simulations modeling. Table 2 below depicts the various business processes associated with ABC. I Identified fifteen different types of processes by different researchers between 2012 and 2017.

Table 2

Business Process Associated with Procurement Related to ABC

Business Process	Author	Year
Cost of quality	Khaled & Murgan	2014
Customer supplier negotiations	Chang, Cheng, & Trotman Masschelein, Cardinaels, & Van den Abbeele	2013 2012
Customer profitability	Cokins	2015
International procurement	Johnson, Sawaya, & Natarajarathinam	2013
Inventory holding cost	Azzi, Battini, Faccio, Persona, & Sgarbossa	2014
Material Handing	Lapinskaite & Kuckailyte	2014
Logistics	Estampe, Lamouri, Paris, & Brahim-Djelloul,	2013
Planning and budgeting	Dybvig, Karrenbauer, & Miller	2014
Procurement risk	Lee, Li, & Xie	2013
Product profitability	Chen, Wang, & Qiao	2013
Production	Lapinskaite & Kuckailyte	2014
Reverse logistics	Govindan, Soleimani, & Kannan	2015
Supply Chain Management	Seuring & Gold	2012
Transportation	Lapinskaite & Kuckailyte	2014
Warehousing	Lapinskaite & Kuckailyte	2014

Note. Adapted from sources used in the literature review process.

Success in the implementation of ABC. According to Moisello (2012), a significant sample of the literature reviewed in her study revealed that implementation of ABC was successful. Success resulted when the leadership team demonstrated organizational qualities that moved the project forward, and the company had an open mind about change and provided the resources necessary to implement the transition successfully (Moisello, 2012). Moisello (2012) mentioned that, as with any transition, effective communication from the leadership team about the benefits from the outcomes of ABC would be helpful in the transition process. Ibrahim and Saheem's (2013) research focused on what motivated management support of ABC. Of their original 13 reasons, the top three included accomplishing more work than before, better use of available expertise, and support of the critical aspect of the company. Ibrahim and Saheem (2013) demonstrated that the results in operational outcomes were cost reduction, the accuracy of information, improved activity coordination, and a better tool for decision-making. Kaličanin and Knežević (2013) posited that ABC applications provided a reliable foundation for reporting accurate data on cost management.

Scholars of CAM-I models based their research on ABC concepts which continues to evolve as more companies implement ERP systems to track total cost. A balance scorecard is a concept used in strategic planning, and Kaličanin and Knežević (2013) mentioned that ABC helped managers estimate future costs and accuracy when reporting current outcomes which helped to have a better balance scorecard reporting. Estampe, Lamouri, Paris, and Brahim-Djelloul (2013) denoted that ABC was useful for internal analysis of companies and proposed that using ABC signified that the firm had

achieved maturity in the context of SCM. Estampe et al. looked at the performance of the ABC model based on a tactical and operational decision-making level. Estampe et al. included financial performance of intra and inter- organizational flows.

A study on fairness perception used in negotiations by Masschelein, Cardinaels, and Van den Abbeele (2012) found that the use of ABC to improve cost accuracy information improved the perception of fairness by channel partners in a supply chain. The idea of measuring the cost associated with customer profitability is not as evident, hence, Cokins (2015) used ABC to measure the cost of resources used regarding customer profitability. Cokins posited that customer segments caused different workload demands that affected profitability, and viewed ABC as a multilevel cost reassignment network to trace and report more accurately the resources used servicing varied customers. Cokins added that some of the costs come from salaries and employee benefits, direct material, travel expenses, communication, depreciation, rent, interest, and taxes. Cokins mentioned that the flexibility of ABC software allowed for an easy process when assigning flow costs into an accumulated cost and, most importantly, cost visibility through the cost assignment network. Ultimately, ABC adoption in an organization can lead to the successful implementation if it includes communication and training of the employees. Moisello (2012) posited that ABC could be advantageous for an organization if those in leadership positions demonstrated the necessary commitment to administrative innovation.

In the area of management control, Gooneratne and Hoque (2013) focused their research on the importance of ABC after the global deregulation of the banking industry.

The authors noted that ABC had become a key mechanism to manage financial performance and costs. Gooneratne and Hoque mentioned that ABC often appeared in articles on strategic planning, but the authors also countered that the ABC studies were not yet grounded in theory. Still, within the financial sector, ABC allowed leaders a better understanding of the driving forces of cost and cost allocations to a resource. Kalicanin and Knezevic's (2013) work on strategic management indicated that ABC was key in providing leaders with information on low-cost production and distribution. Kalicanin and Knezevic mentioned that tracking the cost drivers allowed managers to make quicker and more accurate decisions when responding to market changes in a low-cost environment.

Implementation concerns and limitations of ABC. Before discussing the implementation concerns of ABC, ERP systems needed added discussion. ERP is a platform that may implement ABC, and is considered a key component that affects the speed, visibility, and access to information for those affected by its functionality (Khan et al., 2015). ERP is a platform that provides an integrated approach to processes that are standard in business, like production planning, which directly relates to procurement (Khan et al., 2015). Garg and Garg (2014) posited that IT infrastructure was a key strategy for successfully implementing an ERP system. ERP has other functionalities, like warehousing and inventory management, which also affect the total cost quantification and procurement processes.

Terzioglu and Chan (2016) mentioned that ABC was an effective method and that the lack of successful implementation could only be due to the poor management

application, and although ABC was sound conceptually and theoretically, the issues with failure arose in the implementation stage (Terzioglu & Chan, 2016); yet, ABC has remained the preferred method in the manufacturing industry. Furthermore, Terzioglu and Chan (2016) suggested that to gain a deeper understanding of ABC; more case studies could further the understanding of these implementation issues. The high cost of ERP implementation could be considered a roadblock to the success of ABC (Khan et al., 2015). Terzioglu & Chan also mentioned that company leaders lacked understanding of the value proposition of ERP, which has limited the success of ERP systems affecting TCA using an ABC process.

One of the implementation concerns of ABC was the high cost of obtaining an ERP system that offered the client accuracy in the analysis of large amounts of data in real time that allows managers to assess costing results in real time (Drake, Myung, & Hussain, 2013). Drake et al. recognized an additional issue regarding the cost of maintaining the information because data needs to be accessed quickly and easily. The assignment of cost drivers is time-consuming, and thus very costly. ERP systems created by developers to use ABC in their architecture require extensive human resources and training by information technology managers to maintain the system, which can be a lengthy, and costly process (Drake et al., 2013). Moisello (2012) added that in addition to issues regarding the design of the software, there was a lack of focus on organization issues, specifically the resistance of employees to use the ERP system. Chen et al. (2014) noted that calculations using ABC were challenging because traditional accounting systems did not have enough cost management data. Additional cost data is feasible

through the application of lean six sigma processes, but not all major companies have incorporated lean processes in their operation due to costs, and steep learning curves.

Unrelated to ERP, Johnson et al. (2013) mentioned that ABC was not effective when direct cost drivers were not available. Although considered positive overall, cost accuracy from the use of ABC models was one-sided depending on the point of view of the seller or the buyer. Masschelein et al. (2012) demonstrated that the seller's perception during the negotiation on contract changes seemed fair when the buyer caused the issue, and not when the seller caused the issue, and vice versa.

Regarding quality management, Norreklit (2014) focused his research on how ABC misrepresented indirect procurement cost allocation within the context of supplier-buyer relationships. The author was concerned that indirect costs sometimes became hidden costs. Norreklit mentioned that the literature on ABC did not address the complexity of the procurement activities within the context of the supply chain and the different business functions that procurement affected. ABC did not address costs within the construct of long-term business relationships, and therefore it would be difficult to forecast the total costs, which might put unnecessary pressures on a long-term business relationship (Norreklit, 2014). Gooneratne and Hoque (2013) noted that the issue with ABC was that management adopted ABC as a pilot project or in conjunction with an existing costing system, hence, sufficient commitment to ABC was not evident, thus adversely affecting the success of ABC implementation.

Hidden costs considerations. Studies by Handley and Benton (2013), Johnson et al. (2013), as well as Larsen, Manning, and Pedersen (2013) mentioned that in their

research on offshoring and international procurement, one of the major concerns were hidden costs that were not included in the decision-making process to offshore or outsource. The authors noted that offshoring was a complex process and that it was difficult to calculate all the cost associated with offshoring and outsourcing, and that hidden cost was not a concept that many researchers focused on. Larsen et al. (2013) focused part of their research on finding out why management did not consider, or ignored, some costs not counted in the initial stages of cost estimation. Johnson et al. (2013) posited that cost omissions lead company leaders to incorrect sourcing decisions. Hidden cost research is key for industries that decide to offshore. The initial cost savings objective may not always be feasible, and the decision to offshore may prove to have higher costs than expected (Larsen et al., 2013). For this reason, hidden cost was important in this study because if some of the companies obtained the correct TCA before deciding to offshore, they might have made different decisions and, instead of offshoring, decided to keep jobs in America.

Azzi et al. (2014) mentioned that in nonautomated warehousing, most costs were not easy to quantify, and mostly disappeared into other costs. Some of the hidden costs found in inventory holding cost processes included inspection and counting during the year, remanufacturing, repacking and relabeling; and loss of sales or backlog (Azzi et al., 2014). Some of the hidden costs that Johnson et al. (2013) pointed out were shipping and the cost to expedite a shipment, the variability of lead time of parts purchased that affected inventory levels, financing costs that included exchange rate variations, the

oversight of other locations, as well the cost of the transfer of knowledge to other sites; and taxes, tariffs, and duties which can fluctuate depending on export agreement changes.

Larsen et al. (2013) pointed out the following examples of hidden costs: the cost of layoffs, vendor selection, ramp up costs, managing contracts, low learning capabilities, training costs, reduced coordination ability, coordination costs, negative effects on core competencies, design specification cost; and knowledge transfer costs. Some hidden costs were even less evident; For example, research by Lu, Zhang, and Pan (2015) pointed out that managers did not always consider conflict resolution in the TCA. Lu et al. (2015) mentioned that finding hidden cost in conflict resolution is challenging, perhaps explaining the paucity of research on this topic.

Dispute resolution may not be an obvious cost, yet can be a significant cost. Some companies' leaders decide not to participate in a supply chain projects if they perceive a legal risk due to the complexity of the supply chain. Cost of litigation is an item that is difficult to calculate in the TCA. When Lu et al. (2015) performed a study on the hidden cost of conflict resolution, the most prominent hidden costs identified were grouped into thirteen variables and five categories (Lu et al., 2015). Table 3 below, shows 28 different types of hidden costs, including some information gathered by Lu et al. (2015) on conflict resolution during a literature review for the years 2013 to 2017.

Table 3

Types of Hidden Costs Affecting Total Cost Analysis

Type of Cost	Process	Author	Year
Contract management		Larsen et al.	(2013)
Inventory holding cost processes	Inspection	Azzi et al.	(2014)
	Counting Inventory		
	Remanufacturing		
	Repacking		
	Relabeling		
	Lost sales		
	Backlog		
Shipment Costs	Expedite Shipments	Johnson et al.	(2013)
	Lead time variability		
Financing costs		Johnson et al.	(2013)
Exchange rate variations		Johnson et al.	(2013)
Location oversight		Johnson et al.	(2013)
Taxes, Tariffs, and Duties changes		Johnson et al.	(2013)
Vendor Selection		Larsen et al.	(2013)
Layoff costs		Larsen et al.	(2013)
Reconfiguration of value chain		Larsen et al.	(2013)
Relocation		Larsen et al.	(2013)
Project Dispute Resolution	Emotional cost	Lu et al.	(2015)
	Reputation		
	Cooperation		
	Trust		
	Execution of final judgement		
Coordination costs		Handley & Benton (2013)	
Sudden cost fluctuations		Samvedi et al. (2013)	

Note: Table was adapted from the various sources used in the literature review

ABC in Relationship to Risks in Global Sourcing and Offshoring

Global sourcing has been on the rise, and some companies have decided to establish international purchasing offices (IPO) as a place strategy to improve the response time of overseas suppliers (Sartor, Orzes, Missimbeni, Jia, & Lamming, 2014), and mentioned that IPOs have been growing on average 3.7% annually since the early 2000s. IPOs are common in the aviation industry because the industry is global. The

response time from European airplane parts manufacturers and parts distributors are critical when U.S. airlines that operate European aircraft need parts to repair airplanes (D. Williams, personal communication, January 19, 2014). IPOs helped improve supplier management, resolution of technical problems, negotiations with culturally similar staff, resolving logistical problems, and cultivating a better chance at product development through building relationships faster (Mogre et al., 2014). This is all possible because an IPO is an extension of a U.S. based company in another country (Sartor et al., 2014).

Issues with offshoring are different from those of an IPO, as are the risks. Michele, Mogre, and Perego (2014) emphasized that predictive measures did not exist that would provide leaders a way to better mitigate supply chain risks. In their study, Hahn and Kuhn (2012) used a supply chain integrated approach that utilized ABC as part of a supply chain master plan to maximize the decision-making model in relationship to an average cash position. Elhamma and Moalla (2015) posited that their model provided real decision-making support by using a scenario-based approach, and not the expected value of the risk, to then adjust the risk to the cost of capital. TCA may help to mitigate the effects of unknown risks (Hahn & Kuhn, 2012). Corporate leaders may use varied resources to make decisions, yet risk is an innate part of doing business. Risk concerns in global sourcing and outsourcing are complex. Handley and Benton (2013) addressed the issue of the risk of outsourcing and estimated that 30-50% of companies that outsourced did not reach the level of performance leaders had anticipated. Handley and Benton (2013) also mentioned that 62% of the companies surveyed reported that they needed more resources than they initially calculated.

One of the main risks that researchers considered was supply chain disruption. Samvedi, Jain, and Chan (2013) emphasized that the issues with supply chain disruptions included not only that operations stopped but also the time it took to recover from the disruptions. Samvedi et al. posited that procurement leaders used to focus on reducing purchase price, controlling price variations, and efficient inventory management methods, but in today's global sourcing environment, mitigating supply chain risks has gained a greater focus of organizational leaders. Some of the risks identified by Samvedi et al. included supplier insolvency, quality, sudden hike and fluctuation in costs, market changes, forecasting errors, machinery failures, labor strikes, quality problems, technological changes, terrorism, natural disasters, economic downturns, and social and cultural grievances. Samvedi et al. suggested that if management was aware of the risk levels sooner, leaders could at least better prepare and create an effective contingency plan for resources potentially needed to mitigate the effects of the risk.

Offshoring has created opportunities to increase the standard of living in developing nations. For companies, the benefit has been lower labor costs, resulting in higher profit margins. But offshoring has also contributed to major financial losses due to supply chain disruptions. Based on a survey of 320 companies that currently manage offshore manufacturing plants, 40% perceived a trend toward re-shoring to the United States due to disruptions (Tate, 2014). In Europe, more than 400 companies have re-shored per year (Kinkel, 2014). Some of the problems in supply chain disruptions are due to the complexity of the logistics network and distance between the suppliers and the offshore manufacturing location (Sydow & Frenkel, 2013). Other issues with

manufacturing offshore included rising offshore wages, freight cost fluctuations, higher inventory levels to mitigate disruptions and improved responsiveness to customer demands (National Institute of Standards and Technology, 2015). Some authors mentioned in their studies that cost needs to be quantified accurately to avoid the added cost of relocating.

Foerstl, Kirchoff, and Bals (2016) posited that one of the main reasons that company leaders decided to offshore was to obtain cost savings in production cost from low-cost developing countries. Other reasons to offshore were access to talent and qualified labor (Larsen et al., 2013). Research by Johnson et al. (2013), on manufacturing in Mexico, demonstrated that while there were cost savings in production, the added shipping cost and the cost of inventory plus safety stock cost needed to prevent stock-outs were over one-third of overall cost or almost 45% of the total cost; therefore, savings in labor cost did not overcome the increase in shipping and safety inventory costs. Johnson et al. (2013) stated that leaders often neglected to consider total cost assessment and only counted on a limited set of cost factors.

Larsen et al. (2013) were also researchers who found that offshored operations cost accuracy was affected by hidden cost. These authors mentioned that data from the Offshoring Research Network demonstrated that top company leaders were prone to making errors in cost-estimation as production performed offshore got more complex (Larsen et al., 2013), which has tended to be the case in the aviation industry. The complexities emphasized by Larsen et al. fell in the realm of configuration complexities and tasks complexities. Larsen et al. expanded the concept by mentioning that

configuration complexity applied to operational issues, structural components, and social aspects of the organization. In contrast, tasks complexities referred to the actual offshoring implementation. Outsourcing of production added a layer to the existing complexity of labor issues and ways that management tries to address them in a socially responsible manner (Robinson & Rainbird, 2013). The more complex the production processes, the more likely that corporate leaders ignored the consequences of implementing an organizational change like offshoring. The research performed by Larsen et al. (2013) was important because they collected extensive data from the Offshore Research Network that included 183 companies, of which 102 were from the United States.

Bygballe, Bø, and Grønland (2012) posited that companies that have integrated a global outsourcing strategy to achieve cost reductions have not yet seen improved profits. These authors attribute the lack of actual improved economic performance to the ability to reach a balance between procurement and logistics costs and customer service. The authors' focused their research on the total cost approach of managing an international supply chain. Previous research into some Norwegian companies that have sourced to China identified four configurations for managing international supply. Bygballe et al. concluded that companies must be aware of the risks of procuring low-cost products in low-cost countries, and added that company leaders should focus on total logistics cost and the consequences on inventory cost.

To counter the negative effects of offshoring, Bygballe et al. (2012), Forestl et al. (2014), Hinkle (2014), Larsen et al. (2013), along with Tate (2014), mentioned that since

2013 China announced a major infrastructure project to improve the old silk road. One of the outcomes the Chinese government intended to achieve was to reduce the logistics cost and transit time by expanding the silk road to Europe via the One Belt One Road Project (Fasslabend, 2015). After the completion of the Belt and Road project, additional research would be interesting to evaluate the accuracy of the initial cost analysis.

ABC in Relationship to Lean Six Sigma and Effects on the Procurement Process

A significant number of companies in the aviation industry base their production on a Just in Time (JIT), and Lean Six Sigma (lean) basis, which requires having the inventory needed for production at the right place, at the right time (D. Donaldson, personal communication, October 15, 2016). Having inventory ship from long distance to the offshore location can disturb JIT and lean processes. Schulze, Seuring, and Ewering (2012) noted that in the movement to lean manufacturing during the early 1990s, optimization programs focused on processes done in-house. Schulze et al. mentioned that management leaders wanted to reduce a company's contribution to a product's value by outsourcing up to 70% of production to outside suppliers.

One of the resources used for optimization was time-driven activity based costing (TDABC), which, according to Schulze et al. (2012), combined data retrieved from both ERP and CRM systems. The move to TDABC transformed ABC into an algorithm that provided leadership with organizational and financial information. Schulze et al. pointed out that ABC was a key tool for management leaders to obtain more analytics to better forecast profitability. Schulze et al. added that ABC supported the balance scorecard reports that provided leaders the ability to set targets and score the outcomes within the

framework of the balanced scorecard concept, helping to improve real-time analytics. Furthermore, Schulze et al. posited that ABC was a useful mechanism to forecast the resources required for new activities and helped to perform the analytics needed for the number of workers required to do the new tasks, and added that the architectural developers of ABC had advanced its applications significantly and some applications included relating profitability to sustainability.

Significance of ABC in the Supply Chain Management Procurement Process

Procurement is a key function of an organization because the final cost of the product is directly affected by the contracted purchase price and the procurement strategies of managers leading procurement departments (Lee, Li & Xie, 2013). Managers in procurement departments share a responsibility for the product cost in the marketplace (Pereira et al., 2014). Supply chain costs account for approximately 55% of the total product cost (Lapinskaitė & Kuckailytė, 2014). Schulze et al. (2012) performed a case study on the application of ABC within the SCM framework, and mentioned that one of the critical issues that added complexity in a global environment was the sharing of the cost up and down the supply chain.

Lowering cost is a standard annual goal for companies. A company's cost accounting tool normally generates and shares data within the organizations' departments to analyze costs during a profitability analysis; cost data also is useful to set strategy. Schulze et al. (2012) mentioned that the sharing of cost data was the issue that complicated the integration process in the supply chain because of the differences in costing models amongst the channel partners. The authors also mentioned that not all

channel partners were willing to share sensitive costing data. Terziouglu and Chan (2013) explained that transparency ensured that all the channel partners are clear about the source of the costs; additionally, transparency assured cost identification and correct transferability.

Shipping is an integral part of SCM. Research by Johnson et al. (2013) attempted to project shipping costs using ABC mechanisms to evaluate total shipping costs. The researchers identified over 35 cost activity drivers such as equipment, personnel, fuel over the distance traveled, and the number of stops. Johnson et al. added that more comprehensive models treated shipping costs as manufacturing costs and posited that shipping cost should be a known quantity. Although customer satisfaction is not directly related to procurement, customer satisfaction is related to SCM in that the cost of meeting customer satisfaction levels sometimes accounts for 50% to 60% of total product cost (Kaličanin & Knežević, 2013). Table 4 below lists business activities that may involve procurement personnel found in ABC literature. Researchers have realized that SCM is a lot more than just a cost of doing business, as demonstrated by the research that encompasses a great variation of processes. Notice that as shown in Table 4, the list is extensive and includes 52 processes identified by various authors during the literature review between 2012 and 2017.

Table 4

Supply Chain Process Supported by Procurement Using ABC

Supply Chain Process	Author	Year
Administrative Overhead - Procurement	Johnson et al.	2013
Buyers' Turnover	Kaličanin & Knežević	2013
Customer Service	Lapinskaite & Kuckailyte	2014
Control and Testing of Products	Kaličanin & Knežević	2013
Communication Costs	Sartor et al.	2014
Contract Negotiations	Chen et al.	2014
Contract Oversight (Procurement)	Johnson et al.	2013
Customs Duties and Fees	Mogre et al.	2014
Defective Products	Kaličanin & Knežević	2013
Disruptions from late delivery	Kaličanin & Knežević	2013
Distribution	Kaličanin & Knežević	2013
Economic Risks from Global Sourcing	Johnson et al.	2013
Financing – Loans	Chen et al.	2014
Insurance-Transportation	Azzi et al.	2014
Inventory Inspection and Counting	Azzi et al.	2014
Inventory	Lapinskaite & Kuckailyte	2014
Logistics Costs	Johnson et al.	2013
Lost sales from back-log	Azzi et al.	2014
Material Handling	Azzi et al.	2014
Obsolescence	Azzi et al.	2014
Order Processing	Lapinskaite & Kuckailyte	2014
Packaging	Lapinskaite & Kuckailyte	2014
Procurement (all costs)	Drake et al.	2015
Product Damages	Azzi et al.	2014
Product Depreciation	Azzi et al.	2014
Remanufacturing	Azzi et al.	2014
Re-packaging Re-Labeling	Azzi et al.	2014
Research and Development	Hongzhuan et al.	2013
Safety Stock	Johnson et al.	2013
Shipping and Expediting Shipping	Johnson et al.	2013
Stock outs	Kaličanin & Knežević	2013
Supervision and Oversight	Masschelein et al.	2012
Taxes, Tariffs from Global Sourcing	Johnson et al.	2013
Third Party Markups	Mogre et al.	2014
Travel	Johnson et al.	2013

Note. Adapted from tables used by various authors from the literature review sources

Supplier management cost strategies. Trust between channel partners is key to running a successful business. Masschelein et al. (2012) demonstrated that the cost accuracy of ABC data might enhance the sense of fairness among channel partners. According to Pereira et al. (2015), three types of buyer-supplier relationship outside of the basic procurement process were familiar. The other relationships were cooperative, interdependent, and integrated (Pereira et al., 2015). Buyer-supplier relationships helped to mitigate risks that disruptions in the supply chain may bring; hence, procurement can have an important role in improving the competitive advantage of a company (Pereira et al., 2015).

Chang, Cheng, and Trotman (2013) found that company managers that negotiated with suppliers and had accessibility to ABC data were not always able to use the ABC information to maximize the buyer-supplier relationship. Furthermore, Chang et al. made a recommendation in their study to address the issue of maximizing the data available from ABC to improve supplier relationships, and suggested that use of clear cost information would help negotiating teams reach more successful outcomes between supply chain companies. Krause and Ellram (2014) focused their work on the strategic approach to buyer-supplier relationships, and posited that supplier management and the use of incentives influenced the outcome and performance of the supply chain. Chang et al. discussed in their conclusion that negotiating alone was not enough to maximize the value of channel partners. Chang et al. added that accountability was key to improve the perception of the channel partners and ABC data should facilitate the negotiation outcome. Krause and Ellram suggested that during economic downturns, companies

helped each other out through the downturns up and down the supply chain participants because there was alignment between the channel partners, which included the element of trust.

Reshoring Production to the United States: Effects on Procurement

In this section, *back-shoring* and *reshoring* mean the same thing. Some authors in Europe call it back-shoring, while some authors in the United States call it reshoring. According to Horn, Schiele, and Werner (2013), some business leaders made erroneous cost calculations when outsourcing some of their business processes. Horn et al. posited that unexpected costs were the main reason for the reshoring, and reported that approximately 47% of international projects failed, resulting in costly reshoring expensed back to the domestic market.

Ellram et al. (2013), well known in the field of offshoring and reshoring, published a paper on the subject of reshoring. Ellram et al. focused on understanding some of the reasons why companies were reshoring operations back to the United States. The most common reasons were disruptions, long lead times, and quality issues. The authors used the Council of Supply Chain Management (CSCMP) 2011 conference to distribute a survey to the conference participants. In the study, Ellram et al. alluded to a total cost concept approach during the analysis phase of an offshoring project, and mentioned that companies should consider total cost as part of the decision tool. Ellram et al. concluded that labor cost no longer offered the same advantages as in the 1980's, skilled labor and quality were a major issue at offshore locations, the energy cost in the United States tended to be lower, and shipping and logistics tended to be less complex

within the U.S. locations versus offshore locations. Total cost assessment mechanisms should take into consideration total cost of the offshore location.

As companies begin to reshore, leaders have begun to use existing facilities that they had previously closed down as part of the offshoring process. Tate (2014) mentioned that companies like General Electric were putting efforts into modernizing existing buildings that had been idle because operations offshored in the 1990's. The reshoring process has not been experienced in the United States only. Research by Kinkel (2014) demonstrated an increased focus by policy makers on the importance of back-shoring or reshoring to restore the competitive advantage in high wage countries. The author pointed out that the low wage competitive advantage in countries such as China was eroding, and issues with quality were still present. Kinkel obtained data from a survey by the European Manufacturing Survey gathered from approximately 1650 responses during the period from 1997 to 2012. The author mentioned that some of the reasons for reshoring included significant issues with quality, lack of flexibility, coordination complexity, logistics costs, lack of qualified personnel, higher than expected labor costs, and know how costs.

Kinkel's (2014) research revealed that approximately 700 German companies were back-shoring annually. Kinkle found that of every fourth to sixth offshoring event, there was back-shoring by a company to correct a decision to offshore. SCM leaders should base their offshoring or back-shoring decisions on cost-based analysis. The authors' conclusions included acceptance that although companies continue to offshore operations, company management teams showed a greater focus on critical cost issues and cost-based relocation decisions. Similarly, research by Tate, Ellram, Schoenherr, and

Petersen (2014) revealed the same reshoring practices in the United States. These authors showed that based on a survey of 319 companies, 40% of the companies noticed an upward trend in reshoring due to complexities of manufacturing offshore and risk factors in the manufacturing process.

Peer-reviewed articles on back-shoring in the aviation industry are not available. For this reason, I used research on the information technology (IT) industry, which has experienced issues with offshoring and has begun to demonstrate some back-shoring trends. Solli-Sæther and Gottschalk (2015) mentioned in their study that some of the main reasons for back-shoring included: (a) problems with contracts regarding higher than expected production costs; (b) unanticipated transaction costs; (c) lower quality; (d) loss of control over resources and service functions; and (e) a knowledge gap between vendor and client. The authors also mentioned two other reasons for back-shoring: benefits from the change in the internal organization and external environment.

Consistent with the perspective that ABC is a critical and reliable component of TCA of procurement; scholarly research on cost reduction, visibility, and accuracy of information demonstrated that ABC was a critical tool for decision-making. Some research also demonstrated that there were some implementations concerns with ABC that included poor management application and implementation, and most significant was the high cost to incorporate an ERP system (Khan et al., 2015). While the high cost of an ERP system may be a road block, companies must be willing to invest in systems that make collaboration amongst channel partners a reality. Successful collaboration may include the visibility of accurate real-time information.

The Total Cost Concept and Transaction Cost Economics, and Total Cost of Ownership

The focus of TCE is more pertinent to contract and corporate governance issues (Williamson, 1998). Unlike TCA, which quantifies cost using ABC in all processes, as shown in Table 2, TCE can be an important component when trying to ascertain transaction total cost of contract negotiations and disputes, as mentioned by Lu et al. (2015). Some costs that can impact transaction costs might include the cost of overseen employees and organizational costs (Williamson, 1998). The author posited that TCE has application in many areas, and "transaction cost economizing" (Williamson, 1998, p. 1) can effectively assess any contract related issue. The transaction as a unit of analysis can provide operational significance (Williamson, 1998).

One benefit of using TCE in the TCA of procurement was the support TCE can provide with risk mitigation strategies in the procurement process (Williamson, 1998). Williamson (1998) posited that TCE is highly comparative, and a key question the author posed related to comparative analysis was what the company's strategic approach for building future core competencies is in comparison to current strengths and weaknesses (Williamson, 1998). The concept of comparative analysis is important to the procurement process as companies focus on the process improvement of the ways procurement cost analysis. Process improvement and comparative analysis have a transaction cost associated with a company's specific needs for a strategic management approach (Williamson, 1998).

Crook, Combs, Ketchen, and Aguinis (2013) focused on the outcomes of TCE over the past 30 years related to transaction costs influencing how managers choose to transfer goods or services up and down a supply chain while minimizing transaction costs. The author explained that some of the expenses of the transaction could be identifying supply partners, negotiating contracts, overseeing supplier performance, and implementing the changes needed to adapt to a dynamic supply chain environment (Crook et al., 2013). Williamson (1998) posited that one of the challenges of TCE was for researchers to move forward to a complete and formal analysis instead of semi-formal approach to the research. Crook et al. opined that after doing a meta-analysis of 143 studies, the authors recommended performing further research to understand other perspectives of TCE. The concept of TCE was germane to this literature review because the overseeing of contract execution is a cost overlooked during the TCA. As it relates to TCA, Handley and Benton (2013) posed that transaction cost theory suggested the need for more costly controls when the process was complex as is the case of the aviation industry.

Pan (2015) noted that the most basic premises of TCO were make or buy decisions, and helped leaders in the process of making vendor selections. The author added that TCO assisted in finding all the applicable costs related to the procurement process. TCO used ABC to quantify total cost accurately and helped to find cost associated with the customer base and TCO (Mpwanya & Cornelius, 2015). The authors added that use of ABC had lowered TCO. Caniato, Ronchi, Luzzini, and Brivio, (2014) was another author that posed that some of the benefits of TCO were reducing purchasing

costs. Duran, Roda, and Macchi (2016) focused their work on the spare parts supply chain. The maintenance process in the aviation industry is heavily dependent on spare part. Duran et al. mentioned that logistics and operational factors affected TCO most significantly. Pettersson and Segerstedt (2013) specified that traditional accounting processes did not facilitate TCO applications. The authors based their findings by measuring cost across a supply chain. TCO is a well know total analysis mechanism. However, it still depends on ABC to obtain accuracy in total cost quantification. For this reason, I chose to base my study on ABC and not TCO.

Existing Literature and Future Research

The review of the literature conducted revealed that the available literature on TCA and ABC in the aviation industry was scarce or almost non-existent. Conversely, the topic of ABC was more prominent and was available in various industries. However, there were some areas that still needed more research. Moisello (2012) posited that researchers and authors of peer-reviewed articles have different concepts of success because they measure different components of ABC hence the authors get different results. Accordingly, more research would help to demonstrate the consistency of ABC applications. More research could highlight various applications of ABC so that there is clarity in the results that ABC may bring to leaders doing a TCA. Hongzhuan et al. (2013) mentioned that industrial engineering projects tied to lean six sigma still showed distortions of cost data and recommended more thorough research into ABC cost control systems. Terzigoglu and Chan (2016) noted a lack of sufficient depth in research on ABC within the context of management accounting. The authors mentioned that of the 232

papers used in their research, about 4% of the literature was on ABC. Terzigoglu and Chan (2016) further commented that ABC represented about 20% of accounting practice and that 4% was a small portion of the research. Further research would be beneficial. Larsen et al. (2013) posited the need for further research on the hidden cost. Furthermore, the authors noted that hidden costs were not easy to measure hence a possible underestimation of their results. Hidden costs affect TCA significantly, and further research on the topic of hidden cost could prove useful. Within the framework of hidden costs, was the topic of conflict resolution and contractual agreements; Lu et al. (2015) recognized that hidden transaction costs were difficult to identify within the context of conflict resolution. Thus it was important to research further as conflict within channel partners was not always possible even with a well-written contract. SCM leaders should consider conflict resolution in the TCA decision-making process, although it is not clear how ABC concepts would be applicable.

Further studies on costing models. Peer reviewed articles about the aviation industry were scarce. Even fewer articles addressed the TCA of aviation processes using ABC. Hongzhuan et al. (2013) posited that production processes in aviation were complex, and have extensive and lengthy product development process. The authors mentioned a project by The Boeing Company, a major aircraft manufacturer, which used cost estimation model when Boeing was developing the 787 model aircraft. Further, scholars and SCM leaders should perfom further research on the costing model that Boeing used to help enhance the literature available on TCA whether using ABC or other costing models. ERP systems is another area that lacks comprehensive research. Khan et

al. (2015) mentioned that further research could measure the total cost of the risks associated with bad debt protection. TCA continues to evolve. Dybvig et al. (2014) noted that EMP represented the next-generation of ABC modeling by enhancing the focus from process improvements and profitability to annual financial planning in operations. The authors considered EMP and the optimization of the CAM-I model and recommended further research on EMP.

Summary and Transition

The focus of Section 1 was to offer an overview of the benefits of TCA utilizing ABC as the mechanism to quantify total cost. One of the discoveries was that the use of ABC mechanisms helped to reduce total costs even in a global business environment that is continually changing. The focus of the literature review was mostly on procurement because of the financial impact that procurement teams may have on corporate financial results. Procurement departments spend can exceed 80% of total revenue, hence the importance of cost control and total cost accuracy. Although the foundation of the study concentrated on the benefits of ABC, another important point was the implementation concerns of ABC. In the literature review section, the focus was on the benefits, deficiencies, and application in different business processes using ABC.

A lack of peer-reviewed articles on TCA in the aviation industry was evident when I performed the initial literature review process. Fortunately, a significant number of articles addressed ABC and TCA in other industries. The literature review process was key in revealing the past and current issues in TCA. Especially relevant was the number of companies back-shoring and nearshoring because the benefits of sourcing globally or

outsourcing were no longer obtainable. A central issue of the first section was the importance of having the proper mechanisms to obtain accurate cost analysis.

In Section 2, I focus on the research and design method for the study. Part of Section 2 includes the population chosen for the study, and what methods were used to collect and analyze the data. The final part of the section includes information on the quality process with focus on the reliability and validity of the collection method. Section 3 of this study presents the findings, which confirm the conceptual framework as well as extended the body of knowledge on the topic from articles revisited in the discipline to compare the findings with more recently published literature. Also included in Section 3 are the implications for social change and the recommendations for action and further research.

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Section 2: The Project

In Section 2 of the study, I present the details of the company and participants chosen for this case study. I discuss the role of the researcher, provide details on the research methodology and design, and include the study's data collection and analysis techniques.

Purpose Statement

The purpose of this qualitative, single-case study was to explore strategies some SCM leaders use to improve existing costing systems to forecast procurement costs accurately. The target population was five upper-level SCM leaders at a MRO company in the aviation industry in the Southeastern region of the United States; these leaders had successfully implemented strategies to improve existing costing systems to accurately forecast procurement costs. The implication for positive social change is that accurate cost data could result in decisions that do not lead to outsourcing offshore, thus maintaining job opportunities in the Southeastern region of the United States aviation market and promoting a sustainable economy in the region.

Role of the Researcher

One of my principal responsibilities in this single-case study was to be the primary instrument for data collection (Yin, 2014). Doody and Noonan (2013) noted that an interview is a common method to collect data on a topic, and the researcher needs to have a plan or protocol beforehand.

In order to carry out ethical research, I adhered to the principles of beneficence, respect for persons, and justice throughout the study. The Belmont Report (1979)

mentions that researchers should mitigate ethical issues and ensure the privacy of the participants. The Belmont Report emphasized that a researcher should adhere to the principles of beneficence, respect for persons, and justice. Beskow, Check, and Ammarell (2014), along with Friesen, Kearns, Redman, and Caplan (2017), noted that a reliable guide for ethical principles and the selection of participants included adhering to the Belmont Report tenets, in addition to an inclusion of an informed consent form. The Belmont Report included a summary of the importance of the protection of human subjects participating in research (Brakewood, & Poldrack, 2013; Miracle, 2016). Additionally, Boyd, Parry, Burger, Kelly, Boyd, and Smith (2013) along with Brown, Lamb, Lewis, Pipe, Orbach, and Wolfman (2013) noted that the role of the members of an Institutional Review Board (IRB) is to protect the rights of the research participants. The IRB granted me approval number 03-19-18-0576047, a prerequisite to move forward with the doctoral study.

Previous experience with the topic may be useful in understanding the point of view of the interviewees (Marshall & Rossman, 2016). As a current educator in the field of SCM and with over 25 years' experience in the aviation industry, my professional experience includes sharing the cost with channel partners. To prevent bias, my opinions and ideas remained separate when evaluating the research content. Jamshed (2014) mentioned that a qualitative methodology could assist a researcher to be aware of biases that formed, and a qualitative methodology can support the researcher's focus on the value of the participants' perspective by extrapolating the participants' experiences via interviews. To prevent bias in my viewpoint, I took the approach of being an independent

observer. I explored the data provided by the participants, gathered the information, and ensured member checking of the interview transcriptions. Harvey (2015), along with Marshall and Rossman (2016), posited that member checking was a quality control process for ensuring that the data was accurate, credible, and valid. Barker (2013) noted that a case study design should include a component that ensured integrity. Yin (2014) mentioned that the researcher should use multiple sources of information, and maintain a well-organized case study database that is easily retrievable. As the chief data collector, I ensured compliance and maintained a well-organized database.

Participants

The topic of this study is strategies that procurement managers in the aviation industry used to improve costing systems to forecast procurement costs accurately. The participants in this study were senior level supply chain managers in the aviation industry who implemented costing systems as a strategy to improve procurement processes. Identification of the research parameters helped to ensure alignment of the research question and prospective participants (Houghton, Casey, Shaw, & Murphy, 2013; Yin, 2014). As a participant of the Air Carriers Purchasing Conference (ACPC) for over 15 years, my participation in the conference afforded me the opportunity to gain access to the participants. The ACPC is a platform used by aviation procurement managers to discuss procurement issues from the airline and supplier perspectives.

Blythe, Wilkes, Jackson, and Halcomb (2013) mentioned that the researcher and participants often share experiences that may be favorable for establishing a working relationship and generating substantive content in a shorter period during the interview.

The potential case study participants advocated for improvements in all procurement processes. Senior level members at an aviation company in the Southeastern region of the United States offered to participate in the case study. All the potential participants were part of the procurement process for over 10 years at the same organization. As a follow up, once I received IRB approval number 03-19-18-0576047, I sent the prospective participants an official e-mail to confirm their voluntary participation in the study. Marshall and Rossman (2016) emphasized that an informed consent form was a key component of the interview process so that each participant was well-aware that they could opt out of the study at any time and that they were volunteers in the process. I provided the participants with an informed consent form that they signed.

Research Method and Design

Jamshed (2014) mentioned that researchers considered choosing a qualitative, quantitative, or mixed methods methodology based on the type of research problem. After evaluating the three distinct research methodologies, and the complexity of my problem statement, I chose a qualitative methodology along with an explorative single-case study design. A qualitative research methodology supported the type of information required to explore which was pertinent to the strategies business leaders utilized when adopting mechanisms for TCA.

Research Method

Some authors considered qualitative research methodology to be suitable when the objective of the researcher was to explore significant problems (Jamshed, 2014). TCA within a supply chain framework is complex. Marshall and Rossman, (2016) along with

Yin (2014) posited that a qualitative research method supported the exploration of complex processes. Conversely to a qualitative study, a quantitative research methodology draws data from a sample population to explore the correlation among phenomena (McCusker & Gunaydin, 2015). Reale (2014) posited that a quantitative method approach might be restrictive when using comparative statistical analysis due to the limited availability of comparative data. The availability of statistical data in the Southeastern region of the United States on the strategies that procurement managers in the aviation industry used to improve costing systems provided limited information hence the decision to choose a qualitative methodology. A quantitative methodology was not the best method for this study because a quantitative method did not support open ended exploratory questions, and the types of questions might influence the results (Bigger, 2014). A mixed methods strategy combines qualitative and quantitative methods or theories into a single study to collect and examine various forms of data (Jamshed, 2014). A mixed methods strategy was not the most appropriate because the use of a hypothesis introduces preconceptions about issues which might prevent the researcher from keeping an open mind about the research topic (Klassen et al., 2012). I chose to use a qualitative methodology because researchers use qualitative methods to explore and understand business issues through the lens of the personal experiences of the participants in the study resulting in significantly richer outcomes (Jamshed, 2014; Marshall & Rossman, 2016). A purposeful sample, a required component of a qualitative research study, involves the researcher becoming the instrument to collect and analyze the data (Jamshed, 2014). The findings lead to a study that contained themes that illustrated a

deeper understanding and insights of business issues that were the subject of this research.

Research Design

In my study, I explored how leaders approached the TCA in procurement. A case research design is a common research approach for asking how and what questions within a business context (Cronin, 2014; Yin, 2014). The researcher has the option to choose a phenomenological, ethnographic, narrative, and case study research designs. Jamshed (2014) demonstrated that a single-case study was the most widely used research design. Cronin (2014) posited that the findings of his study demonstrated that a case study research methodology was a systematic and rigorous method that facilitated the study of real life experiences. One of the roles of the researcher is to institute methodological rigor (Houghton et al., 2013)**.** A case study is a platform that supports a researcher's ability to explore a program rigorously and can include a single unit with multiple participants in the same company (Yin, 2014). Unlike a case study, a phenomenological research study is a qualitative research design used to observe a few participants over an extended period to understand what matters to the participants the most. Phenomenology studies require the researchers to contextualize the personal concepts with the study's participants (Leedy & Ormrod, 2016). A phenomenological study was not an appropriate strategy because the intent was to explore an event, not the perception of the event (Leedy & Ormrod, 2016). Ethnography studies the culture of a group of participants for an extended time in its natural habitat and required long term field work (Leedy & Ormrod, 2016). Ethnography, a methodology which was often used

by anthropologists focused on incorporating culturally specific components (Rashid, Caine, & Goez, 2015), and was not an appropriate design because the focus is on the culture of the group instead of exploring the business situations that individuals experienced in a particular time frame, which is the focus of a case study design. A narrative research study is a design that researchers use to study the lives of people that the researcher will eventually make into a story (Marshall & Rossman, 2016). A narrative research design was not an appropriate method because the focus of a narrative research strategy is to combine the views of both the participant and the researcher (Marshall & Rossman, 2016). In this study, I used a qualitative single-case study design because a case study is often used to research real world business issues that companies experience (Yin, 2014).

Morse (2015) focused his research on the importance of data saturation as the guarantee of qualitative rigor and noted that data saturation via an interview process helped to build rich data. Marshall, Cardon, Poddar, and Fontenot (2013) posited that an important component of credible research was making sure that there were enough data. Marshall et al. (2013) mentioned that a case study approach allowed the use of smaller population samples and that data triangulation was representative of a rigorous data collection method. Yin (2014) posited that the collection of data from various sources resulted in a comprehensive representation of a business process. In support of the choice of a case study approach, I note that my focus was on the strategy instead of the application of the strategy.

Population and Sampling

The population included top management leaders involved in procurement in one aviation company in the Southeastern region of the United States that successfully implemented a cost analysis strategy, which is in alignment with the overreaching question. The aviation industry became key to the Southeastern region of the United States when Pan American Airlines established operations in Miami in 1925. The population meets the needs of this study because a significant number of aviation companies in the Southeastern region of the United States have procurement departments that support the global aviation industry (Florida Enterprise, 2017).

During the July 2015 meeting of the Institute of Supply Management (ISM), a presenter spoke about the lack of reliable mechanisms to quantify total cost (Stanton & Zwemke, 2015). During the annual ACPC meetings, issues about total cost were also of concern to the airline procurement teams and supplier member participants. The Institute's meeting was during my first semester of the doctoral study, and the information received prompted me to research for peer reviewed articles about TCA in the aviation industry. Finding literature on TCA in the aviation industry was challenging. There is a need in the aviation industry for articles on better costing strategies.

The purposeful sampling in qualitative research requires the selection of a small number of participants needed to provide meaningful and insightful information based on a participant's personal experiences of the phenomena (Robinson, 2014). Morse (2015) noted that because qualitative samples tended to be small, to facilitate saturation, the data needed to be rich and the participants must be experts. The participants in my study have

over 10 years working experience with the organization. They were involved in the procurement process in the aviation industry for over 20 years, and considered experts and leaders in improving procurement processes in the aviation industry. According to Morse (2015), saturation may also come from the interviewer's knowledge of the literature and experience, which may facilitate the interview process by focusing on asking questions not yet answered. The number of interviewees was five participants. Marshall and Rossman (2016) posited that a researcher execute three to five interviews per case study. The sample size was also supported by Marshall et al. (2013), whose research demonstrated that researchers could reach data saturation from between three to five interviews, and indicated that redundancy would be evident after that point. Marshall et al. further discussed that gathering too much data might diminish the ability of the researcher to produce a substantive analysis of the data. The use of nonprobability purposeful sampling in case studies might substantially solidify the credibility of the research results. Purposive sampling may include the identification of the participants based on selected criteria which may reduce biases (Smith & Noble, 2014). The eligibility criteria that I used stemmed from alignment with the overreaching research question, that translated into being able to identify which aviation company leaders in the region have extensive knowledge of TCA. The overreaching question in my study enabled me to explore the strategies that procurement managers in the aviation industry used to improve costing systems to forecast accurate procurement costs. The potential case study candidates participated in the ACPC, and in the past, showed interest in advancing the knowledge and process improvement possibilities of the research topic.

Ethical Research

Walden University Institutional Review Board (IRB) makes available guidelines to doctoral students to follow. The process assisted in ensuring that the research is ethical. Responsible research ensures that the researcher's conclusions are valid and verifiable (Cook, Hoas, & Joyner, 2013; Cseko & Tremaine, 2013). Ethical principles within a qualitative research framework included respect, the protection of the participant identity, and kindness toward the participant (Beskow et al., 2014; Friesen et al., 2016; Marshall & Rossman, 2016). I first sought the approval from the IRB to conduct the interviews and gather data. Prospective participants were then asked to sign a consent form to meet published ethical guidelines (Festinger, Dugosh, Marlowe, & Clements, 2014). After receiving IRB approval number 03-19-18-0576047, participants received a packet containing the informed consent officially requesting their voluntary participation in the study. For clarity, I informed the participants that they would not receive payment or benefits for participating in the study. An incentive was not necessary because the prospective participants willfully volunteered. The communication provided the potential participant's information about their ability to opt out of the study at any time. During the interview, I reiterated that as a volunteer in the study, participants could withdraw from the interview at any time. The participant received a confidentiality certificate which I added to the appendix.

To ensure confidentiality, I conducted the interviews in a private location other than the participant's office. I prepared an alphanumerical code for each participant and used that code throughout the case study. Check et al. (2014) noted that researchers

should use the information gathered for the intended purpose of the study to ensure confidentiality. The information gathered was used for the doctoral study only, additionally, I kept all hard copies, recordings of the interviews, and electronic files in a securely locked area. After 5 years, I will shred all documents and permanently destroy the recordings to ensure compliance with the confidentiality requirements of a qualitative study.

Data Collection Instruments

One of the primary roles of the researcher is to be the data collection instrument (Jamshed, 2014). When the researcher serves as the principal data collection instrument, the researcher's experience and knowledge of the subject matter may be critical to a quality result (Morse, 2015). I took on the role of the data collection instrument for this case study. Yin (2014) posed that the use of multiple data collection sources of evidence would help to substantiate the information and would add rigor and credibility of the research findings. Jamshed (2014) posited that interviewing was the most commonly used form of data collection in a qualitative research methodology, and in general, the duration would be approximately 30 minutes and may extend to over an hour. The resources that I used in the case study research included semistructured interviews, field notes, archival records, and documents (Jamshed, 2014; Yin, 2014). Semistructured interviews involve the process of having the participants respond to a set of preset open-ended questions which may help the researcher to achieve optimal use of the time allotted for the interview (Jamshed, 2014). A semistructured interview protocol (see Appendix A) involves a valid qualitative research process helpful in understanding the current business

phenomenon (Harvey 2015; Jamshed 2014; Marshall & Rossman, 2016; Yin, 2014). I followed an interview protocol which facilitated the flow of the interview and the exploration of the experiences lived by the interviewee concerning TCA in the procurement process. Cronin (2014) posited that the interview protocol prevented the researcher from interjecting or disrupting the interviewees' flow of information, and helped prevent bias. Heale and Forbes (2013) posited that member checking solidified the interpretation of the data collected during the interview. Harvey (2015) noted that member checking was a participatory event that allowed the participants to peruse the transcripts to verify the accuracy, hence resulted in the personal validation of the participants. Harper and Cole (2012) along with Marshall and Rossman (2016) emphasized that member checking ensured reliability; a procedure that I instituted in my study.

Data Collection Technique

The primary data collection technique that I used in the study was a semistructured interview which I recorded in addition to taking detailed notes of the information provided by the interviewee. Jamshed (2014) mentioned that recording the interview was an acceptable form to collect data and allowed the researcher to focus on the interview and the participants' verbal queues. Regarding a possible disadvantage of the data collection technique, Roulston (2016) noted researchers experienced difficulties when analyzing the detailed transcriptions of an interview in relation to body language, pauses, and a participant's refusal to respond to a question. Roulston suggested that scholars pay attention to data generated from the interview process. I asked ten open-

ended interview questions, then transcribed the interview responses verbatim and submitted it to the participants for member checking before scheduling a second interview. Harper and Cole (2012) noted that member checking was a valid reliability protocol. A semistructured interview may be advantageous in that it allowed the participant to feel comfortable in the conversation and fully participate by speaking about their viewpoint and easily offering their experiences in the subject matter (Marshall & Rossman, 2016; Yin, 2014). A semistructured interview is a research technique that supports social interaction (Frels & Onwuengbuzie, 2013).

I also reviewed company documents, available on site and published in the company's annual report to the stakeholders. The review of the documents ensured validity via triangulation of the sources. Harper and Cole (2012) noted that triangulation was a methodology that helped to compare and analyze data to confirm that the information was consistent amongst all the data sources collected. Additionally, Heale and Forbes (2013) posited that methodological triangulation was a process utilized by researchers to validate the various sources of data collected, and confirmed consistency of the data.

Data Organization Technique

A significant factor of this case study design was to maintain an organized and easily retrievable database, a case study attribute recommended by (Yin, 2014). Kihn and Ihantola (2015) along with Cook et al. (2013) noted the value of a database containing the raw data, which is the key component to ensuring reliability. To ensure reliability and validity, I mapped, cataloged and maintained a chain of evidence that allowed the

observer to sort through the data effortlessly. I used an Excel spreadsheet and added hyperlinks to the cell that will open the related document. The hyperlinks facilitated the document retrieval process. I mapped the files in a logical and intuitive format and saved them on a USB drive that required a password. The USB is kept in a fire-resistant device along with the interview recordings which I will keep for a minimum of 5 years.

Data Analysis

Thematic analysis is a qualitative data analysis technique that researchers may use to identify and report themes that might arise from the interviews (Vaismoradi, Turunen, & Bondas, 2013). Vaismoradi et al. also noted that a significant factor representative of the significance of thematic analysis was the ability of a researcher to quantify the number of times the various themes emerged. The data analysis process consisted of a quality approach to validation and methodological triangulation which is the most commonly used method for triangulation (Heale & Forbes, 2013). Data analysis may include a review of the data, defining, coding and categorizing the data, as well as differentiating between the common themes that emerged from the data analysis process of the documents and interviews (Alby & Fatigante, 2014; Yin, 2014). I compiled, consolidated, and organized the data making it ready for the software to scan for themes. I used NVivo 11 software for its capability to evaluate various sources of data and codify themes**.** Woods, Paulus, Atkins, and Macklin (2016) posited that researchers used NVivo 11 as a data analysis tool to analyze the data collected in interviews and field notes. NVivo11software allowed for the researcher to scan the documents into the database to create the coding nodes providing the mechanism to cluster and label themes (Woods et

al., 2016). An analysis of the emergent themes helped identify a correlation to the literature. Coding assisted in classifying and organizing the data (Harper & Cole, 2012; Marshall & Rossman, 2016; Yin, 2014). I analyzed the result for data alignment amongst the sources and identified emergent themes correlating with the conceptual framework of ABC. As previously stated, to maintain the confidentiality of the participants, I assigned an alphanumeric code to each participant. To maintain confidentiality, I excluded the name of the organization and its participants from all data sources and the final published study.

Reliability and Validity

I had to provide evidence of the quality of the data. In a qualitative study, the researcher must ensure dependability, credibility, and confirmability of the data as well as engage in meticulous recording of the research process to improve the potential of transferability of the findings by future researchers (Frels & Onwuengbuzie, 2013; Marshall & Rossman, 2016). Researchers conducting quantitative research seek validity and reliability whereas qualitative researchers strive for dependability, credibility, and confirmability (Guba & Lincoln, 1994).

Dependability

The researcher has the responsibility of ensuring dependability by maintaining large quantities of trustworthy data in a well-organized manner by using dependable, reliable procedures and protocols (Frels & Onwuengbuzie, 2013; Marshall & Rossman, 2016; Noble & Smith, 2015). Näslund, Kale, and Paulraj (2010) posited that addressing a business problem was useful in ensuring the validity of the analysis because the

phenomenon was identifiable via various methods. The use of various dependable quality protocols also added to the authenticity and credibility of the study, such as a procedure ensured dependability Yin (2014). I mapped the data in a way that an auditor could follow and understand the research design. The protocol that I followed was the use of an Excel spreadsheet with hyperlinks to the documents and an intuitive mapping of the folders.

Credibility

To improve credibility, the researcher may combine data findings using more than one source to perform the research (Heale & Forbes, 2014). Some of the methods might include an interview protocol and participant observation protocol so that the participant can trust that the findings are accurate (Noble & Smith, 2015). Additionally, Kihn and Ihantola (2015) mentioned that a researcher might ensure credibility by providing the data transcripts to the participants for accuracy. I used member checking as a method to ensure credibility. This researcher offered the participants an opportunity to review the transcript of the interview various times for feedback and participant validation. Harper and Cole (2012); along with Marshall and Rossman (2016) noted that to comply with a reliable and responsible research methodology, the researcher must provide the participant the opportunity to review the results and researcher's interpretation of the participant's information captured during the interview to prevent bias. Finally, I combined various sources of data collected such as the literature review, participants' interviews, member checking, and tertiary data collected from artifacts provided by the

participants (Platt & Skowron, 2013). To strengthen credibility, I compared and contrasted the data collected

Transferability

Noble and Smith (2015) discussed in their study that researchers could facilitate the transferability of the findings of the study by representing a truthful account of the data the researcher collected. Platt and Skowron (2013) mentioned that an interview protocol helped ensure that the data collected was well organized and easier to analyze. I used an interview protocol to facilitate the transferability of the findings by future researchers to other settings or cases. To strengthen the prospects of transferability of my findings to future studies and other industries, I presented a detailed and unbiased view of how the supply chain leaders in my study used strategies to improve TCA.

Confirmability

Jamshed (2015) mentioned in his study, that member checking was a reliable way to confirm the accuracy of the information gathered during the interviews. I provided the participants various opportunities for member checking to ensure validity. Kihn and Ihantola (2015) noted that another valid approach to confirmability was to probe the participant during interviews. I questioned the participants from various perspectives to improve confirmability.

Data Saturation

An important component of a qualitative research study is data saturation. Woods et al. (2016) mentioned that more researchers opted to use qualitative data analysis software to facilitate the process that ensured data saturation. Wood also mentioned that

an indicator that data saturation occurred was when no new themes, codes, or data generated from the data analysis (Woods et al., 2016). During the data analysis phase, I used NVivo 11 software to identify all themes captured in the interviews.

Summary and Transition

Section 2 included the responsibility of my role as the researcher and collector of data. Section 2 provided me with the platform to discuss my connection to the topic. I described the eligibility criteria for the participants and strategies I used to access the participants and validation of population sampling. I discussed the research method and design, and the methods intended to ensure an ethical reliable and valid research outcome. The key points discussed in section 2 were the reasons for the selection a case study as the design for this qualitative research study.

In Section 3, I present the findings and analysis of the information gathered during the semistructured interview process. I report the findings from the primary, secondary, and tertiary data sources. I discuss in detail how the findings apply to the professional business practice.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative, single-case study was to explore strategies some SCM leaders use to improve existing costing systems to forecast procurement costs accurately. The scholarly articles and other sources used for consensus of observation corroborated the narrative that ABC was a valid conceptual framework. Team members and leaders in the procurement department often make procurement decisions based on the price quoted and the landed cost (Pumpe & Vallée, 2017). MRO leaders have the task of reducing cost through strategic sourcing (Kotula, Ho, Dey, & Lee, 2015), and thus the importance of TCA.

I conducted an exploratory single-case study at an MRO that used ABC and ERP strategies to improve existing costing systems to forecast procurement costs accurately. Reducing cost was one of the three strategic goals announced by the corporate leaders of the community partner in my study (senior-level manager, personal communication, March 3, 2018). Based on the interviews with the company's senior-level supply chain and procurement leaders, themes of TCA strategies emerged, including implementation of ABC costing systems. Five themes emerged from the NVivo 11 query based on 12 sources that were used to validate the data. The themes that supported the overarching question were as follows: (a) use of ABC to obtain accuracy, (b) competitive advantage, (c) improved corporate performance, (d) improved TCA, and (e) the use of ABC and ERP systems as the strategy to improve costing systems. I compared and contrasted the

12 sources of data for a consensus of observation, and I present the outcomes under findings.

Presentation of the Findings

The overarching question of my doctoral study was as follows: What strategies do some SCM leaders in the aviation industry use to improve costing systems to forecast procurement costs accurately? To respond to this research question, data were validated using 12 sources. After I transcribed the interviews and got confirmation via member checking, I loaded the information from the participants' interviews into NVivo 11 software. I first identified keywords in the conceptual framework to validate the themes against the other sources of data. Then I validated the words by running queries on (a) five semistructured interviews, (b) company annual reports (available on the company's website and Nasdaq website), (c) the literature reviews, (d) four new peer-reviewed articles on ABC and (e) company documents. Concurrence of the themes throughout the 12 sources used for triangulation yielded construct validity. The themes corroborated the categories that emerged from the conceptual framework and provided the format for identifying strategies for improving costing systems. This study corroborated the validity of ABC in relationship to the research question, the conceptual framework, the literature review, the participants' interviews, the new literature in the discipline, the company's annual reports, and the collected company documents.

At the time of the interviews, the community partner was in the first year of changing from one ERP system to a more flexible and adaptable ERP system that could easily allow big data forecasting programs as a plug-in to the ERP system to improve

forecast inventory levels. Both ERP systems used ABC to gather all cost. Some of the participants in the case study mentioned that because the cost of material in the aviation and aerospace industry is so high, the first stage of their strategy was to institute asset management function and inventory control functions to improve customer service levels to obtain a competitive advantage, a concept mentioned by (Azzi et al., 2014) along with (senior-level manager, personal communication, March 3, 2018).

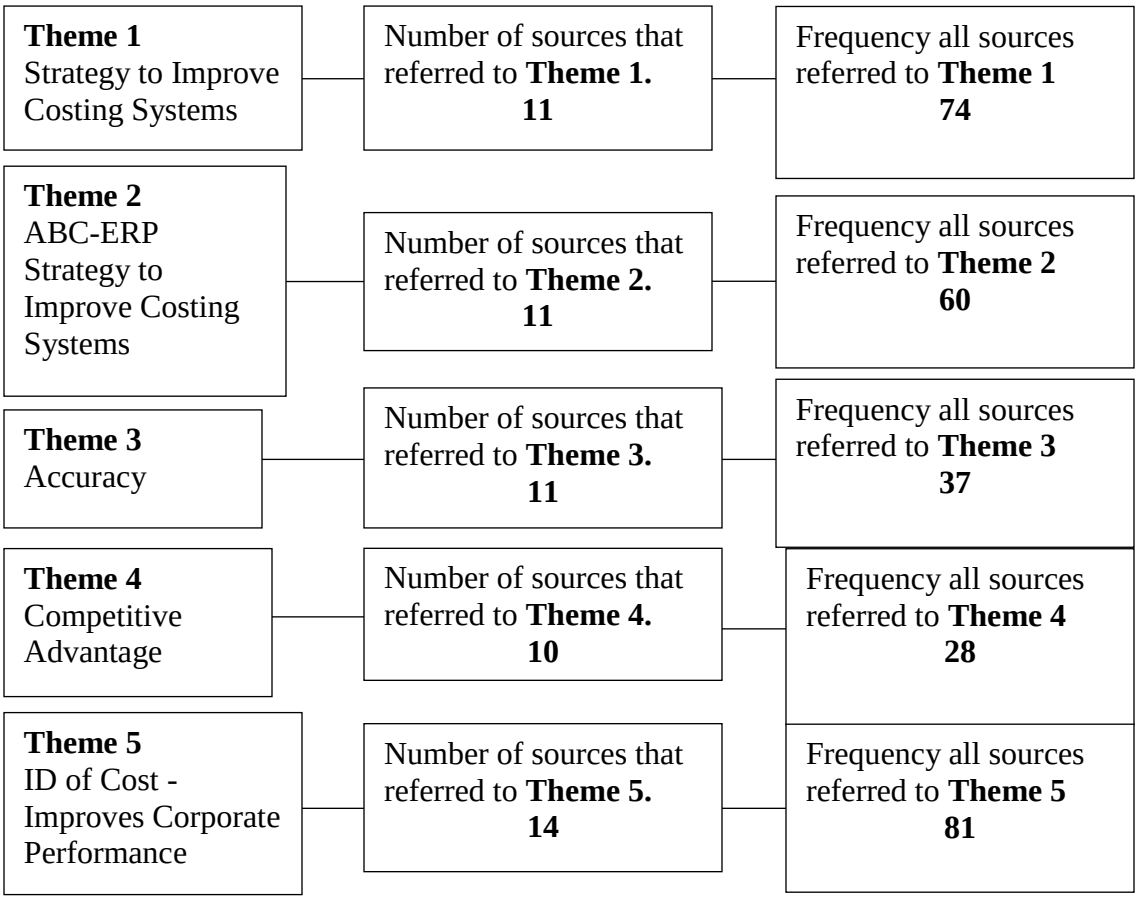

Figure 1. Data saturation by frequency and by source.

Theme 1: Strategies to Improve Costing Systems

I first identified which sources mentioned each of the themes and the frequency referenced by the source. I performed a query in NVivo 11 for each of the nodes; each node became a theme. Table 5 below depicts the query results from Theme 1 by source.

Table 5

Theme 1: Strategies to Improve Costing Systems

Source	Frequency in theme by source
Conceptual framework	5
Participant 1	13
Participant 2	12
Participant 3	6
Participant 4	18
Participant 5	10
Literature review	2
New peer reviewed articles not in proposal	8
Company annual reports	0

I used the node for Theme 1 to specifically validate the research question in relationship to the conceptual framework. I corroborated validation by querying the theme within all sources. Based on Figure 1, Theme 1, was referenced 74 times within all the sources. Improved strategic decision making emerged as a subset of Theme 1 and was mentioned by 12 sources 66 times. Improved strategic decision was not part of this study's original conceptual framework thus becoming a subtheme, and extending the body of knowledge in the discipline.

During the interviews, all the participants agreed that the implementation of an ERP system, which contains ABC in the architecture, was strategic for improving costing systems and improving forecasting methods further validating the case study research

question and ABC as the conceptual framework. Participant 4 stated “It has helped us to at least understand that there are processes and understand what should be automated.” The seminal work of Staubus (1971) along with Cooper and Kaplan (1987) emphasized the importance of accurately identifying total cost with the use of ABC. Accuracy of cost allocation to reduce inaccuracies in total cost assessment was strategic for the community partner leaders to improve their asset management strategy, which further corroborates the conceptual framework and the work of Johnson et al. (2013) along with Mahal and Hossain (2015) which asserted that improving ABC strategies could help leader forecast goals more accurately. Participant 4 stated that “they forecast all our consumption and provide a list of parts that would bring most value to our stock and that is run every day and the forecast is accurate.” The comment is based on inventory asset management, and ABC is already within the application thus improving the accuracy in cost quantification.

Literature in the discipline also contained the narrative that is central to this research. The process of selecting the activity and cost drivers is central to ABC and may be time-consuming when numerous cost centers are required to achieve accuracy in complex industries (Pumpe & Vallée, 2017). Using the appropriate number of cost drivers was required to reach accuracy in the information. Senior-level managers at the community partner site mentioned that central to improving the efficiency of the ERP was to create the cost centers resulting in improved forecast using a big data plugin. Estampe et al. (2013) mentioned that ABC demonstrated the maturity of the company within a SCM context. Based on the documents provided for reviewed, the initial cost drivers were established in processes related to procurement, receiving, inventory stock

room, freight, customs costs, and asset management which included inventory carrying costs thus facilitating the process to improve the inventory levels, and customer service levels at the least cost possible (Senior-level manager, personal communication, March 3, 2018). The company in my study is in the first year of the implementation of the ERP system, and senior-level leaders are continuously working on adding cost center to improve accuracy in financial reporting, cost accuracy, and forecasting. The community partner's document corroborated the importance of establishing the cost center to achieve accuracy in cost quantification. The availability of the company document was a valid form of triangulation and added validity to the study.

Literature on ABC included the study of Foroughi, Kocakulah, Stott, and Manyoky (2017), who mentioned that the United States had approximately 27 million small to medium size companies (SMEs), employing approximately 120 million people. Foroughi et al. (2017) confirmed that ABC has become important in helping SMEs achieve better results in improving costing systems resulting in improved financial performance. The evidence that ABC as a strategy to improve financial performance has catapulted the use of ABC at more SMEs which are implementing ABC systems as part of their strategic goals (Foroughi et al., 2017).

Theme 2: ABC-ERP Strategy to Improve Costing Systems

Table 6

Theme 2: ABC-ERP Strategy to Improve Costing Systems

Source	Frequency in theme by source
Conceptual framework	6
Participant 1	5
Participant 2	3
Participant 3	3
Participant 4	17
Participant 5	7
Literature review	8
New peer reviewed articles not in proposal	10
Company annual reports	1

I corroborated validation by querying theme 2 within all sources. Theme 2, was referenced 60 times within all the sources. The use of the node of ABC within an ERP in Theme 2 was intentional because I wanted to demonstrate that the system was an ERP that used ABC in the architecture because ABC is foundational to the conceptual framework. To validate Theme 2, I ran a query in NVivo 11 that captured the words ABC, ERP, and ERP linked to strategy. Table 6 above depicts the results of the query. Participant 4 stated "The strategy would be not to repeat this function every-time they place an order, also figure out the cost categories." Automating the cost quantification by cost centers significantly improved the company's performance. Additionally, the participants in the study mentioned that the aviation and aerospace industry's supply chain was complex and the cost of inventory materials was extremely high, which was in consensus with the observations of Azzi et al. (2014). The leader's strategy to automate provided the system to procure the parts that brought the most value in relationship to

their service levels goals at the lowest cost possible. Participant 1 stated “it’s nice to have this information, and you can add more to it in your forecast.” To achieve the strategy, the corporate leaders made a commitment to improve the ERP system by implementation a flexible and adaptable ERP system that used ABC in the architecture. The system also allowed the use big data to manage their inventory and forecast in real time. In the literature review, Drake et al. (2013) recognized that implementing ERP systems was costly and time consuming, but the value added was the accuracy and real-time reports that allowed a supply chain leader to make more timely and accurate decisions. As mentioned by Johnson et al. (2013) along with Mahal and Hossain (2015), the basis of the conceptual framework in the study was improved accuracy in costing systems to improve strategic decision-making, which confirmed the validity of the conceptual framework.

Theme 3: Accuracy

Table 7

Theme 3: Accuracy

Source	Frequency in theme by source
Conceptual framework	3
Participant 1	3
Participant 2	4
Participant 3	4
Participant 4	6
Participant 5	2
Literature review	5
New peer reviewed articles not in proposal	9
Company annual reports	1

The node used for accuracy supported the conceptual framework in that ABC was instrumental in producing accuracy in cost analysis. Accuracy in total cost is critical so

that leaders could better analyze costs and improve strategic decision making. To validate Theme 3, I ran a query in NVivo 11 that captured the word or concept of the word accuracy, and was referenced 37 in Table 7 above. Accuracy in financial reporting was a concept identified by Boukherroub (2015) in the conceptual framework. Boukherroub posited that performance measures facilitated the process for managers to distinguish the components that helped improve corporate performance. During the interviews, senior-level leaders mentioned that accuracy in financial performance was a pillar of their organization. Participant 1 stated "for me the first step is to measure what we have, be able to know actual inventory, be able to age the inventory, be able to measure consumption of the inventory, and to set up depreciation rules." The participants recognized the importance of asset management and how critical, accurate recording of assets and inventory costs in the financial reporting were for transparent reporting to the stakeholders (Senior-level manager, personal communication, March 3, 2018). Recent literature on the topic of accuracy included the study of Dwivedi and Chakraborty (2017) whose work focused on the efficacy of ABC in accurately measuring costs which translated into a tool that assisted leaders to establish performance measurement and the resources needed for a profitable operation.

Theme 4: Competitive Advantage

Table 8

Theme 4: Competitive Advantage

Source	Frequency in theme by source
Conceptual framework	2
Participant 1	4
Participant 2	3
Participant 3	0
Participant 4	1
Participant 5	3
Literature review	4
New peer reviewed articles not in proposal	8
Company annual reports	3

The information in Table 8 corroborated the validity of ABC related to a company's ability to maintain or improve a strategic competitive advantage and was mentioned 28 times in table 8 above. Senior-level participants in the study emphasized the importance that accurate costing and forecasting played in improving the level of service to their customers while maintaining the lowest cost possible (Senior-level manager, personal communication, March 3, 2018). A key tenet of ABC was the accurate assignment of costs to the specific activity (Mahal & Hossain, 2015). The use of ABC and the implementation of a flexible and adaptable ERP system corroborated the narrative that ABC was a catalyst helping the community partner maintain a competitive advantage (Boukherroub, 2015). The company's 2017 first half financial report stated that "operational efficiency is a key contributor to customer satisfaction and financial performance, and the Group is aiming for excellence in this area." Also stated in a 2015 report for future strategies was the reaffirmation of one of their strategic goals which was "reducing unit costs while improving productivity." The article by Foroughi et al. (2017)

was one of the new peer-reviewed articles I used for validation, which corroborated the importance of the role that ABC and ERP implementation played in improving the company's competitive advantage. Furthermore, Foroughi et al. (2017) demonstrated the key role that ABC played in small and medium enterprises (SME). The use of ABC in SMEs further adds to the body of knowledge of ABC.

Theme 5: Identification of Cost Improves Corporate Performance

Table 9

Theme 5: Identification of Costs Improves Corporate Performance

Source	Frequency in theme by source
Conceptual framework	5
Participant 1	19
Participant 2	10
Participant 3	5
Participant 4	10
Participant 5	7
Literature review	7
New peer reviewed articles not in proposal	14
Company annual reports	4

The node presented in Table 5 above corroborated the importance of identifying accurate costs resulting in improved corporate performance, and was mentioned 81 times in table 9 above. During the interviews, senior-level leaders indicated that the proper reporting of assets and inventory costs was essential to accurately report corporate performance to stakeholders, but most importantly, to set the required depreciation rules and forecast future financial requirement to support the right inventory levels thus the improvement of customer service level (Senior-level manager, personal communication, March 3, 2018). Participant 1 stated "asset management in our company is one of the most strategic issues. Participant 1 also stated "transportation is one of the highest costs,"

thus cost analysis helped to improve cost identification and corporate performance. Within the conceptual framework, Boukherroub et al. (2015) explained that the use of ABC strategies provided managers the ability to distinguish the components that improved corporate performance.

Senior-level participants in my study mentioned that the aviation industry was complex, and some of the issues they encountered included difficulty in predicting the product life cycle of their products due to lack of communication in the supply chain. Also challenging were issues with forecasting cost that could potentially be hidden costs which included tariffs based on a myriad of export control classification numbers (ECCN), anti-dumping fees set by the U.S. government, hazardous material fees, special fire-retardant certifications, special export license fees on products with limited quantities set for exports. To mitigate issues of potential hidden costs, the ERP systems allowed for the addition of required field and comments that were used to provide specific guidelines for each of the special situations (Senior-level manager, personal communication, March 3, 2018).

Literature by Dwivedi and Chakraborty (2017) along with Wu, Wang, Lu, and Cheng (2017) corroborated the concepts in Theme 5, specifically the importance of identifying all cost in a complex global business environment. Dwivedi and Chakraborty (2017). posited that global business dynamics are complex, life cycles are complex, and it was important to understand all the costs associated with complex structures. Dwivedi and Chakraborty. added to the narrative of Theme 5 and conceptual framework of my study by corroborating that the use of ABC models to improve costing system helped

management leader to ascertain the cost of operations and customer profitability thus improving corporate performance

Application to Professional Practice

In the background of this study, I noted that Rajeh et al. (2015) identified the issue of total cost affecting operational cost and financial performance, thus the importance of improved analysis mechanisms that improve financial outcomes. ABC, as a strategy to improve costing systems and forecasts, addressed most of the issues related to costs at the participating community partner's site. The senior-level leaders in my study experienced the issues previously identified in Table 2 of my study, which validated ABC as a viable solution to costing inaccuracies and financial performance.

The consistency in the narrative of the findings was significant and corroborated the importance of ABC strategies used by the industry professionals in the aviation and aerospace industry in the region. Staubus (1971) along with Cooper and Kaplan (1987) established the conceptual framework that provided the foundation that supported the strategies that professional practitioners used to improve costing system and financial outcomes. The studies by Johnson et al. (2013) along with Mahal and Hossain (2015) further supported that ABC strategies helped leader forecast goals more accurately. The participants in the study mentioned during the interviews that the accuracy of assigning cost was paramount, and made mention that the cost of materials was so high that their focus was on asset management and the accuracy in forecasting inventory needed to support customer service levels. In this case, the choice of an adaptable and flexible ERP system that used ABC was paramount to the improvement of business practices.

The concepts I presented in the literature review and the recent peer-reviewed articles confirmed that the identification of cost, the accurate assignment of costs or cost elements to the appropriate cost centers was foundational to ABC (Dwivedi and Chakraborty 2017; Johnson et al., 2013; Mahal and Hossain, 2015; Wu et al., 2017). The study by Foroughi et al. (2017) along with Kustiningsih, Atmadja, and Patmana (2017) extended the body of knowledge on the discipline when the researchers performed studies on SMEs, which found that SMEs leaders also benefited from the use of ABC to improve financial results. The use of ABC at SMEs is interesting because Moisello (2012) identified the high cost of ERP systems as a hindrance to the application of ABC, yet ABC is expanding at SMEs globally.

Some of the significant issues that the participants in the study mentioned were related to the complexity of the industry which significantly impacted decision making related to asset management strategies, identification of life cycle variations, fluctuation of inventory needs, communication with the channel partners, collaboration with channel partners, hidden costs, international procurement, customer-supplier relationships, procurement risks, transportation risks, cost of quality, and disruptions in the supply chain. Complexity was previously presented in Table 2 of my study and is an issue experienced by the participants of my study.

Norreklit (2014) noted that ABC did not address the issues of complexity of procurement related to the supply chain. Senior-level leaders at the participating company have addressed the issue of complexity by utilizing the flexibility of the ERP system to enter detailed notes to identify the processes. The change to a more flexible and adaptable

ERP helped with the challenges of complexity. The participant noted that at the end of the day, verification was still a manual process that had to be done by a person. Samvedi et al. (2013) considered sudden cost a hidden cost, and the participants of my study were affected by sudden cost changes and depicted in Table 3 of my study. Tariffs, taxes, and duties changes were also previously identified in Table 3 by Johnson et al. (2013). The participants did not discuss the other hidden cost depicted in Table 3. The question on hidden costs did come up and was being addressed with the help of the ERP as the issues were identified. Some of the hidden cost discussed were anti-dumping fees, hazardous material fees, and special certification of material fees (Senior-level manager, personal communication, March 3, 2018). I identified the issue of complexity in the study and mentioned the work of Sydow and Frenkel (2013) to support the idea of complexity and the risks of disruptions in the supply chain.

During the literature review, authors that researched ABC did not directly address issues concerning the identification of life cycles and improved communication with channel partners to obtain strategic intelligence on the industry. Schulze et al. (2012) mentioned in his study that not all channel partners were willing to share data. Related to Schulze's findings, the participants in my study were unable to forecast when an airline removed a component for repair, or when a fleet was going to be phased out. Terziouglu and Chan (2013) noted that transparency helped channel partners be clear about the source of the costs, a strategy that my community partner has established and was strategic to the improvement of customer service levels. The senior-level leaders of my study, are hoping that a customer service strategy will help them improve the

communication needed to understand and forecast the life cycle of their products. One of the benefits the participants mentioned was their ability to benchmark results along the various business units within their company, which helped to forecast some life cycles (Senior-level manager, personal communication, March 3, 2018).

In this study, I presented the findings and described in detail strategies senior-level managers at the community partner's company used to successfully execute ABC as a strategy to improve costing systems to forecast procurement cost accurately. Furthermore, ABC is fundamental to the organization's financial results and transparency in the supply chain. The findings I presented in the study demonstrated the relevancy of the scholarly works asserting the use of ABC (Boukherroub et al., 2015; Cooper and Kaplan, 1987; Kannaiah, 2015; Mahal and Hossain, 2015; Staubus, 1971).

As previously stated in the problem statement, purchasing departments sometimes spend up to 80% of revenues on procurement (Mishra et al., 2013) thus the importance of addressing total costs analysis. The use of ABC demonstrated improvements in accurate cost analysis, asset management, transparent financial reporting and improvements in customer levels at the lowest inventory cost possible (Senior-level manager, personal communication, March 3, 2018). Additionally, the research finding presented five major themes and one subtheme not previously identified in past literature. Some of the results of this study are recommendations to senior-level managers for the identification of hidden costs and expanding the cost centers as they move forward in the ERP implementation phases.

Implications for Social Change

The Southeastern region of the United States is an aviation-centric region. There are approximately 470 companies that support the aviation and aerospace industry (Florida Enterprise, 2017), as well as a plethora of educational institutions at the high school level and technical schools, colleges, and major research universities that have specific programs to support the aviation, aerospace and defense industries. There are 14 educational institutions approved to teach maintenance in aviation in the Southeastern region of the United States officially approved by the Federal Aviation Administration FAA (Federal Aviation Administration, n.d.). Additionally, there are 94 pilot schools in the Southeastern region of the United States (Federal Aviation Administration, n.d.). Keeping aviation-related jobs in the region is critical to the livelihood of the thousands of employees that depend on their jobs to provide for their families. As previously stated, Blakey (2014) mentioned that the aviation and aerospace industry employed approximately one million workers, and indirectly supported over two million jobs. Blakely also mentioned that the aviation, aerospace and defense industry contributed approximately 2.3% to the U.S. GDP. Better TCA could provide leaders a decision-making mechanism that might help leaders decide to keep jobs in America and the Southeastern region of the United States. In their study, Sharma and Yu (2013) mentioned that in the procurement cycle, company leaders often decide to outsource based on the overall cost of the product to focus on core competencies, thus the importance that the MRO companies in the region play as the recipients of the outsourced work by the airlines. Therefore, leaders at MRO companies in the region need to consider

implementing accurate cost analysis strategies to stay competitive and keep jobs in the region and keep jobs in America.

Recommendations for Action

After concluding the doctoral study, my course of action includes the intent to share the findings of the study with the senior-level managers of the community partner. The leadership of the community partner has requested a copy of the final doctoral study and a meeting at the company site will be scheduled upon completion of the doctoral study. Sharing the results of Table 4 which identified 35 supply chain processes supported by procurement using ABC is important. I will also share the results of Table 3 which identified the types of hidden costs affecting TCA. Sharing this information is important now because the community partner is in the first year of implementing a more flexible and adaptable ERP system and the timing is ideal for sharing the findings of my study.

Additionally, during the meeting with the community partner senior-leadership, I will share the recurring themes that emerged which corroborates to the community partner that their strategies to improve costing systems work in other industries, including SMEs. The acknowledgment that the leaders are already paying attention to strategies that work validates their existing strategy, and the finding of the study will help them prioritize which cost centers need more focus.

As previously stated in my study, there was a lack of peer-reviewed articles in the aviation and aerospace industry. Since the time that I started my doctoral study, I found only one additional peer-reviewed article in the industry. Hon and Chu (2015) conducted

a study on the mechanisms of utilizing ABC at an aerospace company in Taiwan and mentioned that because companies are facing global competition, leaders were making decisions to focus more on customer service levels, which corroborated what is currently occurring at the community partner's site. As previously stated under theme 4, based on the financial report of January to June 2017, the leaders stated, "operational efficiency is a key contributor to customer satisfaction and financial performance, and the Group is aiming for excellence in this area." Because there is a lack of literature on the industry, I intend to complete additional research and eventually publish a peer-reviewed article on the topic. Demirtas (2013) along with Quinlan (2013) were some of the peer-reviewed articles I found on the topic. Some of the other articles found were not peer-reviewed, hence the need for more peer-reviewed articles on maintenance of aircraft and aircraft components. I also plan on reaching out to the organizers of industry conferences and share the findings with them at industry conferences I previously attended, for example, the 2019 Air Carriers Purchasing Conference.

Recommendations for Further Research

The lack of availability of literature on the topic in the industry warrants the need for additional research. Based on the findings of a subtheme on improved forecasts, I believe that customer service levels may be tied to accurate cost analysis, resulting in improved forecasts and thus improving customer service levels while maintaining the lowest inventory levels possible, thus significantly reducing cost (Hon & Chu 2015). Reducing inventory carrying costs was a recurring concept presented by the participants. I recommend future research on the relationship between customer service levels and

ABC. I also recommend future research on the relationship between ABC and asset management which was a primary focus at the community partner site, and a lack of literature on the topic also exists.

One of the limitations of the study was the single-case study design which presented the risk of obtaining a result not representative of the larger population and making the results not easily transferable to a larger population (Yin, 2014). An issue when selecting the case study participant was the high cost of ERP implementation, thus limiting the number of participants that had already implemented ABC and ERP system in the Southeastern region of the United States because a significant number of local companies were SMEs. With the advent of new literature on the use of ABC at SMEs (Foroughi et al., 2017), the possibility to expand the research to a larger population is now feasible.

Reflections

One of the concerns during the interview process which may hinder the credibility and validity of the study was personal bias (Jamshed, 2014). As previously stipulated, the role of the researcher was to observe and keep an open mind during the interview (Jamshed 2014). Having transitioned from the aviation and aerospace industry to academia four years ago, provided the participants with the certainty that my research was strictly academic. The participants displayed a calm and comfortable demeanor that allowed for an open and fluid conversation about the topic. The senior-level participant expressed interest in furthering the research and using students from my institution as interns at the company, thus supporting the evidence of an unbiased interview.

Furthermore, the participants understood that I had some previous knowledge which contributed to achieving saturation by asking questions not yet answered (Morse, 2015).

As I worked through this study, I realized the complexity of the industry required more research in other areas in addition to TCA. The emergent themes of improvements in customer service levels (Hon & Chu, 2015) came up 24 times in section 3, and life cycles (Dwivedi & Chakraborty, 2017) came up seven times and are potentially new areas that can be researched in the aviation industry. The new research can add to the body of knowledge on the topic.

Conclusion

Global supply chains are complex adding risks to the already complex aviation and aerospace industry. The aviation and aerospace industry is highly regulated and capital-intensive. The industry may have high incidences of hidden costs and excessive fees that need to be identified and automated. To mitigate the risks of disruptions in the supply chain and effectively control the high cost of materials in the industry, strategies to improve costing and forecasting models must be implemented. The identification of costs and cost centers can be expensive and time-consuming, none-the-less it is paramount to the success of ABC implementation.

The purpose of this qualitative exploratory case study was to determine what strategies supply chain leaders used to improve costing systems accurately. The data collected corroborated the narrative that ABC was an effective strategy and was effectively used by the senior-level supply chain leaders at the community partner site and a few other large companies in the region. Now that the conceptual framework was

validated, and the importance of ABC in achieving better forecast and financial results are better understood, SMEs also need to implement ABC strategies to remain competitive and maintain a competitive presence in the industry and in the Southeastern region of the United States.

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Appendix A: Interview Protocol

Procurement total cost analysis: A supply chain strategy for the aviation industry

Participant Code	
Date and Time	
Location	
Interview Format	

Interview Protocol

What I will do	What I will Say -- Script
Introduce the interview and set the stage to begin the interview.	I appreciate the time you have taken from your busy schedule to meet with me. I would like to thank you for agreeing to participate in my case study and making a difference in the aviation industry. I am a doctoral candidate, and one of the requirements is researching a business problem. The focus of my study is what strategies do supply chain management managers in the aviation industry use to improve costing systems to forecast procurement costs accurately? Before we begin, I have a copy of the consent form you previously received. I want to reiterate that you can withdraw at any time during the interview. I will be recording the interview so that I can focus on your responses. From time to time, I will also be taking some notes, usually to write down a thought or additional question that I would like to ask later and not interrupt you. I will be asking for copies of some documents. I will remove any reference to the identification of the company while on site. If applicable, I might take pictures, but not without first asking for your permission. Before we begin, do you have questions or concerns?
Begin to ask the questions Watch for non-verbal queues Paraphrase as needed Ask follow-up probing question to get more in-depth	1. What strategies do you use to improve existing costing systems to forecast procurement cost accurately?
	2. What strategies do you use to implement a total cost analysis system in procurement?
	3. What costing methods do you use to track total costs?
	4. How do you track the procurement process, and what data do you collect?
	5. What categories of cost are there?

If possible, ask for copies of documents referred to during the questioning process. Do not interject while the interviewee is speaking	6. What strategies and internal controls do you use to identify all the costs associated with the procurement of parts from domestic and international vendors?
	7. How much of the process is automated, and what automation tools are used to gather the cost information?
	8. How do you account for unforeseen or hidden costs when calculating the total cost of procuring a product?
	9. What additional information if any, do you believe pertinent to the study not discussed in the interview questions?
Wrap up the interview thanking the participant	At the moment, I do not have other questions for you regarding total cost analysis. Do you have any questions that I may answer before we end this session? I want to thank you again for your time and valuable information you shared with me today.
Schedule a follow-up member checking interview	I will be transcribing the interview, and I would make it available for you to review to ensure the accuracy of the transcript. I would like to schedule a second session so you can review the transcript. It is important that the transcript is accurate and credible so that it can become a valid record of our interview. I want to ensure that you are comfortable with the content of the transcript.
Follow-up Member Checking Interview	
Reiterate the importance of the follow-up interview to ensure validation	Thank you for taking the time to meet with me again to review the transcripts of our interview. We will review the response to each question, and you can let me know if the transcription represents your responses accurately.

Appendix B: Letter of Cooperation

[redacted]

March 6, 2018

Dear Tulia Badillo,

Based on my review of your research proposal, I give permission for you to conduct the study entitled "Procurement Total Cost Analysis: A Supply Chain Strategy for the Aviation Industry" within [redacted]
As part of this study, I authorize you to conduct interviews with upper level management team members involved in the supply chain process, operations, procurement and total cost analysis. After, you can provide a copy of the transcript for the participants to review for accuracy as part of your member checking process. I understand that you will provide our company with a summary of the research findings.

Individuals' participation will be voluntary and at their own discretion. I will share some non- proprietary documents related to our total cost strategy. We understand that our organization's responsibilities include access to supply chain management personnel and room availability for the interviews reserves the right to withdraw from the study at any time if our circumstances change.
The student will be responsible for complying with our site's research policies and requirements, including:
I understand that the student will not be naming our organization in the doctoral project report that is published in Proquest. The student has provided a confidentiality agreement.
I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.
I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.

Bar

[redacted]