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Qualitative Case Study on F-35 Fighter Production Delays Affecting National Security Guidance

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Abstract

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MSCJ, Boston University, 2012

BA, American Military University, 2011

AAS, Community College of the Air Force, 2010

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Approaching $400 billion for its establishment and production, the F-35 Joint Strike Fighter (JSF) is the Department of Defense's (DoD) largest acquisition program in U.S. history. Unfortunately, significant delays have immobilized the program's production rate, and little research has examined whether and how such delays directly affect national security. The purpose of this study was to determine whether and how production delays in the JSF program directly affect national security. The theoretical foundations for this qualitative case study were Condorcet's modernization theory and Giddens's globalization framework. Data were collected from interviews with 15 senior DoD civilian, military, and JSF officials and were coded and categorized to identify themes and patterns related to the source of production delays and reasons behind their persistence. Data were triangulated using archival records and government research documents. Key findings revealed concurrency issues, Helmet Mounted Display malfunctions, engine concerns, scheduling mishaps, national security vulnerabilities, and astronomical funding outside of the budget. Such factors were responsible for fighter program delays, which affect national security. The results are deemed significant, as the fighter has been a critical "piece to the puzzle" in the national security strategy as well as other national defense guidance issues. These findings have implications for social change in that they may inform senior DoD officials of policy-related concerns due to continued delays and their impacts on national security interests. Additionally, the study identifies concerns related to sustaining international partnerships that have significant interests embedded into this program.

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Dedication

I dedicate this dissertation to my grandparents, Nana and Granddaddy (d. 1998). If it weren't for your upbringing, I wouldn't be where I'm at today. Because of your incessant conversations about the importance of education, being independent, and working hard, I can now call myself *Doctor* and give the same motivation to others. To my mom, Cynthia Marie (d. 1985), I wish you could be here to celebrate this moment with me, but I know you're watching, and I hope you're proud. To my lovely daughter, Araceli: You are a brilliant, animated, and beautiful girl. You're such a great kid, and I'm so glad you love education. Your determination to be a veterinarian is exactly why I fought hard through the long hours, sleepless nights, forgetting to eat, and being the boring "nerd" of a mom to complete this milestone: to show you that you can do whatever you choose and be anything you want to be as long as you put in the hard work, time, effort, and most importantly, BELIEVE.

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Chapter 1: Introduction to the Study

The origination of the F-35 Joint Strike Fighter (JSF) program dates to the 1980s. After several unsuccessful attempts in providing sustainable tactical aircraft acquisition programs, Congress re-evaluated its objectives in technological advancements for air and global superiority. Two major departments, whose missions relied on air support, were in quandary on how to establish an affordable yet effective aircraft for the 21st century for two of the world's largest military fleets. Over two decades, multipurpose programs had been established and evaluated for the Department of the Air Force and Navy: Advanced Short Take-Off/Vertical Landing (ASTOVL), Multirole Fighter (MRF), Advanced Tactical Aircraft (ATA), Naval Advanced Tactical Fighter (NATF), and Advanced-Attack/Advanced/Fighter-Attack (AAAFA; Joint Strike Fighter [JSF], n.d., Pre-JAST History section, para. 2). These variants were deemed necessary in order for each service department to successfully complete its aerial missions.

The Department of Defense (DOD) worked feverishly to formulate an acquisition program that would meet requirements for all branches of services involved, but each program inevitably fell short due to funding and the need to produce a supersonic jet to retire legacy aircraft. This provoked Congress to establish the Joint Advanced Strike Technology (JAST) program, and the goal was to "mature the technologies that a new series of tactical aircraft could use" (JSF, n.d., JAST History section, para. 1). JAST was not intended to develop new aircraft, such as multiple airframes, but instead to provide systematic upgrades through which the program would be more cost effective. In 1993, JAST became the new attack acquisition program for the Department of the Navy and

Marine Corps. The Air Force contemplated a multirole fighter to replace the A-10 Thunderbolt II and F-16 Fighting Falcon jets, but it was not until further evaluation by Congress that a need was recognized for a fighter program that would benefit all three service departments. With the goal of developing a multifunctional aircraft for numerous services (including international partners), Congress developed a new program to emphasize the joint relationship, efforts, and mission. Two years later, the program's name changed to *Joint Strike Fighter* (JSF) to "focus on a joint development of the next generation fighter/attack plane" (Ozdemir, 2009, p. 7).

As the acquisition program was revolutionized from JAST to JSF in the 1990s, DOD projected saving a substantial amount of money for tactical aviation and operating costs. Additionally, the fighter program would reduce the amount of aircraft needed by producing an acquisition program that would serve multiple purposes to mitigate domestic and international threats as well as deter adversarial capabilities. The primary responsibility of the fighter would be to produce a more affordable aviation program with multiple roles that would eventually retire the Air Force's F-16/A-10 model aircraft and the Navy's F/A 18E/F models while increasing technological advancement.

With the JSF program as the largest acquisition program in U.S. history, DOD anticipated the development of 2,457 aircraft across all service departments (Gertler, 2014, p. 1). The Navy would procure 680 with Short Take-off Vertical Landing (STOVL), Vertical Short Take-off Landing (VSTOL), and Carrier Variants (CV). The Air Force projected to secure the largest amount of aircraft by procuring 1,763, specifically the Conventional Take-off and Landing (CTOL) variant to replace its legacy

aircraft. Furthermore, the Air Force set to purchase STOVL versions to "improve future close air support capabilities" (Bolkcom, 2007, p. 1). In addition to a multirole fighter jet, the F-35's most distinctive concept was the international relationship it invoked. The F-35 became a joint service, international program where the United States collaborated with eight international partners, security partners, and foreign military sales customers.

In 1994, JSF reviewed three aircraft designs by Lockheed Martin, Boeing, and McDonnell. Two years later, DOD announced that Boeing and Lockheed would be the competing companies to produce aircraft designs for the demonstration phase by building specific variants for flight-testing. After 5 years of completing demonstration components and flight test competitions, former Under Secretary for Acquisition, Technology, and Logistics Edward "Pete" Aldridge, Jr. announced on October 26, 2001 that Lockheed Martin would establish the F-35 JSF program (JSF, F-35 Acquisition History section, n.d., para. 1). Congress charged the Department of the Air Force and Navy (including the Marine Corps) with management of the fighter program and agreed to coordinate as well as alternate critical positions for checks and balances of the program's overall production.

With Lockheed Martin as the principal contactor for the fighter program, DOD began developing requirements for design and performance. False impressions of the aircraft design were put to rest with the statement that JSF would apply multiple variants to the fighter; this approach would save significant funding, especially in the production phases. Former Secretary of Defense William Cohen stated that this approach "avoids three parallel programs for service unique aircraft that would have otherwise been necessary, saving at least $15 billion over its lifecycle" (as cited in Bolkcom, 2007, pp. 3-

4). Included in the contract was an additional aerospace company collaborator, Pratt and Whitney, which would be responsible for the engine, a current derivative of the Air Force's current fighter aircraft, the F-22A Raptor. At Congressional discretion, the JSF program established a single-engine, single-seat joint fighter with dash and stealth capabilities. Weight qualifications and combat impact would be unique to each service's requirements, and each variant would have the option to upgrade weapon system advancements if Congress considered it to be cost effective. The fighter's performance is the most significant element of the production process, as each section is pertinent to the service departments. According to Bolkcom (2007), performance features would be radar signature, speed, range, and payload dependent upon performance and cost incentives (p. 5).

Amid the new strategic plan with Lockheed Martin and proposed plans for the performance and development of the United States' top investment, problems were inevitable during the production phase. Three years after the establishment of the fighter, the program was rebaselined (meaning that leadership conducted a complete restructure of the program). GAO (2013) concluded that the initial rebaseline was due to weight and performance issues; again, the program was rebaselined 3 years later because of unexpected growth and scheduling mishaps (p. 3). As a result, Former Defense Secretary Leon Panetta mandated an unprecedented evaluation of the program due to frequent setbacks. Under the reformed program, Congress approved DOD to focus further attention on providing additional funding, conducting more tests, and continuing developmental phases to "fine-tune" the fighter. In order to fulfill new requirements

established by Secretary Panetta, the amount of aircraft produced would be condensed in number for all service departments.

Since 2001, the JSF program has been in the System Development and Demonstration (SDD) phase, and during this phase, the aircraft is developed and tested. According to JSF (Program section, n.d., para. 3), almost two dozen aircraft will be tested, 14 fighters will go through flight-testing procedures, and approximately 10 will conduct airborne operations. After new guidelines were implemented, the program continued production over budget. This matter caused controversy, and ultimately, JSF exceeded "critical growth thresholds" (GAO, 2013, p. 4). The problem in question breached the Nunn-McCurdy Act (10 U.S.C. 2433), which compels

> DOD to submit unit cost reports on major defense acquisition programs ... constitute breaches in unit cost growth ... if critical cost growth threshold is breached, DOD is required under law to initiate steps to justify continuation of the program. (Schwartz, 2010, p. 1)

By 2010, Congress approved the program to continue, but the breach of the Nunn-McCurdy Act required reorganization. The third restructure produced additional costs and scheduling delays, and it reduced the amount of aircraft overall. In 2012, a fourth baseline program promised to present a more positive and realistic process (GAO, 2013, p. 4). The current restructure includes reinstatement of SDD and additional guidelines established mandated under the Nunn-McCurdy Act. With the background of this study articulated, it is apparent the JSF program has suffered through four rebaseline endeavors over the past 10-plus years. Due to constant problems, the program could be faced with

possible discontinuation of production. Problems such as over budget costs, developmental errors, and scheduling mishaps have threatened the integrity and execution of the United States' largest technological advancement program, as well as the most expensive acquisition to date.

With constant production delays threatening the fighter program's future, there is little known on whether the issue will affect the target date Congress established, which is currently 2037. The timeline is a critical aspect of the fighter program, as it is based on modernization, national security, and funding. With that said, there is limited information to determine whether such delays will directly affect national security. Also, with such ambiguity, there should be a determination of whether specific delays break down strategic planning, which is emphasized in national defense guidance. Finally, this study investigated whether modernization and technological advancement of aircraft are needed in order to protect the United States from constant threats, as well as what this means for national security. This issue is a major concern, as lack of production for 21st century modernized deterrents could possibly break down and/or violate guidance mandated in the Defense Strategy Guidance (DSG), Quadrennial Defense Review (QDR), and National Security Strategy. NSS will be called *other national defense guidance* throughout. (Office of the Under Secretary of Defense Comptroller [OUSD Comptroller], 2013). The F-35 fighter problem is based on the modernization theory that technological advancement is needed in order to promote social development in countries or societies.

Problem Statement

Since 2001, there have been numerous delays in production due to maintenance performance, mechanical failures, increase in cost, and scheduling misfortunes. As a result of continued delays, Secretary Panetta mandated a thorough review of the program, which calculated four rebaseline programs in 2004, 2007, 2010, and 2012. While the JSF program has remained stable, there have been additional delays related to the same issues. The problem to be addressed is that it is not known how constant production delays within the F-35 JSF program could directly affect national security. As a result, Congress could potentially be directed to make a decision on reevaluating the program's ability to fully execute in the next 23 years.

The F-35 JSF program is a "joint, multinational acquisition intended to develop and field an affordable, highly common family of next generation strike fighter aircraft for the United States Air Force, Navy, Marine Corps, and eight international partners" (GAO, 2013, p. 3). DOD began the JSF program in October 2001 with a "highly concurrent, aggressive acquisition strategy with substantial overlap between development, testing, and production" (GAO, 2013, p. 3). The largest acquisition in DOD history is projected to be fully operational for all services and U.S. allies by 2037 (Hartung, 2014). The U.S. Marine Corps will begin military operations with the fighter as early as 2015 and the Air Force the following year.

Outlined in the DSG (2012), the United States will be prepared to defend and protect national security interests, as well as the American public. In doing so, the United States must "secure the homeland against 21st century threats by preventing terrorists and

other threats against our homeland, preparing and planning for emergencies, and investing in strong response and recovery capabilities" (White House [WH], 2013). In addition to DSG, NSS is a correlating component that identifies how the United States will identify strategic methods as well as protect American interest and address future challenges. Finally, the QDR sets long-term strategies for how to face possible threats against the United States (Quadrennial Defense Review [QDR], 2014, para. 1). In order for the F-35 JSF program to be proficient over the next 23 years, there has to be a firm timetable that is conducive to production and military readiness that is in accordance with DSG, QDR, and NSS.

It was not known how constant production delays within the F-35 JSF program directly affect national security. Even though there was research presented on the issues (Aksamit, 2009; Drew et al., 2013; Gertler, 2012; Greaney, 2010; O'Rourke, 2009; Ozdemir, 2009; Sullivan, 2014; Wilkinson, 2010), there was little research regarding how this issue breaks down strategic planning, which is emphasized in the DSG, which is implemented through NSS and other national defense guidance, and what this means for the United States. Research emphasized that even though the fighter program has structured its platform for stability and has decreased risks, concurrency is still a critical concern (Sullivan et al., 2012). This means that while aircraft are certified as operational and perform training exercises, there are fighters that are still in the production phase working on issues. Every time there is a concern with aircraft in production, the fighter that is in operational status has to be grounded and updated to mirror changes from the production phase (called *concurrency*). This is a concern because millions of dollars are

constantly wasted by grounding aircraft to fix the problem, especially if there is a good amount of fighters in operational status. This could delay production due to the amount of money allotted to constantly fixing issues. Lack of production for this particular aircraft does not give a direct census on the vulnerability and/or position of the United States in advanced aviation security and protection. If production delays of the F-35 JSF program formulate a severe threat to U.S. national security, its American resources/interests, and its international allies, there needs to be direct guidance on how the United States will maintain its air superiority by not having consistent and "ready" modernized aircraft. Research has been conducted on how software systems can limit initial warfighting capabilities, which is a concern for national security (Sullivan, 2014; Sullivan et al., 2014). Additionally, there has been research completed on budget concerns with the program (Brown, 2013;Sullivan, 2013; Sullivan et al., 2013), but there are not any "clear cut" initiatives on whether production delays of the F-35 JSF program can harm U.S. national security interests and, if so, the severity of vulnerability. Furthermore, research has been conducted to voice the absolute need for the United States to produce advanced weapons systems (Gillespie, 2009), but there is little research on the importance of modernization, how it affects production delays, and most importantly, how it affects national security. In addition, there needs to be research on how modernization and production delays will affect current weapons systems that are considered advanced, current, and the future for U.S. security as a continued air superiority force.

Guidance from the DSG and other national defense guidance confirmed that U.S. strategic objectives and foreseen military missions are needed based on the existing

security environment (DSG, 2012; NMS, 2004; NSS, 2015; QDR, 2014). To fulfill this requirement, DOD needs modernized capabilities in order to operate, deter, and defend the nation in a new operational environment, which is mandated in the DSG (Department of Defense Research Engineering Enterprise [DOD REE], n.d., p. 2). These objectives conceivably require new capabilities and technologies that can prepare the United States for new threats. In addition, advanced technology is required to sustain U.S. industrial superiority and innovative edge, which is an important concept in protecting national security (Greaney, 2010; Wilkinson, 2010). Remarkably, the F-35 JSF program can fill this void as the new technological advancement and fifth-generational asset for the United States in the 21st century.

The NSS's connection with production, capabilities, and readiness permeates a plan to develop a national security strategy for technology, which is based on a prioritized assessment of risks and challenges (Princeton University, STOVL section, n.d., para. 2). The objectives stated in the NSS are significantly interlinked with the DSG when it comes to technological advancement and modernization. The QDR directs the President of the United States' (POTUS) guidance, along with the Secretary of Defense's (SECDEF) implementation, of how the United States will strategically defend itself against adversarial forces with modernized assets.

With specific requirements summarized in the national defense guidance concerning the need for technological advancement and development, concerns have been raised for the F-35 JSF program and national security. Scholars have mentioned that modernization is required in advanced technology in order to evolve as well as be

prepared for any situations that may arise (Wilkinson, 2010). According to Greaney (2010), "even though America has made great strides in increasing survivability [the JSF] of its aircraft over the contested airspace of the nation's enemies, its adversaries … have not remained idle" (p. 1). Greaney continued to discuss how adversaries have "advanced their technology and increased their ability to track and target aircraft in the skies over their territory" (p. 1). Now that the United States' adversaries are advancing and are more innovative, the United States has a problem, as the F-35 fighter is still in the production phase of the program.

Research has exposed mechanical errors that have delayed production, incurred costs, affected scheduling, and mandated alignment but does not indicate how these issues will affect overall national security interests. Research studies have found that the fighter program has affected other innovative projects that have become a concern for national security. Greaney (2010) stated, "the Air Force was on track to gain its next long-range bomb, but it appears that the high cost and production delays of both the F-22 and the F-35 have impacted this goal" (p. 36). The purpose of this study was to gain an understanding of the future of the fighter and whether it will be able to stay on its timetable to officially execute in 23 years. Additionally, the purpose of this study was to determine whether constant production delays directly affect national security. It was not known how constant production delays within the F-35 JSF program directly affect national security. Furthermore, this study investigated whether modernization and technological advancement of aircraft are needed in order to protect the United States from constant threats and what this means for national security. These elements are

standards that are mandated in the DSG and NSS (OUSD Comptroller, 2013). While fifth-generation assets should be the only aircraft positioned now to deter and defeat current and future adversarial threats, some scholars believe that it will be up to both the fourth and the fifth generations to do the job. Greaney speculated that "America's Air Force is headed in a direction that will combine its 4th generation fighter and bomber fleets with limited procurements of 5th generation stealth aircraft for at least the next fifteen to twenty years" (p. 37). With that said, DOD will continue to face serious issues concerning whether or not production delays will hurt national security.

Nature of the Study

The study was qualitative in nature and used a case study approach. The qualitative research method was an appropriate form of study to determine whether fighter production delays directly affect national security. If delays in fact affect national security, there should be a determination of how specific delays break down strategic planning, which is emphasized in the DSG, which is implemented through NSS and other national defense guidance. Qualitative research was an appropriate form of study to understand how production delays break down strategic planning, emphasized in the DSG and implemented by NSS. The problem with production delays on fifth-generation aircraft threatens national security interest, which was the primary focus of this study. By linking the need for advanced technology to improve strategic planning for national security interests, this research should be consistent with Condorcet's modernization theory (Gilman, 2003).

For this study, qualitative methods afforded the opportunity to engage with interviewees in a neutral setting because interaction develops a level of ease, and the participants involved can know more about each other during the interview process (Creswell, 2003, p. 181). As there was limited research on this topic, qualitative case study analysis was a good option to obtain a substantial amount of data that needed to be better understood. McNabb (2008) indicated that the fundamental purpose of completing a qualitative research study is examined with an organization, and this is a true testament to the F-35 JSF program. With McNabb's position, the organization satisfied the requirement, in which the fighter program falls under the largest organization in the U.S. Congress.

As fighter production delays are an underresearched topic, qualitative analysis provided an in-depth approach (Babbie, 2007). As this particular case study examined whether modernization and technological advancement of aircraft are needed in order to protect the United States from potential threats, this method was more suitable than quantitative or mixed methods. Whereas quantitative methods accentuate objective measurements and numerical analysis from gathered data (Babbie, 2010), qualitative methods center on in-depth interpretation of people or events, which can revolutionize ideas and/or theories (Hancock, Ockleford, & Windridge, 2009, p. 6). Furthermore, qualitative case studies intensify the need to explain an intricate problem or event. According to Yin (2003), there is a need for case studies because case-study techniques lead to enlightenment on difficult social phenomena. Additionally, Yin explained the reason for case studies in qualitative research by stating,

> case studies […] are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study […] does not represent a sample, and in doing a case study, your goal will be to generalize theories (analytical generalization) and not to enumerate frequencies (statistical generalization). (p. 10)

Finally, qualitative research gives researchers the opportunity to collect information from a specific group of individuals in order to grasp actual events or phenomena. Because this research covers three aspects of the F-35 program that are distinct yet relate to the same concern, one case study design was implemented to obtain a complete understanding of the fighter aircraft phenomena at the Congressional level.

For this case study, I interviewed 15 participants. According to Bertaux (1981), "15 are the smallest acceptable size for sampling in research" (p. 35). Even though authors such as Guest, Bunce, and Johnson (2006) have suggested that data saturation usually occurs around 12 participants, Latham (2015) contended that 15 participants should be a minimum for most qualitative interviews. Additionally, Latham recommended a minimum sample size of 15 for participants who are homogeneous in terms of "a particular position or level (i.e. top level executives) in the organization or a particular type of employee (i.e. customer service representative)" (para. 2). Fifteen was a sufficient sample size of top officials who make direct decisions on the budgeting and execution of the F-35 JSF program. With 15 participants who were senior officials, I obtained a substantial amount of information on what is needed for the data collection process; furthermore, I discovered information on what could happen to American

interests and national security if the fighter does not stay on its current timetable. Fifteen individuals agreed to participate in the interview portion of this research study; all participants worked for DOD and either F-35 Integration offices or the Joint Program Office (JPO) because they were individuals who made and currently make decisions on the fighter program. This was an appropriate amount for data saturation. Data saturation is an important element that justified the amount of participants for this study. Each participant works together with others to make critical decisions on the fighter within the DOD; with commonalities and acknowledgement of the existing issues as well as the production status of the F-35, there should be a period of data saturation. Data saturation occurs when the researcher no longer collects original information. Based on the participants involved, the interview process indeed was a significant factor in reaching the goal of data saturation. In order to collect specific data, I conducted face-to-face interviews at an appointed location within the Pentagon (unclassified conference rooms). There were three sets of questions about the F-35 program based on the budget, overall perspective of the program, and specific concerns about the ongoing issues. Additionally, I collected archival data, public records, and government research documents because these documents provided supporting statements to the research problem and gave depth to the interview process.

As mentioned, a case study method was the best approach to for this study, and triangulation was a specific concept used to achieve results. According to Tellis (1997), a case study approach is considered a specific research strategy for triangulation, which is needed in order to determine the validity of data collection processes in research. Stake

(1995) described *triangulation* as a "quality assurance tactic to ensure case study research is based on a disciplined approach and not simply a matter of intuition, good intention, and common sense" (p. 107). Feagin, Orum, and Sjoberg (1991) stated that triangulation is achieved with data, investigators, theories, and methodologies.

The type of triangulation study is data source triangulation. According to Denzin (1984), data source triangulation occurs when the researcher seeks information on a topic in an attempt for the data to be the same. In addition, data source triangulation is based on qualitative inquiry, which involves time, space, and individuals. Three sources are required to achieve triangulation for case study research. The three concepts used for this study were the following:

- Interviews
- Government research documents
- Archival records

Senior officials who were experienced with the production delays, the Congressional budget, and fighter-specific issues were interviewed to gather additional information on the F-35 JSF program. Additionally, interviews were conducted to gather full explanations of what production delays with the fighter caused, in reference to lack of modernization assets for the 21st century and vulnerability of national security. Government research documents from federal agencies for this program, which are considered to be academic literature, were researched to support information given by the participants in an attempt to "fact check" and ensure credibility and validity. Archival records on the F-35 JSF program were researched to support data given by the

participants and to crosscheck data from various resources to seek data saturation (just like data saturation in interviews) and to show commonalities within the data from multiple sources.

Interviewee participation was critical to this research study because data were warranted from key experts to add supporting statements in order to determine whether production delays really do affect national security interests. Interviewees gave a professional perspective based on their experience and knowledge in the field; additionally, this determined whether delays broke down strategic planning mandated in DSG, which is implemented with NSS. This case study included a review of the data collected to determine if there were any contradictions between the interviews conducted and scholarly articles (i.e., government research documents and archival records) on fighter production issues. Interview approaches are important and give researchers the opportunity to tailor their settings for the maximum amount of data collection possible. According to Sewell (n.d.), qualitative interviews provide "open-ended responses to questions provided by the evaluator, which are the main source of raw data" (para. 2). This approach made it possible to obtain a significant amount of data from participants during the interview. Another important element of interview approaches is reviewing the outcome "to gain insight into interesting or unexpected findings" (Sewell, n.d., para. 3). Interview methods contribute to evaluating programs, examining processes, investigating experiences, and developing outcomes that are beneficial to qualitative research. Ultimately, these approaches determine the meaning of research for participants and make it possible to examine the evolution of phenomena for the study.

Based on the need for an extensive interview process, a case study was the best approach. Case studies in qualitative research formulate descriptive ideas that are used to develop an individual's perspective on an event. In addition, case studies, researchers "collect data about participants using direct observations, interviews, protocols, tests, examinations of records, and collection of writing samples" (Colorado State University [CSU], 2014, para. 1). A descriptive case study for this qualitative research served as the best approach because there was a need to gather specific details from each participant during the interview process. Additionally, the descriptive case study process determined the measure of the participants' statements and how this made a significant difference to this study. Case studies involve inductive processes where themes and specific categories "emerge through analysis of data collected" (McRoy, n.d., para. 1). Furthermore, case studies are in-depth examinations that entail analysis of specific events. In this instance, a singular case study sufficed in interviewing participants on specific issues within the F-35 program and the production delays. Case studies are necessary elements of qualitative research in being centered on the individual case and "not the whole population of cases" (CSU, Case study section, 2014, para. 10).

Creswell (2007) described case study research as a qualitative approach in which an investigator explores cases over a period of time, through detailed, in-depth data collection involving more than one source of information; furthermore, case studies involve reporting descriptive information based on certain themes (p. 73). Even though there has been criticism on the validity of case studies, it been accepted in research as a constituent that furthers information on a limited topic or an unexplained phenomenon.

Easton (2009) claimed that the justification for validating case studies is based on their presentation of popular results that will gain attention, especially if they bring original contributions to a specific field (p. 118). According to Eisenhardt (1989), it is not necessary to conduct a large number of case studies on the same topic; up to 10 cases would be sufficient for a credible case study (p. 532).

Research Questions

It was not known how constant production delays within the F-35 JSF program directly affect national security. The following research questions and subquestions were the basis of this qualitative research case study:

RQ1. How do constant production delays within the F-35 JSF program directly affect national security?

SQ1. How are production delays in the F-35 JSF program relevant to National Security Strategy (NSS)?

SQ2. How are production delays in the F-35 JSF program relevant to National Military Strategy (NMS)?

SQ3. How do production delays of fifth-generation aircraft directly affect national security interests?

RQ2. What is the future of legacy aircraft if delays such as the delay in the F-35 fighter program continue to occur?

Purpose of the Study

The purpose of this study was to investigate whether F-35 production delays directly affect national security. The concern was whether constant delays break down

national security guidance, as modernization and technological advancement of aircraft is needed in order to protect the United States from constant threats. This issue is a major concern as lack of production for 21st-century modernized assets could possibly break down and/or violate guidance summarized in the DSG, QDR, and NSS (Office of the Under Secretary of Defense Comptroller [OUSD Comptroller], 2013, p. 7). This research resulted in gaining an understanding and filling an information gap concerning how F-35 JSF program production delays may threaten national security as advancement in aircraft and weapons systems illustrate the standards that are mandated in the DSG and NSS (OSD, Comptroller, 2013, p. 2). Moreover, it was important to interview key experts from major agencies that are directly involved with the F-35 JSF program process to determine whether production delays will affect the nation's security efforts. Information obtained in this study will give Congress and DOD a direct look at how frequent delays break down the strategic planning stated in the DSG and executed by NSS.

Theoretical Framework

The theoretical framework for this study was Condorcet's modernization theory. Influenced by the ideal of progress and became existent in the 1950s, modernization was thought to emphasize industrialization and economic development, which leads directly to positive social and political change (Berman, 2009; Gilman, 2003; Huntington, 1968; Lipset, 1959; O'Donnell, 1973; Przeworkski & Fernando, 1997). Modernization theory is centered on development and technology, which are needed as innovation epitomizes modernity. Additionally, modernization is believed to lead to positive social change because innovation constitutes development (Huntington, 1968). The F-35 fighter

program was established as the focal point for defining affordable next-generation strike aircraft weapons systems while bringing cutting-edge technologies to the battle space of the future (cited from Home Page, JSF, n.d, para. 1). The problem at hand epitomizes what is mandated in the DSG: that the United States develop a protective strategy that modifies security guidelines based on today's war while preparing for future challenges (DSG, 2012, p. 1). This approach offers elements of technological changes that emerge as a result of development and progression of the United States actions on national security. Lipset (1959) argued that modernization is the key to creating economic development and that nations that are modernized are more sophisticated in aspects of innovation. Furthermore, subsequent research and application of Condorcet's modernization theory for this research study will represent what impact delays have on advanced technology and how constant postponement can potentially affect U.S. national security.

Using modernization theory, it is possible to observe social changes in a given country and evaluate them against those of other countries. According to Mihan (n.d., para. 1), applying this theory involves looking at internal factors of a country. Underdeveloped countries have the potential to modernize or mature economically in the manner of privileged countries (which can be a threat to modernized and/or technologically advanced countries). While undeveloped countries have the potential to innovate, modernized countries are more sophisticated and can maintain democratic governments to make decisions on their developing economies (Huntington, 1986; Lipset, 1959). In essence, "modernization theories attempt to identify social variables, which contribute to social progress and development of certain societies as well as seek

to explain the details of social evolution" (Mihan, n.d., para. 1). Furthermore, modernization theory encourages social change as well as consequential developments. Countries that have positive social change outcomes are "likely to emerge only where healthy political institutions capable of channeling and responding such exist" (Huntington, 1968, para. 2). Applying this theory, one can also look at inner dynamics related to social and cultural change as well as the adaption of technological advancements. Author Rodney (1973) claimed,

> Modernization theory is a new model of basic principles, which is derived from Age of Enlightenment with the concept that people could develop and change their society. This particular theory contrasts from the terms of the reasons as to why the countries of the third world status are suffering from a lack of development. The modernization theory insists that the third world is underdeveloped and remains in such a state because its historical failure to industrialization and modernization with technology. (p. 1).

Such theory indicates that modernization is needed in order to develop society. For instance, modernization theory applies to the United States' need to protect national security interests as well as air superiority based on globalization theory. Former Acting Secretary of the Air Force (now Under Secretary of the Air Force) Eric Fanning commented on air superiority and modernization:

> These programs [joint strike fighter, long-range strike bomber, and next generation air-to-air tanker programs] go to the root of Air Force capabilities. We need to be able to move quickly and strike anywhere in the world, and we need to

> be able to monitor things anywhere in the world. The service has to invest in the next generation platforms and we cannot over the next 10 years just invest in modernizing legacy platforms. If you modernize … a fourth-generation fleet, when it goes against a Chinese or Russian fifth-generation aircraft, it's dead before you even know an adversary is in the air. (Fanning, 2013, para. 3)

Modernization theory elaborates on the reality that a fifth-generation aircraft such as the F-35 fighter is needed because threats are ever changing and rising globally. According to Secretary Fanning (as cited in Garamone, 2013), such capabilities (JSF) are pivotal, as threats are shifting and growing geographically (para. 6). Moreover, other countries field advanced weaponry, and as a result, the United States needs to maintain investments in next-generation aircraft for improvement; such platforms will have agility, mobility, and ability to strike and have much-needed components of modernization that the United States will be up against.

A second theory that is significant to this research study is Giddens's theory on globalization. *Globalization* is a "long-term, largely irreversible phenomenon involving the political, cultural, and economical merging of geographically dispersed groups and shares the idea that transportation and communication technologies are pervasive and consequential" (Gansler, 2013, p. 2). Giddens's globalization theory (1990) involves the "intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa" (p. 64). With this theory, Giddens expressed more concerns in globalization for "high modernity" than post-modernity society. In this concept, globalization affects modernity,

which is becoming more radicalized and universalized as social and cultural concerns overshadow further issues against global threats.

In this study, modernization and globalization are key concerns in the effort to protect the national security environment. As of 2015, the national security environment faced reduction in critical assets, leading to questions concerning the future of growth and sustainability, increasing costs in mandatory spending, critical jobs, Congressional budget issues/a intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles and vice versa massive debt ceiling, global evolution, and global security (Gansler, 2013, p. 4). The United States is a global force when it comes to military strength, technology, and modernization (Under Secretary of the Air Force Eric Fanning, personal communication, December 4, 2013). Even with this position, current issues (e.g., terrorism) are disturbing modernization and slowly decreasing the nation's economic and global standing, affecting overall national security interests. According to Robinson (2007), globalization is changing traditional ways in which individuals and the social world emerge (p. 125).

Globalization is forcing evolution within the United States and as a result, major issues are reshaping history. With globalization as a dominant process of the United States modernization is needed to sustain global supremacy. Gansler (2013) maintained that the U.S. National Security Strategy is "technological superiority" but the way the nation handles industrial defense strategy and policy must be modified in order to "gain economic and security benefits of globalization" (p. 5).

Globalization theory was well suited to this study because it acknowledges the need for change in society, technology, and security, which relates to the fate of the F-35 JSF program. The JSF program promotes social change, technological advancement, and, most of all, increased national security protection. Additionally, the F-35 program will globalize as the Air Force, Navy, Marine Corps, and eight international partners exploit the world's most dominant aircraft once these aircraft are fully produced and executed by 2037.

Definitions of Terms

Active Electronically Scanned Array (AESA) radar: "Enables F-35 pilots to effectively engage air and ground targets at long range, while also providing outstanding situational awareness for enhanced survivability. AESA's solid-state technology and elimination of mechanical moving parts will enable the radar to far surpass current standards for systems reliability" (Lockheed Martin, 2015).

Acquisition: "Acquiring by contract with appropriated funds of supplies or services by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated and evaluated" (Acquisition Central [AC], n.d.).

Acquisition Program Baseline (APB): "An agreement of the Program Manager (PM) and the Milestone Decision Authority (MDA) that reflects the approved program and contains schedule, performance, and cost parameters that are the basis for satisfying an identified mission need" (DAU, 2012).

Air superiority: "That degree of dominance in the air battle of one force over another that permits the conduct of operations by the former and its related land, sea, and air forces" (Air University [AU], 2014).

Average Procurement Unit Cost (APUC): "Calculated by dividing total procurement cost by the number of articles to be procured. Total procurement cost includes flyaway, rollaway, sailaway cost (that is, recurring and nonrecurring costs associated with production of the item as hardware/software, systems engineering [SE], engineering changes, and warranties) plus the costs of procuring technical data (TD), training, support equipment, and initial spares" (DAU, 2012).

Capabilities: "The ability to achieve a desired effect under specified standards and conditions through a combination of means and ways across doctrine, organization, training, materiel, leadership and education, personnel, and facilities to perform a set of tasks to execute a specified course of action" (Department of Defense Directive [DODD], 2008).

Communications, Navigation, and Identification (CNI) system: "The most advanced integrated avionics system ever engineered. It provides F-35 pilots with the capability of more than 27 avionics functions. Using software-defined radio technology, the CNI allows for simultaneous operation of multiple critical functions, such as identification of friend of foe, precision navigation, and various voice and data communications, while greatly reducing size, weight, and power demands" (Lockheed Martin, 2015).

Defense Acquisition Executive Summary Report: "The principal mechanism for tracking programs between milestone reviews. The information in the DAES is designed to provide early-warning reporting to the USD (AT&L) and Assistant Secretary of Defense, and such data describe actual and potential program problems and mitigating actions taken or planned" (DAU, 2012).

Distributed Aperture System (DAS): "The only 360-degree, spherical situational awareness system. The DAS sends high-resolution real-time imagery to the pilot's helmet from six infrared cameras mounted around the aircraft, allowing pilots to see the environment around them—day or night—without loss of quality or clarity. The DAS greatly reduces the potential for midair collisions and virtually eliminates surprises" (Lockheed Martin, 2015).

Defense strategic guidance: "A government regulation that is intended to reshape future DOD priorities, activities, and budget requests for the next decade. Additionally, this regulation refines the DOD 10-year strategic outlook in response to change in the global security environment" (DSG, 2012).

Electro-Optical Targeting System (EOTS): "The world's first and only senor that combines forward-looking infrared (FLIR) and infrared search and track IRST functionality. The high-performance, lightweight, and multifunction system enhances F-35 pilots' situational awareness and provides precision air-to-air and air-to-surface target capabilities" (Lockheed Martin, 2015).

Globalization: "A long-term, largely irreversible phenomenon involving the political, cultural, and economic merging of geographically dispersed groups; shares the

idea that transportation and communication technologies are pervasive and consequential" (Gansler, 2013).

Helmet Mounted Display Systems: "Provide pilots with unprecedented situational awareness. All the information pilots need to complete their missions—airspeed, heading, altitude, targeting information, and warnings—is projected on the helmet's visor, rather than on a traditional Heads-Up Display" (Lockheed Martin, 2015).

Major Defense Acquisition Program (MDAP) List: "An acquisition program must either be designated by the USD (A&T) as an MDAP or estimated by the USD(A&T) to require an individual an eventual total expenditure for research, development, test, and evaluation" (DAU, 2012).

Multifunction Advanced Data Link (MADL): "Enables pilots to share data with other strike aircraft as well as other airborne, surface, and ground-based platforms required to perform assigned missions" (Lockheed Martin, 2015).

Multinational: "An agency or organization that is owned by nationals of two or more countries" (Iowa State University, 2014).

National Defense Authorization Act (NDAA): "The comprehensive legislation to authorize the budget authority of the Department of Defense and the national security programs of the Department of Energy" (Armed Services Committee, n.d.).

National security interest: "A nation's perceived needs and aspirations in relation to its international environment" (Yarger & Barber, 1997).

National security strategy: "A report on the national security strategy of the United States from the President to Congress, which addresses U.S. interest, goals,

objectives, policies, commitments, and capabilities" (Congressional Research Service, 2013).

Nunn-McCurdy Act: "When a unit cost breach occurs and the Major Defense Acquisition Program (MDAP) experiences an increase of at least 15% in Program Acquisition Unit Cost (PAUC) or Average Procurement Unit Cost (APUC) above unit costs in the Acquisition Program Baseline" (DoD Acquisition).

Program Acquisition Unit Cost (PAUC): "Computed by dividing the Program Acquisition Cost by the Program Acquisition Quantity. The PAUC and APUC are the subject of the Unit Cost Reports (UCRs). Programs for which the current estimate of either the PAUC or APUC has increased 15% or more over the currently approved Acquisition Program Baseline (APB) or 30% or more over the originally approved APB must report a unit cost breach to the Congressional defense committees" (DAU, 2012).

Short Take Off and Vertical Landing (STOVL): "The ability for an aircraft to take off from a short runway or take off vertically if it does not have a heavy payload and land vertically" (Lockheed Martin, 2015).

Technology: "Associated with the application of science to the solution of technical problems and advancement in the new age" (Sanders, 1995, para. 9).

Quadrennial Defense Review (QDR): "A legislatively mandated review of Department of Defense strategy and priorities. It is a long-term course for DOD, as it assesses the threats and challenges that the nation faces and rebalances DOD's strategies, capabilities, and forces to address today's conflicts and tomorrow's threats" (QDR, 2014).

Unit Cost Report (UCR): "A quarterly written report that is submitted by the Program Manger to the service acquisition executive (SAE) on the unit costs of a Major Defense Acquisition Program (MDAP). UCR information is submitted to the Defense Acquisition Executive Summary (DAES) report" (DAU, 2012).

Sampling Protocol

Criterion sampling was used for the participant selection process because it involved reviewing and studying "all cases that meet some predetermined criterion of importance" (Patton, 1990, p. 176). Inclusion criteria were used to select participants; these criteria were critical to the interview process. In order to meet inclusion criteria, participants must have specific characteristics that render them qualified to contribute (Yale University, 2006). To meet the criteria for inclusion in this study, each participant in the interview process needed professional expertise within the defense budget, DOD, and most importantly, the F-35 JSF program. If a participant did not meet these criteria (exclusion), the interview could not be conducted because the participant would not be able to answer the questions, which were critical to this research study.

At the end of the interview, snowball sampling was used. Snowball sampling is a precise method in which participants are asked to refer other individuals as participants in a study (Oregon State University, 2010). After an in-depth interview, it was beneficial to have additional experts who contributed to this qualitative research case study. This process occurred when participants who declined referred other individuals of expertise; this proved to be beneficial because the participants met the criteria. Participants who

were referred to the study due to snowball sampling experienced the same procedures with the interview process that initial participants did.

Assumptions

This qualitative case study involved the assumption that individuals would participate as interviewees. Additionally, it was assumed that the participants would provide insight on F-35 JSF program production delays and how certain factors such as mechanical errors, scheduling mishaps, and over budget cost affect national security interests. Furthermore, it was assumed that participants would offer information as to whether or not the lack of modernization or technological advancement of fifth-generation aircraft break down the strategic planning required by DSG and NSS. It was also assumed that interviewees in this research study would answer all interview questions with integrity and to the best of their ability. Lastly, it was assumed that this research would be the foundation for determining whether or not past, present, or future production delays would affect the timetable for the fighter program in 2037. Officials stated that continued delays and budget cuts to the nation's largest weapons program will drive up costs, "putting the entire program in danger" (Barnes, 2013, para. 3).

Limitations

There were certain limitations that could have affected this qualitative research case study. The interview process may not have provided sufficient information to determine whether fighter production delays directly affect national security or whether the modernization would be the basis for this issue. I received approval from the Air Force to conduct research on this topic but still needed approval from the Walden

University Institutional Review Board (IRB) to collect data, which was a critical element for the interview process. Officially, Walden IRB approved this study on November 7, 2014, approval number 11-07-14-363643. As for the F-35 program office, I kept the F-35 JFO director informed of all significant changes on a quarterly basis, which could have affected this research; the point of contact could have been concerned with the information annotated in this study. Another limitation was experts, who were critical to my research. Participants often left DOD due to retirement, promotion, reassignment, and/or other unspecified reasons. This could have posed a threat to the knowledge and experience needed during the interview process. During this study phase, four participants declined the interview due to busy schedules around the holiday season. The data collection process called for 15 participants, and in order to resolve data saturation, I had to find four more participants. Fortunately, participants who declined recommended other individuals who were just as knowledgeable in this topic (which was an alternative plan stated in the IRB application).

Researcher biases could have posed a weakness in this qualitative research study. I am currently an Active Duty member of the U.S. Air Force, and it was probable that my personal experiences with the branch of service would influence some information that resulted from this study. My personal interest in this topic and how the F-35 JSF program affects me professionally as an Air Force member could have posed a weakness. Interviewees, even though senior and experienced, could have influenced the study as well with their biases. Furthermore, I knew six of the participants professionally due to my position at the Pentagon, and that could have posed issues for this research study. All

interviews were strictly professional, and I interviewed each individual in the capacity of a student and researcher. As stated by Briggs and Coleman (2007), "the characteristics of the interviewer, the characteristics of the respondent, and the substantive content of the questions" can manipulate a study (p. 98). Last, significant weaknesses of this study were the possibilities that participants would not take part in the study after initial acceptance, would be unwilling to participate, would give personal beliefs rather than facts, or would misconstrue information for any reason.

Delimitations

This qualitative case study was restricted to key experts and senior officials who worked for DOD, civilian personnel, and contracting companies responsible for the JSF program. These participants were asked to take part in an interview for approximately 45 minutes to an hour regarding their professional knowledge of the F-35 JSF program and its purpose to the U.S. government and national security. This method was pursued in an attempt to discover additional information on how the fighter program is the next (and only) fifth-generation aircraft development for U.S. global superiority in air warfare. Additionally, based on the interviewees' professional expertise, the interviews were designed to determine whether there is an alternative to production delays such as changing the execution date, changing current contractors, upgrading legacy aircraft, or seeking unconventional capabilities for the United States to continue as the global force.

Significance of the Study

This study was unique because it identified limited research on how production delays in the F-35 JSF program could threaten national security interests. Strategies are

summarized out of assessment and developed, resulting in a transition in "Defense enterprise from an emphasis on today's war to preparing for future challenges, efforts to rebalance and reform, and support the national security initiatives" (DSG, 2013, p. 1). This study identified constant interruption in the production process, which deviated from the timetable established by Congress. The delays contradicted strategic planning guidance directed by the DSG, threatening national security interest. Furthermore, other national security guidance determined how America handles national security concerns, and it is important to rejuvenate aircraft and weapons as appropriate to stay ahead of adversaries' technological gains. Chief of Staff of the Air Force General Welsh stated,

> The air superiority this nation has enjoyed for 60 years is not an accident and gaining and maintaining is not easy. It requires trained, proficient and ready Airmen and it requires credible, capable and technologically superior aircraft. I believe the F-35 is essential to ensuring we can provide that air superiority in the future. (as cited in Colon-Francia, 2013, para. 3)

General Welsh also answered the question "Why is the Air Force so adamant about protecting the F-35?" "If we are to be a global power capable of deterring and defeating possible threats, then we need fifth-generation aircraft" (as cited in Clark, 2013, para. 3). Lockheed Martin, the primary contractor of the F-35 fighter, understands the importance of this aircraft and how its capabilities are crucial to global and air superiorities.

> The F-35 fighter is the United States' largest acquisition program. Approved by Congress, this program was established to increase substantial savings in the federal congressional budget. Additional savings will be due to replacing legacy

> aircraft with 5th generation characteristics of radar evading stealth, supersonic, and extreme agility with the most powerful and comprehensive integrated sensor package of any fighter aircraft in history. (Lockheed Martin, 2013, para. 2)

With this plan, Congress can deliver reliability and long-term cost savings for the federal government, which is a critical benefit and facet of U.S. public policy.

Social change is a major factor in this study, given that the United States wants to manage the rise of China peacefully, even as they modernize their own capabilities. As China has the second largest economy in the world, following the United States, the nation must seek an approach to "avoid debilitating rivalry and conflict that have accompanied the rise of new powers in previous eras" (Lawrence, 2013, p. 1). Additionally, the United States will continue to broaden its networks of participation with international partners across the Asia-Pacific to ensure collective capability and capacity for securing common interests (Ballard, Harysch, Cole, & Hall, 2015; Basham & Rouleau, 2015; DSG, 2013, p. 2). These elements directed by the DSG are incumbent on the F-35 JSF program, as "it is the only real, viable option to form the backbone of the future fighter fleet and remains the best platform to address the proliferation of highly capable integrated air defense and new air-to-air threats" (Welsh, as cited in Colon-Francia, 2013, para. 2). The POTUS and SECDEF will be responsible for acknowledging continuous modifications and informing the nation of new strategies to assist in mitigating potential threats at a global level. For the Air Force and Navy, the key to identifying current threats and ensuring that the United States is prepared for adversarial backlash is the F-35 Joint Strike Fighter.

Secretary Panetta stated that the DSG explains the redirection and focus that shape U.S. leadership as well as U.S. global partners (DSG, Secretary letter section, 2012, para. 1). He also stressed the concerns of the war in the Middle East and conflicts rising in Southeast Asia that has changed strategic plans and how it heavily impacts the nation, its people, international partnerships, and adversaries (DSG, Secretary letter section, 2012, para. 2). Political implications from the DSG expressed strategic guidance changes along with the increasing and ever-changing threats that the United States faces. As a result, DSG needs to be adhered to because the "Joint Force will be prepared to confront and defeat aggression anywhere in the world and have the ability to surge and regenerate forces and capabilities, ensuring that we can meet any threats" (DSG, Secretary letter section, 2012, para. 3).

In order to achieve the social change sought within this study, which involves the United States establishing global security, sustaining air superiority, and strengthening international relationships with its allies, critical issues need to be handled at home. In order for the United States to handle global issues, there needs to be a better understanding of national security issues and how they are handled by Congress and DOD. Taxpayers need to understand how their money is spent and be educated on programs that require a substantial amount of funding. The F-35 JSF program is one of the largest and most expensive acquisition programs in American history. If taxpayers knew more about the history of the fighter program, there would not be any misunderstandings of its capabilities as well as the importance of its mission. American citizens need to be educated and know that the most innovative assets are required to

protect the nation and keep it safe. In this case, the F-35 fighter is the "latest and greatest" asset of the 21st century to maintain air superiority so that the United States can continue to be the global force and protect national security.

Summary

The F-3 JSF program was established to be DOD's next-generation strike aircraft with advanced weapons systems to bring cutting-edge technologies to the battle space of the future (Greaney, 2010; McGarvey et al., Ozdemir, 2009: 2013; Sullivan, 2014). The fate of the fighter's military operations in the next couple of years as well as the execution/finality of the program by 2037 is based on consistent production and staying within the timetable established by Congress. The problem stated in this study is incessant delay, to the point that the program had to be restructured four times in a 10-year period (2004, 2007, 2010, and 2012). By 2009, the same delays became apparent when immobilized periods became inevitable as Congress had to establish resolutions to continue with production. It is evident that production delays are an existing issue and major software is not currently performing at the level it should. According to government reports, software issues alone "could significantly delay deployment of the plane" (Shalal-Esa, 2014, p. 3). Additional factors, such as scheduling slips and overbudget costs, can also contribute to more delays, guaranteeing that this program will more than likely not make its execution year. This dissertation fills an information gap on how the F-35 JSF program's production delays have directly affected national security. This study also served a purpose in obtaining information to determine how modernization ties into national security guidance and the fighter program.

Chapter 2 contains a literature review on the brief history of the JSF fighter and the frequent delays that have occurred over the past decade to impact the program. This chapter also addresses three primary issues that have caused production delays, which have enacted four rebaselines and forced immobilization on many occasions. Finally, Chapter 2 addresses the concept of the program and its importance to national security to show how the modernization and globalization theories guide this study. Chapter 3 addresses the qualitative research method as a specific probe for this study, offers justification for the choice of the case study as a primary approach, and covers strategies and methods for participation selection, sampling, data collection, analysis, and interpretation of the results. Chapter 4 addresses the analysis of data that were collected and provides findings, reports, results, patterns, themes, and associations obtained from the data collection phase of this study. In Chapter 5, I discuss the interpretation of the findings presented and provide recommendations for action and further study as well as the conclusion of this research study.

Chapter 2: Literature Review

Introduction

The JSF program is a derivative of the former JAST program that was set up to establish a prime multifunctional aircraft that would be affordable and supreme in weapons system upgrades. While there is good reasoning as to why the federal government wanted a reformed program, history indicates why the JAST/JSF was needed. In the early 1990s, Defense Secretary Les Aspin mandated a complete examination of the nation's defense strategy in terms of "force structure, modernization, infrastructure, and foundations" (Ozdemir, 2009, p. 5). This plan was required because critical changes needed to be completed due to the aftermath of the Cold War.

Secretary Aspin wanted to develop a plan that would be the basis of the United States new strategic response to potential threats and/or national security concerns after the end of the Soviet Union. In addition to the secretary's request for a strategic plan, it was realized during Aspin's review that the best way to mitigate adversarial threats was aviation missions. Ozdemir (2009) noted that the review indicated that aviation structures were the foundation of future success in dealing with global threats (p. 5). With the establishment of an original strategic plan for air capabilities, tactical missions were born to retire legacy aircraft and formulate JAST.

Air superiority is a top priority in countries controlling global air (Gertler, 2009). In order for a country to obtain superiority, it must be able to obtain ample control of the air space and maintain it when facing adversarial threats. In this process, adversarial retaliation is inevitable, in which countries can avoid serious enemy air incursions. As the

United States currently maintains air superiority, the country remains constantly vulnerable due to crippling budget issues, production delays, and technological errors. The issues are direct failures to maintain innovative assets that are used to maintain domestic and global stability. The F-35 JSF is a modernized fifth-generation aircraft needed to sustain air superiority at a global range. The F-35 fighter is the linchpin of the effort of the United States and its international partners to replace legacy aircraft to support combat operations, and it is one of the largest American acquisition programs to date. Gertler (2012) stated that the fighter guarantees considerable advances in military capabilities but can also put its budget in jeopardy (p. 36). Basham and Rouleau (2015) acknowledged that the fighter is the "primary platform and the most capable weaponry, which represents a unique opportunity to enhance interoperability and bridge many air-sea battle concepts into operational reality" (p. 15). On the contrary, O'Rourke (2009) expressed that Congress would inherit substantial savings by procuring the fighter in three variants that would save the defense department billions (p. 2).

The JSF program was established in the 1990s in order to modernize aircraft to maintain superiority in the 21st century. The fighter aircraft will "provide the Department of the Air Force, Navy, Marine Corps as well as U.S. allies and security partners with highly advanced, multi-role, fifth generation capabilities" (QDR, 2010, p. 39). Additionally, the fighter will "increase combat capability and improve war-fighter integration" (Basham & Rouleau, 2015, p. 15). However, for the past 13 years, the aircraft has been in the SDD phase due to unavoidable issues; this phase of the program has raised concerns about delaying the program's full execution in the next 23 years.

Former SECDEFs Robert Gates and Leon Panetta continued aggressive rebaselines over 5 years (Gertler, 2012) in order to keep its production on schedule.

As the focus continues to be on production delays, technological errors, and scheduling failures, there has been limited research on how these issues affect the lack of current modernized aircraft as well as the influence these issues have on national security interests. While there has been some research as well as public statements about how the F-35 JSF program is needed to replace legacy aircraft and maintain air superiority (Fanning, 2013; GAO, 2011, 2012; Goure, 2013; Sullivan, 2009, 2012, 2013; Sullivan et al., 2013; Sullivan et al., 2014; Welsh, 2013), there have been limited studies on how production delays may cause vulnerabilities in national security by not adhering to mandated guidelines of the NSS and DSG (Bolkcom, 2009; Gertler, 2009, 2014; O'Rourke, 2010).

For this literature review, I explored studies of the F-35 fighter and its connection to national security. In addition, efforts have been condensed over the years, creating the most affordable yet beneficial aircraft that would have multifunctional roles and supersonic capabilities as the world's most innovative and high-tech fighter (Sullivan, 2013, p.1). With these capabilities, the military would be able to protect national security, as well as American assets. In agreement, the QDR (2010) stated,

> The nation depends on U.S. military capabilities in different ways, based on the threats faced, and its security is dependent upon national security and defense strategies that are interlinked to "strong foreign ties, including a vibrant network

> of defense alliances and partnerships that will require effective strategic communication. (p. 57)

The fact constant delays within the F-35 JSF program can pose concerns for national security has produced an obvious informational gap in the literature because there is not an understanding of how such delays affect national security. This research study's purpose is to acquire an in-depth understanding of the F-35 production delays and how those delays break down strategic guidance evident in the DSG and implemented according to NSS. This qualitative case study analysis had the modernization and globalization theories of Condorcet (2003) and Giddens (2009) as its theoretical framework, and this framework guided the research questions.

The literature review is composed of 10 segments, which are intended to delineate gaps in scholarly knowledge. The first section, which focuses on the F-35 Lightning II, offers an understanding of the multirole fighter and gives an in-depth review of how it was created as well as why it is a critical component of the American government. The next section addresses major issues that have caused delays and resulted in four restructured operations to keep the program on track due to budget, cost, and funding concerns. Developmental errors are addressed next as elements inhibiting fighter production, followed by scheduling issues, which Congress and Lockheed Martin have attempted to alleviate. The critical question of how issues have affected DSG and NSS is addressed in the next section, in which I discuss technological advancement for the 21st century. With constant concerns about the future of the fighter program, Congress has voiced alternatives and addressed legacy aircraft, which are concerns in this section.

An important element of the F-35 Lightning II that may have been overshadowed because of the apparent production delay concerns is the advanced weapons system. The primary responsibility of the F-35 is to maintain air superiority and protect national security with upgraded weapons systems, which are supposedly unmatched by any of the nation's legacy aircraft. A section on the rationale for the global threat includes literature on the F-35 as" stealth, supersonic, multirole aircraft" (Greaney, 2010, p. 2; Hshanglan, Jurong, & Yong, 2014, p. 35; Petrescu, & Petrescu, 2013, p. 94; Ozdemir, 2009, p. 11). These arguments on global threats are related to security and rebalancing, which is the nation's major concern in terms of national security and can be found in the DSG (2012). Such concerns are intertwined with social change, which relates to the purpose of this study. In a section on political implications, I address how the F-35 production severely impacts Congressional decisions and what is being established for the program to stay on its current timetable. A section on international partnerships addresses how constant delays jeopardize the current deals the United States has with its eight international partners.

The literature review was based on peer-reviewed journals and scholarly articles from governmental research facilities (i.e., Congressional Research Service, Rand Corporation, Brookings Institute, U.S. Government Accountability Office, Air Force Research Laboratory, Air Force Institute of Technology, Air University, and other research facilities mentioned throughout this chapter). The F-35 JSF fighter is a federally funded program, and research on the program has been conducted by military, contracted, and "think tank" organizations. Additionally, a restricted amount of archival and current

governmental records was used to add to the literature review in an effort to understand mandated guidelines and mission requirements (Defense Strategic Guidance, Quadrennial Defense Review, National Security Strategy, and Quality Military Edge). These policies added further credibility to the analysis.

The scholarly articles and government documents chosen were selected through the Walden University library, Google Scholar, the Pentagon library, and governmental research websites. There were many databases available but most articles chosen came from the policy, administration, and policy research databases. Furthermore, articles were selected from the Walden University Research Database, Google Scholar, Political Science Complete, Military and Government Collection, EBSCO Host, Sage Journals Database, JSTOR, RAND Corporation, and Catalog of U.S. Government Publications. Additionally, scholarly articles were chose from the Air Force Research Laboratory, Research Engineering Enterprise, National Defense Research Institute, Small Wars Journal, Congressional Research Service, National Academy of Science, and Air War College.

The search keywords used were the following: *F-35 Joint Strike Fighter (JSF) program, Defense Strategic Guidance (DSG), National Security Strategy (NSS), Quality Military Edge (QME), National Military Strategy (NMS), Department of Defense (DOD), Quadrennial Defense Review (QDR), Air Force, Navy, Marine Corps, Congress, United States (US), legacy aircraft, sequestration, fiscal year, affordability, funding, national security, national security interests, modernization, technological advancements, fifth-generation, 21st century, allies, globalization, cooperation, economy, security, qualitative*

study, case study analysis, research, government, strategic planning, interviews, international partnerships, rebalance, rebaseline, multilateral agreements, concurrency, air superiority, innovative, capabilities, military, multi-role, aircraft, fighter jet, acquisition program, procurement, adversaries, threats, and global, budget, government shutdown, aged, assets, and *scheduling.*

The importance of this study is significant because there is limited information in determining the United States' vulnerability to new and advanced threats without modernized aircraft. It was very critical that this case study be established so additional and original data could be produced and conclude if lack of modernized assets, such as the F-35 fighter, would affect national security interests. This study identified an informational gap between modernization and national security. There has been a plethora of knowledge to determine technological issues (i.e. software), scheduling mishaps, and funding have caused periodical delays within the F-35 JSF program (Bailey, 2015; Gertler, 2014, Hartung, 2014; McGarvey et al, 2013; Ozdemir, 2009; Sullivan et al, 2014, Sullivan, 2014). Additionally, this research could potentially discover the fighter's future as the advanced weapons system investment of the 21st century.

One researcher's thesis showed similar issues of how production delays have caused problems between the United States and its 8 international allies. Author Ozdemir, completed research on the JSF program called, "Analyzing the Multi-National Cooperative Acquisition Aspect of the Joint Strike Fighter (JSF) Program." This proposal entailed critical information about the fighter and its relationships with the international partners who have invested in the program. Additionally, the research discussed how

important the U.S.' relationship is with the 8 other countries because allies would have advanced weaponry at an affordable prices in order to protect their countries from adversarial threats. Ozdemir emphasized frequent delays have put the fighter program in jeopardy because it has driven up the price per aircraft, which violates the agreement between the United States and its allies of having such programs at affordable prices. Further information on this issue is discussed in the social change section of the manuscript.

The F-35 Lightning II

Since the 1980s, Congress has struggled to establish a fighter program that would dominate as the most technologically advanced weapons system in the world. It was not until 1994 that Lockheed Martin was awarded as the primary aerospace company to produce a supersonic, stealth fighter with radar signature to be the fifth-generation aircraft for the United States (Hshanglan et al., 2014, p. 35). The fighter would be affordable by producing an aircraft that would provide three variants for the Air Force, Navy, Marine Corps, and 8international partners (U.S. Government Accountability Office, [GAO], 2009, p. 3). The interest in affordability derived from the joint perspective of providing an aircraft that would have unique capabilities for each branch of service as well as its international ally's mission requirements. Due to this distinctive factor, the program's name changed to the Joint Strike Fighter (JSF) to identify the joint, multinational relationship of the acquisition program.

In 2001, when the F-35 JSF began, DOD anticipated a "single-seat, single-engine aircraft with stealth technologies, defensive avionics, advanced sensor fusion, internal

and external weapons, and advanced prognostic maintenance capability" (Sullivan, 2010, p. 3). These capabilities would be universal to the aircraft in every aspect of modernized advancements for air superiority. These capabilities would be universal to aircraft and three variants were manufactured for service missions:

- F-35A Conventional Take-off and Landing (CTOL) – U.S. Air Force
- F-35B Short Take-off and Vertical Landing (STOVL) – U.S. Marine Corps
- F-35C Carrier Variant (CV) – U.S. Navy. (Joint Strike Fighter [JSF], n.d., F-35 variant section)

Figure 1. F-35A conventional takeoff & landing (CTOL). From "F-35 Variants," by F-35 Lightning II Program, n.d., retrieved from http://www.jsf.mil/f35/f35_variants.htm

The Air Force procured the F-35A, which is a multirole fighter (MRF) designated CTOL. CTOL is a variant that enables traditional takeoff and landing measures for jets. With additional capabilities correlated with the CTOL variant, the Air Force is projected to use the F-35A to replace legacy aircraft, the F-16 Falcon and A-10 Thunderbolt II fighter/attack jets. The Air Force's current stealth fighter, the F-22A Raptor, will be an

addition to the nation's fifth generation aircraft, but not necessarily a main frame to be utilized in military operations. According to Lockheed Martin (2014), the fighter is practically undetectable and its stealth capabilities are the ammunition need for the United States. to maintain air superiority (F-35A CTOL section, para. 1). Additionally, the F-35 is an "agile, versatile, high-performance 9g multifunctional fighter that provides unmatched capability and unprecedented situational awareness (Lockheed Martin [LM], 2014, F-35A CTOL section, para. 1).

> The F-35A variant has an upgraded sensor package, which collects and allocates data than any of fighter aircraft in American history. This element alone puts pilots and combat targeteers in the lead against adversarial threats. The aircrafts "processing power, open architecture, sophisticated, information fusion, and flexible communication links make the F-35 and indispensible tool in future homeland defense" (LM, 2014, para. 2). The fighter's modification virtually increases value in combat operations and mitigates "joint and coalition irregular warfare" (LM, 2014, para. 3).

Figure 2. F-35B short takeoff & vertical landing (STOVL). From "F-35 Variants," by F-35 Lightning II Program, n.d., retrieved from http://www.jsf.mil/f35/f35_variants.htm

The F-35B model will replace the Marine Corps' F/A 18 C/D Hornet and AV-8B Harrier aircraft. The Marine Corps' F-35B variant has STOVL capabilities in which the fighters can takeoff on a short runway or carrier. Additionally, the STOVL variant gives the fighter the ability to takeoff vertically, dependent upon the weight capacity and payloads. This feature would be necessary when the fighter is not landing on a runway. Furthermore, the F-35B will "revolutionize expeditionary combat power in all threat environments by allowing operations from major bases, damaged airstrips, remote locations, and a wide range of air-capable ships" (LM, 2014, STOVL section, para. 2).

Figure 3. F-35C carrier variant (CV). From "F-35 Variants," by F-35 Lightning II Program, n.d., retrieved from http://www.jsf.mil/f35/f35_variants.htm

The Navy will replace its F/A 18 E/F Super Hornet with the F-35C variant fighter, which will have CV capabilities. The CV variant is intended to withstand severe sea and carrier conditions. This fighter will have the advantage to obtain the same capabilities as the other variants, yet, serve as a maritime fighter. The F-35C variant is distinctive because it is one of the upgraded fighter jets that can be operational at sea. According to Lockheed Martin, there has never been a low observable aircraft that functions the same operations as the air to ground and air-to-air jets at sea (2014, CV section, para. 1). Additionally, it has a broader wingspan than the other variants with "ruggedized structures and durable coatings and is designed to stand up to harsh shipboard conditions while delivering a lethal combination of fifth generation fighter capabilities" (LM, 2014, CV section, para. 1). The F-35C also has upgraded weapons systems like the A and B variants as well as special modernized features that can really withstand potential air and

maritime threats. Lockheed Martin noted all variants of the F-35 are "truly a first-day-of-the-war fighter with the ability to dominate adversaries in the air or on the surface, while surviving the most formidable threat environments" (LM, 2014, CV section, para. 3).

Budget, Costs, and Funding Concerns

The F-35 JSF program is America's most expensive acquisition program in history and its continuing recapitalization tactic is to replace the service departments' legacy aircraft (Hshanglan et al, 2014, p. 35). In order to maintain the sustainment of the F-35 fighter, the program must stay within budget and stay on it timetable with full execution in 2037. Congress approved a budget that will cost over $1 trillion in its lifespan. According to GAO's 2009 research report, approximately $300 billion was used to procure 2,456 aircraft and approximately $700 billion will be for the continued life cycle of operational and maintenance costs (p. 1). With the initial budget supposedly set at $300 billion, the current program is approaching $400 billion and "ensuring affordability – the ability to acquire aircraft in quantity and to sustain them over the life cycle – is a paramount concern" (GAO, What GAO Found section, 2013, para. 3).

For procurement quantities, Air Force requested 1,763 F-35A variants, making it the largest purchase in the nation. The Navy procured 680 F-35B variants for the Navy and Marine Corps – the exact numbers have not been determined between the two branches (O'Rourke, 2009, p. 7). The quantity purchased by each service was determined by requirements and mission capabilities to function operationally without interruption. There was some skepticism as well as ambiguity about the Air Force's request for over 1,000 aircraft (Bolkcom, 2009; O'Rourke, 2009). The number of aircraft was included in

the QDR that is reported to Congress based on the budget reviews, strategic planning platforms and strategic shifting based on the global, economical, and security needs. Former Air Force Chief of Staff, Norton Schwartz stated in an interview about the number of aircraft requested:

> The requirement for 1,763 JSFs would be examined during the comprehensive Quadrennial Review. Whether the Air Force ultimately buys more or fewer F-35s than planned depends on the review of military capabilities and requirements. No matter the amount of aircraft purchased, the Air Force will have a predominately F-35 force. (Gertler, 2009, p. 58)

The amount of aircraft produced by Lockheed Martin raised major concerns about the cost. As mentioned, Congress approved of $300 billion for the fighter program; today, the program has cost the federal government close to $400 billion due to production delays and technological errors. Sullivan (2013) reported JSF program issues have been researched and reported to Congress over the past nine years (p. 1). During this period, researchers asserted the 2012 rebaselined identified additional costs due to more time for deliveries. Research suggested the program needs an additional $12.6 billion per year starting from 2013 into 2037 (Hshanglan et al, 2014, p. 35; Sullivan, 2013, p. 7). With an increase in budget, the program would almost double it initial funding.

With a shattering sequestration and a government shutdown in 2013, the government may not be able to sustain increased funding over the next 23 years. The federal government's constant budget issues create uncertainty over the next decade and the funding could potentially flat line the program if it faces competition with other major

programs for additional funding. According to researchers, the main priority of the F-35 fighter is reducing costs in terms of production, development, and ownership (Hshanglan et al., 2014, p. 35). This concern does not even include the United States' international partnerships and the funding from their purchases. Turkey, United Kingdom, Canada, Denmark, The Netherlands, Norway, Italy, and Australia together plan to purchase almost 700 fighters (Bitzinger, 2010; Bolkcom, 2009; Gertler, 2009; Lam & Cozzarin, 2014; O'Rourke, 2010; Sullivan, 2013, Taylor & Francis, 2011).

In addition to increasing need for funding, researchers found there were additional concerns about the expenditures over time. Garretson (2013) stated the skepticism on how the government will continue to operate and sustain over the up and coming years (p. 1). As of 2013, the Cost Assessment and Program Evaluation (CAPE) office projected based on an "estimated 30-year service life, exceeds $1 trillion" (GAO, 2013, p. 8). Additionally, CAPE predicted mandatory spending processes such as inventory flying time, maintenance, and operations will run the government almost $20 billion annually. This is almost $10 trillion more than all branches of service legacy aircraft. The rise in cost to sustain operations is not a cost that the federal government can afford. In order to maintain the fighter program and keep it on the current timetable, officials must regularly evaluate the issues such as conducting baseline programs and find alternative ways to keep costs down (Drew, McGarvey, & Buryk, 2013). Sullivan (2013) voiced that continued production delays and uncertainties, with the F-35 "would incur future sustainment costs by holding onto legacy aircraft" (p. 8).

Table 1 clearly shows the major concern with funding and it is inevitable that Congress and the military would not be able to allocate funding based on the need. Inevitability of the financial issue is based on the severe budget constraints and emergency events (i.e. sequestration and government shutdown) the nation has been facing post September 11, 2001 due to funding wars in position of the Global War on Terrorism (GWOT). Sullivan stated in order to keep the program on its timetable, "funding has to be increased over the next few years and protract an average of $12.6 billion annually over the next 23 years" (p. 5). Funding issues deemed a concern since the aircraft is slated for military operations as early as 2015. In order to maintain progression during the SDD phase, funding has to continue and technical errors would have to be alleviated. Over the course of time, funding will increase to $15 billion annually.

With such a large amount of funding to sustain the program, affordability is no longer the attractive element of the fighter. As funding increases over the next 5 years, it will continue to be a congressional issue each fiscal year. Sullivan observed that there is a mandated guideline where "costs must be reduced in order for the aircraft to stay affordable" (p. 5). He stated, "the program has been directed to reduce costs to meet established affordability targets before full rate production begins in 2019, but those targets will be challenging as significant cost reductions are needed" (Sullivan, 2014, p. 5). DOD officials have expressed that the life span of the program is currently unaffordable and the life cycle would include O&S, labor, and inflation, which boosts the price.

Due to scheduling delays approximately $5 billion was added to the development budget. This made the total of $56.4 billion, a 26% increase from the 2010 rebaseline program and then increased to 65% from the initial rebaseline in 2004 (GAO, 2011, p. 11). This budget increase resulted in reduced productions in the amount of aircraft. In Table 1, the graph shows the defense budget from 2012-2016; it depicts the revised development and procurement funding requirements as well as annual quantities following reductions" (GAO, 2011, p. 11).

Table 1

Budgeted Development and Procurement Funding and Quantitative for FY 2012 to 2016

(Dollars in billions)						
Development Funding	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Air Force (CTOL)	$1.4	$1.2	$0.9	$0.6	$0.4	$4.5
Navy (CV)	0.7	0.7	0.7	0.6	0.5	3.2
Marine Corps (STOVL)	0.7	0.7	0.7	0.6	0.5	3.2
U.S. total development	**$2.7**	**$2.7**	**$2.3**	**$1.8**	**$1.3**	**$10.8**
Procurement Funding	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Air Force (CTOL)	$3.8	$4.1	$5.6	$6.5	$8.5	$28.5
Navy (CV)	1.8	2.5	2.8	3.3	2.9	13.2
Marine Corps (STOVL)	1.3	1.3	1.4	2.0	2.9	9.0
U.S. total procurement	**$6.9**	**$7.9**	**$9.8**	**$11.8**	**$14.3**	**$50.7**
Procurement Quantities	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Air Force (CTOL)	19	24	40	50	70	203
Navy (CV)	7	12	14	19	20	72
Marine Corps (STOVL)	6	6	8	12	18	50
U.S. total quantity	**32**	**42**	**62**	**81**	**108**	**325**

Source: GAO analysis of fiscal year 2012 President's Budget.

Note: Numbers may not add due to rounding.

Note. From *Joint Strike Fighter: Restructuring Places Program on Firmer Footing, but Progress Is Still Lagging*: *Testimony Before the Committee on Armed Services, U.S. Senate*, 112th Cong. (2012) (testimony of Michael Sullivan). Retrieved from http://www.gao.gov/new.items/d11677t.pdf

It is apparent that costs and maintenance of the aircraft is a concern. Affordability, when it comes to operation and maintenance, puts its life cycle is at risk (GAO, 2011, p. 8). As a result, the increased funding will raise the price of aircraft making it expensive for the United States and it allies to procure (GAO, 2011, p. 8). To reduce the amount of aircraft would not be feasible, as lifecycle costs will actually be more expensive than the aircraft it will retire (CRS, 2013; GAO, 2011). With the history of budget concerns, it is evident that there is sight lost on the "affordability" aspect of the program. The most important concern is the JSF program needs to formulate better solutions to continue production and maintain affordability in order to fully execute by the approved timeline.

Developmental, Technological, & Scheduling Issues

The F-35 Joint Strike Fighter was established with much uncertainty about technological design. With controversial issues, the program was mandated to produce the highest level of development, production, and testing, which the aircraft is still in the developmental stages (Ball, Gross, Burt, 2014; GAO, 2014). The program was immobilized multiple times due to developmental issues that caused the program to continually be overbudget. Researchers stated that performance shortfalls were one of the major problems in the technological advancement of the aircraft. These shortfalls caused the program to rebaseline four times within a four-year period (GAO, 2014; Sullivan, 2014; Sullivan, Masters, Anderson, & Porter, 2014). Technological errors deemed to potentially threaten initial operational capabilities (IOCs) for the service departments. The Marine Corps would be the first service to conduct military operations in 2015 and the Air Force would be IOCs in 2016; the Department of the Navy would be last, starting flight tests in 2018.

Two main technological issues that have hindered production are mission systems and flight science. According to GAO (2014) and Sullivan (2014), mission testing is critical because it ensures suitable software systems and war fighting capabilities function appropriately to meet production requirements. Flight science guarantees the minimum standards of flying capabilities are met. In 2013, researchers found mission capabilities were delayed due to a significant delay with software deliveries that were detrimental to the fighter's execution. The delays caused the production to fall behind schedule,

therefore, creating problems were software that needed to be fixed and retested for validity. The same issues continued throughout the year and restricted testing procedures.

Due to repetitive issues, the Director of Operational Test and Evaluation (DOT&E) speculated that the Marine Corps first IOC would be delayed over a year (Arthur & Eveker, 2009; GAO, 2014). This delay created a concern for the program's concurrency testing and aircraft procurement, which inevitably increased cost growth. This problem essentially completed all mission system tests but did not complete certain test points and diminished productivity by 11% (GAO, 2014, p. 6). The program was projected to complete over 2,800 test flights and was less than 300 for fiscal year 2014. As the program's productivity is stable, it still fails to complete critical tests needed for full execution. Contractors expressed that slow production poses considerable threats for the entire program. (GAO, 2014; Jones, 2014; Sullivan, 2014; Sullivan, Masters, Anderson, & Porter, 2014). On the contrary, Gertler (2012) cited from Admiral David Venlet believed that "slowing production would help reduce the cost of replacing parts in jets that are being built before testing is complete" (p. 11). Lockheed Martin swayed Admiral Venlet suggesting that increasing production is needed because it "would boost economies of scale and help lower the politically sensitive price per plane" (as cited in Gertler, 2012, p. 11).

As for software capabilities, there have been noteworthy concerns on how each section would function in its own right. The software program is currently categorized into five blocks: Block 1, Block 2A, Block 2B, Block 3i, and Block 3F and each

successive block builds on the capabilities provided in prior blocks. Below is how the blocks function for the aircraft:

- Blocks 1 and 2A offer training capabilities
- Blocks 2A and 3i supplies initial war fighting capabilities (Air Force and Marine Corps potential to begin IOCs)
- Block 3F grants full suite of war fighting capabilities (Navy needs for IOCs). (Sullivan et al., 2014, p. 6)

The current issue faced is the 2B software capability for the Air Force and Marine Corps. The developmental testing has been delayed multiple times due to delivery capabilities of the software. Delivery is a concern because its capabilities are heart of the fighter program (Sullivan et al., 2014, p. 6). The block 2B software is the foundation of the wartime capability platform established for the fighter. As of January of 2014, the authentication and functionality of software is nearly 15%. In order for software capabilities to be in tact before the end of the fiscal year, it has to be in operation or the program will not meet its developmental testing. This developmental stage could potentially be delayed for over a year and Marine Corps IOCs are scheduled for the beginning of 2015. Currently, testing facilities and contractors do not have a solid timeframe on completion dates as testing is being conducted. This delay will also be a tumbling effect for Air Force and Navy IOCs and potentially push back their requirements if developmental testing is not completed.

There is much skepticism on whether software issues will continue and delay developmental testing. Since 2009, there has been uncertainty in the software

requirements and if they will be resolved to mitigate production delays (Sullivan, 2009, p. 15). GAO contractors expressed that with current and frequent delays, software capabilities will still be delivered to service departments. With positive and opposing arguments, the major concern still stands that force structure, funding, and mission system issues can potentially delay military IOCs. Again, software issues and delivery delays could potentially amplify funding. As it is now, the developmental flight-testing phase is projected for full completion in 2017. If the program is extended, the fighter will have to continue testing which will incur costs (Sullivan et al., 2014, p. 7). At this rate, the federal government would have invested over $70 billion to secure over 350 aircraft in the next few years. If the program is forced to extend, the procurement of aircraft will increase by 100 but government's budget will be stretched by approximately $12 billion. Test officials expressed that there is limited testing because there are specific variants that only be completed at a time (Sullivan et al., 2014, p. 7). Contractors countered by stating that the program could alleviate some testing risks, it would still be difficult to recover lost time from software issues and delays.

Despite multiple issues, the program managed to make some progress. Table 6 shows progressed made in 2013, with each aircraft variant. For the CTOL variant, the fight productively demonstrated the ability to launch aim 120 missiles from its internal weapons bay and to refuel while in flight (Sullivan et al., 2014, p. 9). Additionally, the variant completed nearly 60 percent of the flight test. The STOVL effectively launched weapons from internal weapons bay and refuel processes when applicable. Most importantly, the variant productively completed almost 50 percent of its flight-testing on

amphibious assault ships. The CV tested flights at high altitudes as well as towering vertical flight angles and demonstrated refueling processes with no issues. As of 2013, the variant conducted close to 45 percent of its flight-testing.

> Under the fourth and latest rebaseline mandated by former Secretary Panetta, there has been relative stability and progression in certain area. Nevertheless, constant software problems have deemed multiple delays with developmental flight-testing, which threatens service departments' projected IOCs. If continuous software delivery delays persist, DOT&E predicted that production could be delayed by over a year for all IOCs. Additionally, extensions over development flight-testing program would drive up costs approximately by $12 billion (Sullivan, 2014, p. 1).

Effects on Defense Strategic Guidance and National Security Strategy

The DSG, also called, *"Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*,*"* is essentially a new defense strategy presented by POTUS, SECDEF, and CJCS. This plan provides guidance on various projects that gives strategic planning for the United States and "encompasses strategic direction" (Defense Acquisition University [DAU], 2013, para. 1). The last revision, approved in 2012, was published at a time where the nation had to restructure and determine its future based on DOD primacies, undetermined budget solutions, and other governmental priorities for the next ten years. The DSG's purpose and significance serves as the "strategic foundation for further DOD policy and resource decision-making, under tighter fiscal constraints" for the federal government (Dale & Towell, 2013, p. 1). To ensure its compliance, former

SECDEF, Chuck Hagel, has held multiple Strategic Choices and Management Reviews (SCMRs) and used the DSG as a foundation to investigation multiple solutions to reduce costs for the largest executive department in order to implement defense strategy. In addition, the QDR was a preservative and a "statutorily mandated" review that was established in 2014 to coincide with principles embedded in the DSG (Dale & Towell, 2013, p. 1). The POTUS stands behind all guidance written in response to alternative strategic based on the economic shift and the security concerns the nation's face post 9/11.

> President Obama stated in the DSG letter of introduction,
>
> Going forward, will also remember the lesson of history and avoid repeating the mistakes of the past when our military was left ill-prepared for the future. As we end today's wars and reshape our Armed Forces, we will ensure that our military is agile, flexible, and ready for the full range of contingencies. In particular, we will continue to invest in the capabilities critical to future success, including intelligence, surveillance, and reconnaissance; counterterrorism; countering weapons of mass destruction…(DSG, President's letter, 2012, para. 5).

Former Secretary Panetta's guidance written in the DSG stated,

> … shaping a Joint Force for the future will be smaller and leaner, but will be agile, flexible, ready, and technologically advanced; it will have cutting edge capabilities, exploiting our technological, joint, and networked…the Joint Force will be prepared to confront and defeat aggression anywhere in the world. It will

> have the ability to surge and regenerate forces and capabilities, ensuring that we can meet any future threats… (DSG, SECDEF's letter, 2012, para. 3).

This DSG's foundation for a strategic platform strongly encourages technological advancement in order to be the finest military, protect national security interests, and most importantly, American assets. The United States' strategic planning concept has kept the United States as the leading nation for almost 70 years and because of this, the country has provided a more dependable and safer world for the nation and its international partners. The DSG essentially is an,

> Assessment developed as a defense strategy that transitions our defense enterprise from an emphasis on today's war to preparing for the future challenges; it also protects the broad range of U.S. national security interests, and advances the department's efforts to rebalance and reform. (DSG, 2012, p. 1)

The defense guidance explained global threats and challenges that need immediate attention. The threats presented must be mitigated by U.S. power as the nation continues to face extremist that want to devastate that nation as well as its international partners. The DSG (2012) described with the distribution of destructive technology, "adversaries have the potential to pose catastrophic threats that could directly affect our security and prosperity" (p. 1).

There are certain strategic methods that the United States must enforce to maintain global security and stability. The plan stated that global security and prosperity are entirely dependent upon the flow of goods shipped by land, air, or sea (DSG, 2012, p. 9). Adversaries, state, and non-state actors will continue to be global threats in order to

mitigate trade, multilateral agreements, and partnerships. Additionally, state and non-state actors will continue to attempt to deny strategic platforms and/or tactics to mitigate global growth and peace. And in this instance, the United States will continue to "lead global efforts with capable allies and partners to assure use of the global commons, both, by strengthening international norms of responsible behavior by maintaining relevant and interoperable military capabilities" (DSG, 2012, p. 3).

To solve this problem and sustain air superiority, the United States established a military capability called the F-35 Joint Strike Fighter, which is the "most complex ambitious aircraft acquisition, seeking to simultaneously produce and field three different variants each service department (Bolkcom, 2007; Bolkcom, 2009, para. 1). The nation contributed its expertise and most expensive technological advancement with eight international partners in order to produce a stealth, supersonic aircraft with defense avionics, and an advanced weapons system. This acquisition was established to replace all service departments and allies' legacy aircraft in order to "modernized tactical air force" (Bolkcom, 2009, p. 5). The U.S. international partners contributed heavily $5 billion to the cooperative agreement in procuring aircraft for the next 23 years (Gertler, 2014; Sullivan, 2014).

The F-35 fighter's advanced capabilities and modernized design for multiple variants fall under the DSG policy to "deter and defeat aggression" mandates (DSG, 2012, p. 4). Under its guidance, the U.S. forces will be military ready and progress advanced capabilities of "deterring and defeating aggression by any potential adversary" (DSG, 2012, p. 4). Military deterrence is a strategic mechanism for the ability to defeat

the aggressor with advanced capabilities, and the United States must know its aggressor and strategically plan to defeat them on a large scale. With this directive, the United States must "secure territory and populations and facilitate a transition to stable governance on a small scale for a limited period using standing forces or for an extended period, mobilizing forces" (DSG, 2012, p. 4). The nation must know how to maneuver between certain strategic challenges in order to conduct military operations in one region while handling other challenges in parts of the world. To which nation does not fall from its current global standing, the country must cooperate with its partners and coalition forces. This strategic move will create balance and stability at a global level. Positive steps "reinforce deterrence, help build the capability and competence of the U.S, allied, and partners forces for internal/external defense, strengthen alliance cohesion, and increase U.S. influence" (DSG, 2012, p. 5).

DOD must shape missions against evolving times post Iraqi and Afghani wars and will still enforce operations based on the need or threat. DOD should also change strategic planning efforts based on strategic, operational, economic, and technological spheres" (DSG, 2012, p. 7). The United States will continue to face global challenges that require strong, agile, and war fighting capable military forces whose technological advancements coincides U.S. national power (DSG, 2012; Sullivan, 2013). According to Ballard, Harysch, Cole, and Hall (2015), "the United States is faced with a decade of costly wars, conflicting national priorities, and budget cuts, the DOD must find other ways to gain and maintain military advantage and maintain dominance" (p. 27).

Even though DSG is the foundation of the nation's strategic "thinking tank," researchers have stated there have been oppositions to the guidance's affect and implementation. Researchers Dale and Towell from the Congressional Research Service (2013) explained there has been uncertainty on what specific strategies should be implemented based on new priorities post 9/11 (2013, pp. 1-2). Their research also identifies strategic issues that were raised by publication of the DSG.

The DSG identified key areas that are pertinent to the national security interests:

- "A shift in overall focus from winning today's wars to preparing for future challenges;
- A shift in geographical priorities toward the Asia and the Pacific region while retaining emphasis on the Middle East;
- A corresponding shift toward advanced capabilities…new technologies." (Dale & Towell, 2013, p. 2)

Even with strategic alternatives and preparedness for future challenges, some researchers felt there were insufficient standings on the importance of Counter Insurgency Operations (COIN). Additionally, skeptics contended that DSG was not a reliable source in terms of identifying the most critical priorities (Dale & Towell, 2013, p. 4). Researchers stated that senior officials should have classified specific priorities in the order of importance, which would be more beneficial for addressing external stakeholders and increasing awareness for comprehensive issues that may arise. Again, critics believed the DSG came with risks on how to actually implement such strategic planning. In response to the

skepticism, former Secretary Panetta stated, "because we will be somewhat smaller, these risks will be measured in time and capacity" (Dale & Towell, 2013, p. 4).

With multiple concerns on defense guidance, decisions were made in order for senior officials to address new threats. One of the main elements was determining what capabilities would produce extreme results in mitigating potential threats (Ballard, Harysch, Cole, & Hall, 2015). Those who are not convinced of DSG's suitability were not convinced that senior leadership and interagencies had the correct solution on strategic priorities. The United States current NSS (2012) dictates how the country should handle potential global threats. This plan is established by the executive branch and informs Congress as well as DOD on national security concerns. The document gains perspective on those issues and formulates strategic planning concepts on how to mitigate national security problems. The plan is derived on the Goldwater-Nicholas Act. Even though the NSS is general in content, in-depth guidance is executed from the executive department based on NMS.

Current national security advisor to POTUS, Susan Rice recommended the latest NSS focus on relations with China, Russia, and India as security concerns and threats to the United States. Additionally, the NSS noted the United States would heavily concentrate on security, which is dependent upon the economy. In regards to modernization, the NSS stated:

> The United States leads the world in obtaining on economic and security advantage…our ability to apply ingenuity of our public and private sectors toward the most difficult foreign for policy and security challenges of our time – will help

> us protect our citizens and advance United States national security priorities. For example, protecting United States and allied forces from asymmetric attacks; preventing terrorists from attacking our homeland; security the supply chain; detecting weapons of mass destruction by the time they reach our borders; and protecting our information, communication, and transportation infrastructure. (NSS, 2010, p. 31)

The Quadrennial Defense Review (QDR) feeds off the DSG in terms of formulating a plan for strategic defense. This review adds on to finding solutions protect and defend the United States as well as maintaining critical guidance from the nation's senior leaders. The QDR supports the DSG and acknowledging strategic plans are needed in order to determine long-term and future solutions to threats the nation will face. In this instance, senior leaders formulate noteworthy objectives that protect national security interests and meet the needs of the United States. The defense review showed major concerns on the ambiguity of the global security environment and believes implementation on posture and security need to executed immediately. Global threats are arising and adversaries are advancing with their weaponry as well as heightening extreme terrorism. With this being said, all interactions (whether peaceful or combative) are based on technology, which provides incredible capabilities. In the midst of increasing terrorism, conventional/unconventional warfare, and other security concerns, it is imperative that the United States. is prepared by "adapting more quickly than it has in the past and pursue more innovative approaches and partnerships in order to sustain its global leadership role" (QDR, 2014, p. 3).

The NSS outlines the need for modernization in order to face future threats against America. The United States and its allies must coordinate and prepare advanced/upgraded assets that can produce the highest capabilities. The plan stated political and developmental capabilities must be modernized to support the full breadth of our priorities (NSS, 2010, p. 5). In order for guidelines to be adhered to intelligence professionals and homeland security officials must incorporate these national security polices as well as international partners. Efforts should be harmonized and communication is pivotal in order to sustain global support.

The United States has a complicated mission, which is to protect the American people from all enemies, foreign and domestic. In order to fulfill this essential requirement, the nation must formulate strategies protect national security interests as well as international allies and partners. There have been federal guidance revised and approved by POTUS, SECDEF, and CJCS which establishes foundation on how to strategically protect the United States as well as other international societies from imminent danger such terrorism, conventional/unconventional warfare, and other serious issues that could possibly damage the nation and foreign interests.

Alternatives, Legacy Aircraft, & Long-Term Challenges

McGarvey, Bigelow, Briggs, Buryk, Conley, Drew et al (2013) completed a research analysis report for the RAND Corporation to the Director of Logistics of the Office of the Deputy Chief of Staff for Logistics, Installations, and Mission Support, Headquarters Air Force; this report specific recommendations for the F-35 JSF program (Preface section, p. iii, para. 2). Researchers believed that the cost of the fighter could be

reduced with a few approaches that were drafted by the corporation. The first approach would be the Air Force increases the number of Primary Aerospace Vehicles Authorized (PAA). If the number of PAAs increased, the Air Force could reduce the amount of home-stations utilized for fighter aircraft, which would save the service department hundreds of millions. McGarvey et al. (2013) expressed the reduction of operation and supporting (O&S) costs due to PAAs would reduce the number of F-35 home station operating locations (p. 1).

Vice Chief of Staff of the Air Force made a recommendation to RAND Corporation to determine if PAAs would be the best option. With this particular research, researchers ascertained the following:

- Ability to support both surge and steady – state contingency operations
- Ability to absorb the necessary number of F-35 pilots
- Requirements for maintenance manpower and support equipment (SF)
- Ability to develop future senior leaders out of the pool of fighter pilots. (McGarvey, 2013, p. 6)

This program is called the alternate beddown, which authorizes additional fighters per squadron among active duty, guard, and reserve locations. This beddown would reduce savings b y providing additional 24 PAAs for active duty and reserve locations; 18 PAAs would be specifically for the guard units. This plan would save more than $400 million for flying costs, $180 million in maintenance/manpower, $200 million for SE, and 10% percent in facilities costs (McGarvey, 2013, p. 9). With an alternate beddown plan, the federal government could potentially save hundreds of millions annually and significantly

reduce maintenance, and SE costs. In 2012, the Air Combat Command (ACC) Commander approved a beddown plan for almost 1,000 aircraft to be considered for distribution across fighter squadron and operating location. The total across the board would be "combat coded F-35s at 31 locations, 44 squadrons, and 960 PAAs" (McGarvey et al, 2013, p. 3).

A second approach requested by researchers was for the Air Force to establish procedures for deployments. Researchers suggested units deploy more legal aircraft to combat locations. McGarvey et al (2013) argued that respected units could deploy a large amount of legacy fighters, split them between two units and this would give larger units the ability to reduce the amount of F-35s in a deployed location (p. 11). In order for this alternative to be effective, the process would take the Air Force approximately 20 years before it could enforce all combat coded aircraft to stand up. Additionally, if F-35s are combat coded in the same timeframe the legacy aircraft would be retired, which not satisfy the solution of new fighter deploying. The assumption is made that by 2034 there will not be a need for legacy aircraft and will not be coded for taskings (McGarvey et al, 2013, p. 11).

These approaches have been suggested to Air Force leadership currently responsible for the fighter program, but there has not been a solid solution. There are many factors within the program that influences the fighter's hefty budget. Certain issues such as weapons system cost are another factor in the future of the program's life cycle. Drew, McGarvey, and Burk (2013) argued sustainment cost of weapons system is over 50% of the program's budget and it is critical strategic sourcing, which should be

carefully planned in order to sustain the fighter's life cycle (p. 2). The F-35 JSF program should maintain the affordability stamp, the O&S must not increase and find solutions to reduce the most expensive element of the aircraft. In finding a cost effective solution, there has to be a determination in whether sourcing will be organic or provided by contractors. It would be essential for organic sourcing and have the Air Force complete operations military facilities. According to researchers, the Air Force maintains "40 percent of the workload and be considered for sourcing to an organic Air Force facility, another military service's facilities, a foreign partner, or the private sector" (Drew et al., 2013, p. 4).

Weapon Systems Management

The purpose of this section is to show the derivation of American weapons procurement and its complexities when needed for technological advancement and/or militant strategies. American weapons procurement goes as far as pre-revolution for military aircraft (Gillespie, 2009, p. 8). It was in the early 1900s when combat airpower was established and realized that weapons systems were needed post World War I. When the United States entered WWI, there was an apparent needed for combat strategies and the Army (then) realized aircraft manufactures did not have dependable combat aircraft or knew how to successfully develop their assets. At this time, the United States was not prepared and eventually coordinated with European-based manufacturers to see what designs would be best for American aircraft and diligently researched on how to determine production methods (Gillespie, 2009, p. 8). Near the 1920s, American military

leader Major Raynal C. Bolling completed a report back to the United States, which established an aircraft production program (Gillespie, 2009, p. 8).

Until full production, the United States had to depend on European capabilities in order to participate in WWI and this approach became apparent when international alliances were needed. As a result of this prominent stance, Congress passed the Advisory Committee for Aeronautics in 1918 (United States National Advisory Committee for Aeronautics [USNACA], 2011; Gillespie, 2009; Roland, 1985). By WWII, the United States was a little more prepared since receiving European resources and special skills from the first war, but was still faced with similar problems of not having sufficient combat aircraft. It was not until WWII, that the United States truly understood the importance of weapons development. Former President Roosevelt stated, "we must be the great arsenal of democracy" and stated the United States would supply necessary arms to those fighting against dictators" (as cited in U.S. Department of State Publication, 1983, p. 603).

Post WWII, there was much debate over whether United States forces and its allies should stand down forces. The United States still did not have sufficient capabilities after WWII and its allies did not have stable military forces. This produced the need to formulate a solution because "the rise of the Soviet Union was a potential aggressor in Europe and for the first time it was not safe to demobilize as it had been the practice in the past" (Gillespie, 2009, p. 9). U.S. allies were heavily affected by the war and depended on America when it came to military spending (Gillespie, 2009, p. 9). It was evident that all NATO countries needed U.S. support and it also became apparent as the

American Air Force worked feverishly on a weapons system program. Former President Eisenhower realized the United States was now the global force and needed weapons systems in order to sustain its current position. He stated in the 1954 Union Address,

> More closely than ever before, American freedom is interlocked with the freedom of other people … we shall, therefore, continue to advance the cause of freedom on foreign front. (Annual Message to the Congress on the State of the Union, 1953)

By the 1960s, the United States was the primary source of weapons, especially air force weapons and employed the most advanced weapons systems.

A study was conducted at the request of former President Harry S. Truman to "identify the need for a strong aerospace industry as part of the nation's defense posture" (Gillespie, 2008, p. 12). This is where weapons and aerospace systems amalgamated to become one of the main defense postures for the U.S. Even former NASA Deputy Administrator, Robert C. Seamans stated, "I feel very, very strongly that we need a capability within our own country to design and manufacture the key elements of our defense system" (R. Seamans, personal communication, September 23, 1974). This was in response to the nation's past relationship with European manufacturers who were the exclusive source of modernized aircraft some decades ago. For the United States to develop their own weapons system was the primary requirement to defend American assets, this was considered a modernized foundation of weapons development in which the United States would have the necessary capabilities to protect its own.

With this new necessity came uncertainty and speculation as to where ally countries would accept the United States' new stance on weapons development. In the end, the United States became more knowledgeable about the weapons system program post WWII and had an advantage to develop its own systems in order to increase its defense mechanism to protect national security. The United States was not seriously damaged (economically and military wise), but it was inevitable that the nation would become the defense force of the world. In order for the United States to have the most optimized weapons systems, it had to manufacture its own weapons. As an advantage, the United States could afford to produce testing, research, and development facilities for advanced weapons systems because it had larger and more functional economy than other countries.

The weapons system program was developed in order for the nation to have a standard technological foundation to produce weapons and ensure they are available when needed. If the United States does not produce its own systems, it could face "the supplier will exert control over the employment of such weapons systems, whether internationally or because of supply problems, which could leave the United States vulnerable and unacceptable" (Gillespie, 2009, p. 20). The United States highly depends on itself to produce the most accurate and proficient weapons in order to protect its own assets.

The primary focus of weapons system development and how it affects the F-35 JSF program is the tactical strategy in how the United States chooses to defend national security. As of now, the F-35 program has been accepted as a joint endeavor with the

U.S. Navy, Marine Corps, and the United States international allies: the United Kingdom, Denmark, Norway, The Netherlands, Canada, Singapore, Turkey, and Israel have been faithful partners during its production process. Gillespie (2009) wholeheartedly expressed "what America buys dictates how America fights" (p. 17). Combat capability is a necessity in the nation's DSG and NSS; employment of the weapons systems on combat aircraft is determined by the advanced capability and entirely affects national security strategy as with as the U.S. Armed Forces (Gillespie, 2009, p. 19).

As mentioned before, the F-35 JSF program breached the Nunn-McCurdy, which "establishes the requirement for DOD to submit unit cost reports on major defense acquisition programs or designated major subprograms; furthermore, it increases in unit costs over certain thresholds, which constitute breaches in unit cost growth and when the critical cost growth threshold is breached, DOD is required under law to initiate certain steps to explain and justification continuation of the program" (Schwartz, 2010, p. 1). As a result of the breach, the federal established the Weapons Systems Acquisition that mandates the Pentagon to "presume termination of any program with a critical Nunn-McCurdy breach" (Gertler, 2009, p. 70). One of the stipulations to maintain a program without termination is to have it "restructured" and "recertified" (Gertler, 2009, p. 70). Since DOD did not want to end the F-35 JSF program, SECDEF Panetta mandated a rebaseline to carry on with the production. As many issues arose during the process, there was senior leadership and Congress wanted to ensure the weapons systems program was intact.

According to researchers, the committee responsible for the maintenance and operation of fighter jets were concerned specific aspects of the weapons systems and whether it would be useful for the fifth generation aircraft. Gertler (2009) cited from the operations and maintenance department that there were major concerns about preventing corrosion within the previous modernized aircraft, the F-22A Raptor. Sources stated the concern may have not been fully investigated and the same issue can happen with the F-35 and requested to have it issues early the weapons phase to prevent additional delays (Gertler, 2009, p. 91). Due to the complexity, serious, and major mission capability weapons systems provide for aircraft, the fighter committee initiated a program called the Director of Corrosion and Oversight Fighter program, which assesses inspections and provide evidence any issue that arise.

Many decisions on weapons systems are a concern that relies on sensitive decision making of military leaders. Weapons systems are considered complex and critical in which leadership delve in ambiguity when it comes to appropriate upgrades, feasibility, cost, and effectiveness. Gillespie (2009) stated that there is strong dependency for modern warfare to be linked with technology (p. 2). With that said, weapons systems have proved to be tougher than organizations realized; weapons systems demand intricate solutions, and simply, there were no solutions due to modifications in procurement decisions as America went into the 21st century (Gertler, 2014; Sullivan, 2014). In the past, weapons systems decisions were dependent on the need for military forces, which were connected to political and economic affiliations. Now, modern warfare is a major decision that is an international concern and influence.

Modern warfare is an innovative concept that was established post World War II based on lessons learned and rising technology. In order to be a stronger force, modern warfare is only as good as the military and federal government who employ it. This ideology is centralized on national security within the United States and abroad, therefore modernization and strategies are dependent upon senior leadership. Gillespie (2008) made it known that advanced technology and strategies are closely related and it was incumbent on military leadership to determine how technology, strategies, and weapons systems work together to regulate weapons procurement (p. 2). Again, the author expressed that his study emphasized decision-making techniques to combine technology and strategies, concentrating on weapons systems procurement (p. 2). This process heavily influenced globalization, as well as American technology and how it affects America's national security strategy.

Weapons systems are one of the most important aspects of the F-35 JSF program and determining specific decisions on how to innovate aircraft is the power in technology and strategic concepts (Ozdemir, 2009). Additionally, decision-making methods of weapons systems require unique as well as convoluted ideas, which are handled by very experienced experts in the field. Gillespie (2009) indicated a particular model of how innovation is created for weapons systems (p. 5). It is called the "Rate of Innovation," in which the design has three phases: fluid, transitional, and specific phases. The first phase begins when there is a concept that has been developed and there is "a lot of activity around determining the best way to develop and use it" (p. 5). In the transitional phase, there is a decision to determine the "dominant design" and "product innovation slows

while process innovation ramps, as competitors strive for the ability to design and produce the product more efficiently (p. 5). Lastly, the specific phase "both product and process innovation dwindle, as surviving firms make incremental improvements focused on improving cost, volume, and capacity" (p. 5).

Weapons systems have proven to be a critical asset to the F-35 JSF program and its attainment in air superiority. While critics believe the fighter's weapons systems success or failure cannot be determined due to its new service life (Gillespie, 2009), other researchers have proven that without the advanced weapons systems, the aircraft will not be the modernized asset deemed by parties involved. Since speculation, there have been significant upgrades in the weapons systems program to shy away from the fact that its abilities are unknown. The main issue is the importance of these how advanced weaponry to complete the F-35 fighter. Since the beginning of the SDD phase, weapons systems have considerably increased in cost and this could pose a problem as the fighter has constantly been delayed due to costs as well as technological errors and scheduling slips

Social Change

Social change is an important aspect of this study, as the United States wants to maintain global peace and stability. China is right behind the United States when it comes to one of the largest and most innovative economies in the world. In order to promote and protect global stability, the United States needs to strengthen its relationships with its international allies and security partners. The POTUS and SECDEF will be responsible for acknowledging continuous modifications and keep foreign policies current to inform the nation on new strategies as well as assist in mitigating potential threats at a global

level. For the Air Force and Navy (including the Marine Corps), the key to identifying current threats and ensuring the United States prepared for adversarial attacks is the F-35 Joint Strike Fighter. For national security, the fighter is the most prominent aircraft in protecting national security.

National security is America's most valuable obligation to maintain global powers as well as protecting U.S. assets and interests. The necessity for national security ensures continued existence through political endeavors, international relations, economic stability, and power projection. Without protection to national security, the United States is vulnerable to new and adversarial threats, which can compromise the federal government's strategic methods against global and domestic enemies. Additionally, lack of national security could negatively affect the United States' standing as the "super power" in a global and political standing and compromise its relationship with international allies and security partners. That is why the United States has to sustain its position as a modernized force.

The F-35 Joint Strike Fighter program was established to be a more affordable, multifunctional airframe that will be the face of the United States as well as its 8 international partners. This aircraft strictly ties into the modernization requirement for the nation's DSG in terms of establishing guidelines that demand technological advancement to deter and defeat future aggression. The F-35 fighter was established as the primary answer to face emerging potential threats against national security interests. This program alone in conjunction with modernization theory epitomizes social change and how this aircraft will change the world. Also, the fighter program promotes social change in terms

of how the aircraft will be the most affordable, powerful asset for the United States and how it will continue dominate air superiority as well as boosting maximum participation with international partners. The affordability and purchase of sales from other countries can boost economic growth. The Air Force stated:

> The F-35 program will develop and deploy a family of highly capable, affordable, fifth generation strike fighter aircraft to meet the operational needs of the Air Force, Navy, Marine Corps, and Allies with optimum commonality to minimize life cycle costs. The F-35 was designed from the bottom-up to be our premier surface-to-air missile killer and is uniquely equipped for this mission with cutting edge processing power, synthetic aperture radar integration techniques, and advanced target recognition. The F-35 also provides leap ahead capabilities in its resistance to jamming, maintainability, and logistic support. (Darnell, Shackleford, & Johns 2009, p. 10)

The F-35 also affords the opportunity for the United States to increase their military operations with international partners and practice critical scenarios that provide security and peace at a global level. The main goal is to protect American national security interests as well as its allies while establishing global peace, stability, and producing economic growth. Such ecstatic features are needed to share with international players and the United States possesses a strong global leadership that employs security obligations and the nation's partners should build a tough barrier for adversarial threats and enforce a secure environment.

In order to maintain "superpower" status, the nation must sustain airpower, superiority, which is accomplished through strategic plans. The F-35 fighter satisfies those requirements by offering stealth, supersonic capabilities that no other jet fighter can fulfill. Additionally, the F-35 fighter is the epitome of air superiority based on technological advancements developed over the past two decades to fight and conquer adversarial threats. This fighter will replace legacy aircraft such as the Air Force's F-16 and the Navy's F-18 with dominating hi-tech systems to deter future threats.

As social change for this study focuses on the United States' larger picture of establishing global security, sustaining air superiority, and strengthening international relationships with its allies, critical issues need to be handled at home. In order for the United States to handle global issues, there needs to be a better understanding of national security issues and how they are handled by Congress and DOD. Taxpayers need to understand how their money is spent and be educated on programs that require a substantial amount of funding. The F-35 JSF program is one of the largest and most expensive acquisition programs in American history. If taxpayers knew more about the history of the fighter program, there would not be any misunderstandings of its capabilities as well as understand the importance of its mission. American citizens need to be educated and know that the most innovative assets are required to protect the nation and keep it safe. In this case, the F-35 fighter is the "latest and greatest" asset of the 21st century to maintain air superiority so the United States can continue to be the global force and protect national security.

Methodology & Design

This study is qualitative in theory with a case study approach. For this literature review, scholarly archival records and government research documents were researched in order to conduct analysis as well as synthesize key information from other researchers. In order to produce an original study on this issue, a case study and in-depth face-to-face interviews were conducted in a qualitative research format to secure data that may have not been explored. This process was the main form of data collection, along with content analysis of governmental records and archival documents to provide assistance in understanding the F-35 production delay issue. Using a qualitative method approach obtained critical data from a select group of individuals during the interview process. Qualitative interviews involve more unambiguous information and very important to certain research areas that have an informational gap (Rubin & Rubin, 2012, p. 5). This is a serious topic because there is a substantial gap on this topic and needs to be addressed in order to determine if lack of modernized assets indeed directly affect national security interests.

The philosophical theory of constructivism proved to be the best approach for this qualitative research study. Constructivism is a theoretical concept that enables one to comprehend and gain knowledge (Fosnot, 2005, p. 1). This theory offered more appropriate guidance than the quantitative theory of positivism in this case, which is based on exact truth and answers. Constructivism does not need a definite answer, simply information that is impartial and fair. Additionally, constructivism is based on how individuals interact socially and gains knowledge from historical to future events. Both

approaches provide obvious differences and the theoretical backgrounds make their purposes distinctive.

With positivism as an important element in gaining and understanding information in research, modernization theory and globalization framework tied into this study's issue and as such have served as the theoretical framework. The modernization theory is based on the process of modernizing societies (Gilman, 2003). It is believed that modernization is needed in order for countries or societies to control their environments for social and economic development (Huntington, 1968; Lipet, 1959; Mehlika, 2013). Modernization is a key piece to the F-35 JSF program because the fighter is based on the most innovative weaponry to protect American assets and national security interests.

Globalization theory suggests there is an integration of a country's cultural and socio-economic development that encourages modernization to evolve (Berman, 2009; Mehlika, 2013). Globalization describes the "economic, political, social and culture changes, which was accelerated by the scientific revolution to the diminishing of national and geopolitical boundaries in an expanding transnational movement of goods, services, and capital" (Mehlika, 2013, p. 2). The F-35 is predicated on innovation as well as providing assistance to international allies and security. The F-35 program also has a multilateral cooperation agreement with 8 international partners and security partners to make the fighter world's largest international program. The key to international partnership is affordability, increased security, global peace, cooperation, and advanced strategy against adversarial threats.

Qualitative methods focus on exploring questions that answers "by what means" and investigates the mystery of the problem at hand for further inquiry. Quantitative research attempts to answer the particular problem and to what degree (from a statistical or numerical aspect). The primary element of positivism is the theory, which is manipulated by the use of statistical value in social sciences (Hjorland & Nicolsen, 2007, para. 4). Additionally, positivism depicts "underlying causes which is regarded as metaphysics and ignored, which are considered quantitative science" (Hjorland & Nicolsen, 2007, para. 4). Furthermore, positivism is based on the deductive reasoning concept, which is not suitable for this particular research. Finally, constructivism is a theoretical ideology that is beneficial to this study because of how information will be gathered during the interview process.

Besides the importance of constructivism and inductive reasoning to explore the problem of the F-35 fighter, there are other elements that are the foundation and survival for this study: verification and reliability. These approaches have to be demonstrated to reduce error and mitigate bias. The first step was to have the supervisory dissertation committee review and report information based on ending product of this study. According to Doctors Cohen and Crabtree of the *National Institutes of Health* (2008), readers can distinguish specific patterns and verify the data and its interpretation (p. 334). The dissertation chair determined the intended interpretation and provided candid feedback based on the clarity, validity, and reliability of the study. The second step, the researcher established straightforward instructions on her intentions, which was annotated in the study to assure readers as well as the committee ensured verification and reliability.

Procedures were embedded and "built into the research process to repeat and affirm researchers' observations" (Cohen & Crabtree, 2008, p. 335).

In research studies, verification and reliability are the most important components of a research study. Even though two approaches were addressed, there is a model that would be of much use for this examination: the qualitative legitimation research model. Benge, Onwuegbuzie, & Robbins (2012) stated that legitimation is the "most important step in all research studies, whether the research represents a quantitative, qualitative, or mixed study" (p. 66). No matter how information and research has been incorporated for a successful study, if it lacks legitimacy, then it is invalid. In other words, legitimation of study can be the success or failure of a researcher's work.

Again, the qualitative legitimation model entailed internal and external threats, which acknowledges the truth and credibility of research. With this said, pragmatic studies should be justified and sufficient research be completed to proved the results (Benge, Onwuegbuzie, & Robbins, 2012, p. 66). By using this particular model, researchers have the opportunity to formulate corrections, if needed. This was a needed concept because certain ethical and validity issues can affect a research study. Benge, Onwuegbuzie, & Robbins (2012) also noted that researchers could use any particular research method, but if certain issues arise, such as insufficient amount of participants for an anticipated interview or survey, a researcher may be tempted to oversample to come up with the results (p. 67).

Research legitimation issues afford the opportunity for researchers to analyze their findings and interpret them based on proper circumstances. If researchers are aware

of the sizes needed for data collection, no matter what the research method, can mitigate false data and exacerbated results. Previous research by Onwuegbuzie, Slate, Leech, and Collins (2009) expressed that conceptualized results included external statistical generalizations, internal statistical generalizations, analytic generalizations, and case-to-case transfer (p. 67). These generalizations can assist with researchers determining future solutions for in-depth research.

Using the qualitative legitimation model can significantly mitigate verification and validity issues in research. This representation epitomizes credibility and is based on factual data, "applicability, consistency, neutrality, dependability, and/or credibility of interpretations, and conclusions within the underlying setting or group" (Onwuegbuzie & Leech, 2007, p. 234). Internal threats can be summed up as bias from participants, the researchers involved, miscommunications, misinterpretations, and observations. External threats for this particular qualitative research case study could over-generalize of results, bias based on answers from the interview, and possibly bias from governmental and archival records.

Qualitative Case Study Methodology

Historical research by Yin (2003) states that case studies should be used in qualitative research when: (a) the focus of the study is to answer "how" and "why" questions; (b) you cannot manipulate the behavior of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context. Case study research is a specific investigation of cases where one examines

the complexity of the issue identified. Case study methodology "maintains deep connection to core values and is particularistic, descriptive, and heuristic" (Merriam, 2009, p. 49). When added with a qualitative approach, case studies are more "authentic" and "in-depth" examinations of the phenomenon. According to Creswell (2013), the qualitative approach "explores a real-life, contemporary bounded system (a case)… through detailed, in-depth data collection involving multiple sources of information…" (2013, p. 97).

Researchers such as Creswell (2013), Denzin & Lincoln (2011), Merriam (2009), and Yin (2009), have put a stamp of approval in the popularity on qualitative case study research. Even though case study research is "an increasingly popular approach" in qualitative research (Thomas, 2011), there has been confusion on what qualitative case studies are and what they prove to society in research. These particular studies provide researchers an opportunity to "explore or describe phenomenon in context using a variety of data source" (Baxter & Jack, 2008, p. 544). Moreover, other researchers such as Carla Willig (2008) believed qualitative research case studies concentrate on specific analysis and are a fundamental way of gaining perspectives from individuals, organizations, and communities (p. 74). Such qualitative studies were formed by examples, particular methods, research designs, and based on literature reviews. When researchers conduct case studies, then there is a need to better define its methods.

PhD Candidate Hyett, Dr. Kenny, and Dr. Dickson-Swift (2014) implied published case studies could possibly be challenging with trying to interpret specific methodology and its intent (p. 1). Other researchers stated experienced qualitative

researchers identify case study research as “stand-alone qualitative approach” which means there should not be any ambiguity in published work (Denzin & Lincoln, 2011).

For this particular case study, a singular case study was deemed necessary to determine how production delays will affect U.S. national security interests since lack or slow growth in production affects the guidelines outlined in the DSG and NSS. Yin (2009) noted that single case studies rely on one precise occurrence; this case study is appropriate in exploring the F-35 JSF program and its production issues. Even though it is a single case study, the information provided will not be based on any one person, but multiple individuals to gather a precise perspective based on factual information as well as experience in the field of interest. Baxter and Jack (2008) expressed that qualitative case studies should not be investigated through one lens, but multiple lens so researchers can interpret all aspects for the occurrence to be interpreted and comprehended correctly (p. 544).

A great advantage of utilizing the case study approach in qualitative research is its diversity, as well as the ability to have freedom in data collection. Researchers have the ability to explore further information by using selected participants to gain an understanding in the phenomenon presented. Hyett, Kenny, and Dickson-Swift (2014) opposed in argument the diversity in case studies cause credibility issues and can misguide researchers in having a shared knowledge of the difficulty in case study practices (p. 2). With this being said, researchers believe case studies bring limitations issues, which brings uncertainty to its approach. Thomas (2010) and Tight (2010) discussed concerns that issues with credibility and limitations in case study approaches

could cause speculation as to whether they should be considered a methodology in qualitative research.

Again, supporters of the case study approach agree that this type of research is "timely and a review is required to analyze and understand how this methodology is applied in the qualitative research literature" (Hyett, Kenny, Dickson-Swift, 2014, p. 2). This is a method that shows if researchers complete the correct steps in using case studies in qualitative research, and as a result, there should not be any ambiguity or hesitance in denying case studies are legitimate approaches. With arguments over qualitative research case studies, ultimately, the researcher holds the key to its validity and credibility. According to Morse (2011), researchers will manipulate qualitative research and how they direct their study. Additionally, researchers must understand that if their studies will be published in any format, they must know the importance of credibility, reliability, and validity (Hyett, Kenny, & Dickson-Swift, 2014, p. 3). Halberg (2013) and Morse (2011) strongly expressed that lack of credibility and an in-depth knowledge about the research can truly damage a researcher's reputation as well as his or her work.

Theoretical Guidance

The modernization theory guides the purpose and problem of this study as well as the research questions, which are the basis for this research. Modernization theory was utilized to identify the process of innovation within societies. This concept observes how undeveloped countries managed their societies while acknowledging opportunities for such countries to modernize like more developed countries. This theory emphasizes social change within societies and focuses on the fundamentals of social development to

advance in new technologies (Gilman, 2003; Huntington, 1968; Lipset, 1959). French philosopher, Marquis de Condorcet, believed that modernization theory was a concept that technological advancements and economical changes could positively alter cultural experiences within societies. According to Gilman (2003), Condorcet was the first philosopher to connect technological advancement to an ever-changing world and believed the innovative progress was the way for countries to control their environments. This theory connects with the United States' need to be innovative and to continue advancing technology so the nation can protect its land, citizens, and resources.

Globalization theory is another perspective that contributes to this study's purpose and problem. Globalization is defined as the "long-term, largely irreversible phenomenon involving the political, cultural, and economical merging of geographically dispersed groups and shares the idea that transportation and communication technologies are pervasive and consequential" (Gansler, 2013, p. 2). This theoretical concept believes that global economy development produces positive effects of resources of all countries such as international trade, policies, tourism, and so forth (Mehlika, 2013). Globalization identifies the separation between undeveloped and more developed countries and technology is one of the main factors to economic progress (Gansler, 2009). Modernization theory and the globalization perspective significantly contribute to this research study. The research questions presented were based on such theories to determine whether modernization is needed in order to for a country to maintain its dominance. Innovation is needed in order for a country to socially and modernly advance;

additionally, countries need stable economies in order to have resources needed such as weaponry, aircraft, and manpower.

The research questions are based on production delays, national security, and modernization. The questions are to determine if fighter production delays directly affect national security. As it has been expressed in national defense guidance, modernization is needed in order to maintain superiority and be a global force as well as protect national security. If there is a lack of modernized assets--the F-35--then there is a state of vulnerability towards national security. The globalization perspective ties into this study because this U.S. program is based on international relationships and partnerships with its allies. Globalization theory will provide affordability, global security, and precise national security strategy against adversarial threats. Additionally, there were subset questions intended to explore whether the fighter production delays break down and/or violate policies established in national security guidance because the fighter is not ready. Such questions tied in with the modernization theory as well as the global perspective is due to the lack of modernized assets does show development and progression, in which the United States is not prepared for current and future adversarial threats.

Summary

The United States faces constant changes that are dependent upon the national security environment. According to the QDR, one of the strategic challenges that will alter the nation is define the future is “new technologies” (2014, p. iii, para. 1). Secretary of Defense, Chuck Hagel, emphasized the need for modernization in order to satisfy the three pillars established to improve the defense strategy. He stated, “innovation - with our

own Department and in our interagency and international partnerships – is a central line of effort" (QDR, 2014, p. 6). With the new security strategy that emphasizes innovation as the key to a successful defense comes with some concerns. DOD continues to face an uncertain budget for the federal government. With this downfall, sequestration will continue to threaten funding to critical programs given the fiscal ambiguity. President Obama passed a budget bill (the Bipartisan Budget Act) in 2013, which reprieved sequestration, but fiscal year 2016, the government will resume with massive budget cuts projected at $50 billion dollars annually.

With such a massive divergent, America wants to continue its largest, most expensive acquisition program in history: the F-35 Joint Strike Fighter program. In order to continue the national defense strategy expressed in the DSG and implemented in the NSS (with assistance of the QDR), the fighter program must stay on its current timetable in order to fully execute in 2037. In order for the United States to continue as the global force, the nation will have to prolong the SDD phase of production within the JSF program, sustain advanced weapons system production, and maintain the international partnership with allies that have procured aircraft in advance. If this is a consistent process, America can stand to continue its defense strategy that will rebalance the Asia-Pacific, maintain security in Europe and Middle East, protect nuclear programs, and fight the GWOT. There is much research on these problems that have caused constant delays within the fighter program, but there is little research as to the consequences of prolonged delays and how this will affect national security, as there is obvious communication issues in strategic planning derived from the DSG and NSS. Additionally, this study will

explore additional avenues by conducting face-to-face interviews (if approved) with selected senior officials to discover if continued delays will affect national security interests and what will it mean for existing relationships with international allies and security partners. If innovation of the JSF program proves to be too expensive and possibly no longer be afforded due to the uncertainty of the budget, what does that mean for national security? How does the lack of production and/or production delays affect the guidance stated in the DSG and implemented in the NSS? How do these breakdowns in not having consistent and constant modernized aircraft affect national security?

Chapter 2 gave a brief synopsis regarding how the three main issues of technology software, budget, and scheduling mishaps caused production delays within the F-35 JSF program. This extensive literary review would not have been possible without government researchers, scholars, experts, and senior officials involved with the fighter program to contribute such an abundant amount of information on the issues. Knowing the issues of the fighter program certainly identified the need for further research on how production delays directly affect national security. Many scholars completed studies to show repetitive problems that have caused periodical delays, but there was insufficient research to determine how production delays affect national security.

With limited studies to determine if production delays directly affects national security leaves speculative innuendos about the United States' position in the world. Since the Korean War, the United States has globally dominated in technology, strategy, and air superiority. In order to sustain global dominance, there must be technological

advancements to protect assets, resources, and security. The United States is currently utilizing its 20th century assets to defend the national against adversarial threats; this is a major issue since adversaries today are more innovative and dangerous. They have access to weaponry unlike ever before, which poses a threat to the United States. In order for the United States to maintain dominance, air superiority, and global security, the country must be prepared.

Chapter 3 covers key foundations of this study such as the case study design, research questions, and the setting. The chapter also discusses in-depth information about the participants that were selected and ethical considerations that needed to be acknowledged to protect individuals who voluntarily agreed to be apart of this research. In addition, thorough instructions are annotated to discuss how participants were handled, data collection processes, analysis methods, and safeguarding instruction to ensure information was not compromised to during the process.

Chapter 3: Research Method

Introduction

The purpose of this study was to determine whether constant production delays within the F-35 JSF program directly affect national security. The key phenomenon of interest in this study was how lack of modernized resources could break down strategic planning that is outlined in national defense guidance. In determining whether production delays affect national security, there was also an issue with modernized assets. Within modernization concepts, innovation is needed in order for a country to develop, and globalization ensures that countries can control their environments when they are technologically advanced. If the aircraft of the 21st century is not currently ready to prepare the United States for adversarial threats, this situation could conflict with national security guidance, which states that advanced technology is needed.

Chapters 1 and 2 identified the necessity to explore the F-35 JSF program, its current issues with production delays, and how these delays may affect national security interests. Moreover, both chapters identified specific justifications based on two theories that are deemed beneficial to comprehensive studies of the United States and its need for air and global superiority. The literature review also identified issues with global stability and international relationships. In order for the United States to maintain global stability and peace, it has to have strong relationships with its security and international allies and security partners. Additionally, international partners should have the same technology to assist in global peace. According to Wilkinson (2012), "international participation benefits all stakeholders [the U.S.] and thus strengthens alliances" (p. 35). Technological

errors, scheduling concerns, and substantial costs for the F-35 program have caused production delays over the past 12 years. The literature uncovered when production delays existed and the cost of the program rose, threatening the program's timetable to be completed by 2037. The literature review also covered lack of modernized assets indicating that the United States has been forced to continue the use of legacy aircraft (Asksamit, 2009; Greaney, 2010; Ozdemir, 2009; Waite, 2012; Wilkinson, 2010). The use of legacy aircraft in conjunction with the production of the fighter could cause budget issues, as it will be expensive to maintain both generations (Gertler, 2014; Gertler, 2012). Military operations have projected initial operational capabilities for the fighter as early as 2015 (the Marine Corps variant—F-35B), but production delays could potentially immobilize its execution during that time.

Threatening the timetable as well as military operations affects the modernization clause established in DSG and employed by NSS and other national security guidance, which indicates that technological advancements are needed to mitigate adversarial threats and capabilities. It is not known whether national security interests are severely threatened by lack of modernization; the United States has experienced more than a decade of problems with the fifth-generation aircraft. Research has been conducted to identify production delays that will affect the nation's position as a global force (Greaney, 2010; Wilkinson, 2010). China, as the world's second largest economy, is second in line in terms of military operations and technology; this could pose a problem, as democracy is the leading concept of bureaucracy to promote global peace and stability as China's form of government is based on communism. Additionally, this problem

would negatively affect modernization, as democracy is strongly supported and considered a great step forward in social change (Huntington, 1968; Lipset, 1959). Furthermore, Condorcet's theory can be applied, as modernization emphasizes the need for technological advancement in addition to democratic justice and social change. This chapter summarizes the research method used for this qualitative case study to investigate how production delays affect the F-35 JSF program and how these delays affect national security guidance. Additionally, this chapter contains the research questions, interview protocol, and procedures for data collection and analysis purposes.

Case Study Design

A single case study approach was selected for this research study out of five traditional approaches. According to Yin (2003), a case study approach should be reflected in research when

> the focus of the study is to answer how and why questions, you cannot manipulate the behavior of those involved in the study, you want to cover contextual conditions because you believe they are relevant to the phenomenon under study, or the boundaries are not clear between the phenomenon and context. (p. 5)

Additionally, the case study approach was very intuitive because this approach uses an amalgamation of resources to obtain a deeper understanding of a phenomenon. In this case, a plethora of interviews, governmental research records, and archival documents were used over a period of time to explore a single case (Creswell, 2007). Case studies are conducted in an attempt to establish comprehensive descriptions and analyses of isolated or multiple cases for problems or issues that either require further information or

involve analysis of specific concerns. This is an ideal approach, as a portion of the investigation requires analyzing individuals to complement literature review and research.

Case studies permit researchers to preserve universal characteristics of specific events and interpret significant findings relative to the inquiry in nature. Even though some researchers and authors oppose case study approaches, there are some relevant cases that have proven that case study methods work. For example, Harvard professors chose case studies "to highlight analyze specific principles and engage readers in active learning" (Harvard, 2015, para. 5). Critics of case study methods have emphasized that case studies provide a lack of consistency, as opposed to quantitative or mixed methods, because there are not efficient procedures in place to verify the validity of evidence (Ryan, n.d.). Additionally, some resist qualitative case studies due to time-consuming data collection tools (such as interviews) in which large amounts of data and research are involved.

Despite the limitations of case studies, authors such as Yin (2009) have proved the method to be reliable. As stated by Yin, case studies produce theoretical research that is just as reliable as any other style, and case studies are more specific to selected groups than mass populations. Finally, case studies do not have to be portrayed as time consuming, lengthy, unorganized, or impractical because there are procedures in place to make this method flow more easily. There are multiple ways in which researchers can conduct interviews, and there is plenty of research for individuals to review and

internalize information in order to produce studies that are valuable, valid, clear, ethical, and evidentiary.

Proving that qualitative case studies are just as valuable as quantitative research has been difficult in scientific and education research due to qualitative research's lack of statistical value and numerical emphasis. With that said, some authors have attempted to restructure the meaning of case study and remove it from the traditional sense. According to Niglas (1999), individuals see qualitative research as more of an interpretive paradigm; essentially, more assumptions are made based on this concept due to the data collected and researched versus a positivistic paradigm (quantitative) where results are more generalized.

Baxter and Jack (2008) concluded that there are seven types of case studies: explanatory, exploratory, descriptive, multiple case, intrinsic, instrumental, and collective. *Explanatory case studies* are used to "explain presumed causal links in real-life interventions that are too complex for the survey or experimental strategies" (Baxter & Jack, 2008, p. 547). With explanatory case studies, researchers continue to link the issue at hand with the results derived from it. *Exploratory case studies* are used to further explore events that have an ambiguous outcome or for which the outcome cannot be predicted (Yin, 2003). *Descriptive case studies* are used to outline interventions or phenomena in the real-life contexts in which they transpired (Yin, 2003). These types of case studies involve events or issues that are currently happening.

Multiple-case studies

> enable the researcher to explore differences within and between cases. The goal is replicated findings across cases because comparisons will be drawn and it is imperative that the cases are chosen carefully so that the researcher can predict similar outcomes across cases, or predict contrasting results based on theory. (Yin, 2003, p. 19)

Intrinsic cases are reserved for researchers who have a humble interest in the topic at hand (Stake, 1995). *Instrumental cases* are used when researchers want to improve a previous theory or obtain a deeper understanding of a specific topic (Stake, 1995). Finally, *collective case studies* deal with comparable issues based on multiple case studies (Yin, 2003).

Based on the issue to determine if production delays directly affect national security, I implemented an intrinsic single case study over the other six case studies. In the prospectus phase of the research, I had a true interest for U.S. Air Force fighter program. I am fascinated how our advanced technology in fighter jets has obtained and sustained air superiority since the Korean War. Additionally, there was a great fascination for the world's most advanced weapon and the United States' largest acquisition to date: the F-35 JSF. With a large and fascinating program inevitably comes with catastrophic issues that could potentially affect the entire world and how it operates.

Multiple distinguishing factors were identified in this case study. Small population samples were chosen because of the depth of issue, thoroughness of the analysis, and the setting in nature because there was unpredictability of the specific studies, in this instance. With such a large issue involved, it was beneficial to have an

intimate size of a highly educated and experienced group of individuals to fill the void in the case studies. Finally, this particular case study used numerous resources such as interviews, governmental research, and archival records to enable triangulation by verifying information through multiple sources for exactness as well as crosschecking for similarities in data collected. In addition, this approach gave the ability for reader's to further recognize and familiarize himself or herself with a single phenomenal event (Creswell, 2007).

Research Questions

It was not known how constant production delays within the F-35 JSF program delays directly affects national security. The following research questions were the foundation of this qualitative case study:

RQ1. How do constant production delays within the F-35 JSF program directly affect national security?

SQ1. How do constant production delays within the F-35 JSF program directly affect national security (NSS)?

SQ2. How do production delays within the F-35 JSF program directly affect National Military Strategy (NMS)?

SQ3. How do production delays of 5th generation aircraft directly affect national security interest?

RQ2. What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur?

Below, interview questions were supporting inquiries to the research questions, which gathered data and established a guideline to put this study into perspective.

The modernization and globalization theories guided the research questions for this study. Such questions were developed to investigate whether F-35 JSF production delays directly affect national security. In order to formulate these questions, there had to be a link to the aircraft and national security. The link was Condorcet's modernization theory and Giddens' globalization theory. Modernization theory was derived from the 1950s and is based on advancing technology within societies. Modernization is a fairly new concept and its principles were based on the Ideal of Progress, which is derived from the Age of Enlightenment (Gilman, 2003).

French philosopher, Marquis de Condorcet, evolved the concept and believed innovation and positive changes can influence a country's the social-economic development (Gilman, 2003). Condorcet also believed it is important to for countries to continue to technologically advance to maintain control over their environments (Gilman, 2003). Condorcet's vision on the conceptualization of the theory emphasizes the need for technology in order for a country to control its environment. The research questions were based off this theory because the fighter program is predication on modernization because technologically advanced assets proves that a country can dominate. The JSF is the United States' most advanced 21st century aircraft and it is currently not ready for missions so the nation can continue its dominance.

The globalization theory is quite similar to the theoretical concepts of modernization. The globalization perspective is a based on a "capitalist world-system that

spreads across the globe" (Emory University, 2001, para. 1). This theory is based on countries coming together for a common global on worldviews, cultures, policies, trade, and other social-economic development issues (Mehlika, 2013). This is a critical aspect to the research question presented, the problems with the fighter, and the future of the actual program. As the fighter is predicated on modernization, it is also predicated on globalization as the United States has 8 international allies and security partners invested in the F-35 JSF program (Gertler, 2014). If production delays cause periodical immobilization within the program, foreign military sales as well as international relationships are affected because the lost of investment. The nation's allies could potentially back out of the program because delays could possible make the fighter unaffordable.

The key to the research questions presented in this study is that the modernization and globalization theories are linked together to be the framework of this study. Such questions hone in on modernization, which is needed in order for a control to control its environment (Huntington, 1968; Lipset, 1959). The F-35 JSF is the leading asset in accomplishing this goal. Globalization is the key for international development among countries and modernization is an important concept in this theory (Mehlika, 2013). Globalization is a concept, which brings countries together for international commitment such as trade, foreign policy, global security, and so forth. The F-35 links with international allies and security partners with a multilateral cooperation agreement. These research questions provided the answer to how modernization affects national security.

The answers were the key to determining the F-35 programs stance with production delays.

Validation of Interview Questions

Content validity is the concept where specific components are calculated based on relevance and representation (Haynes, Richard, & Kubany, 1995; Lund Research Ltd, 2012;). This is an important concept because content validity establishes significance to new instruments that are used in research. With new instruments, there are has to be a methodical procedure to test its ability and reliability. This is another important practice because instruments have to be reliable and tested before they can be utilized in research (Lund Research Ltd, 2012). Validity is an important element to all research studies (Brigham Young University, 2012). According to Selinger and Shohamy (1985), "any research can be affected by various factors which, while extraneous of the concerns of the research, can validate the findings" (p. 95). Validation in research provides not only reliability, but also efficiency of information, trustworthiness, and certainty that data presented is accurate and can be considered among a peered environment (Simon, 2011, p. 1). Interview questions for this qualitative research case study were established as an instrument for the data collection process (face-to-face interviews). According to Simon (2011), it is beneficial that researchers implement tools for the data collection process to confirm that information analyzed concerning a specific topic is examines to its utmost potential in order for the study to be fully reviewed (p. 1). For interview questions to be considered credible and accepted into research, they must be validated.

Interview questions were validated based on Dr. Marilyn K. Simon's Survey/Interview Validation Rubric for Export Panel (Appendix I) for content validity. Dr. Simon is an online instructor at Walden University and is a supervisor in doctoral studies. She created this rubric to determine the validity of interview questions and surveys. In the rubric, the validity of interview questions are based on the following:

- Clarity
- Wordiness
- Negative Wording
- Overlapping Responses
- Balance
- Use of Jargon
- Appropriateness of Responses Listed
- Use of Technical Language
- Application of Praxis
- Relationship to the Problem

For clarity, the rubric ensured questions were precise and mitigated ambiguity. Additionally, the researcher ensured the participants understood the questions asked and that questions were answered with clarity and efficiency. The rubric prevented lengthy questions or superfluous words that could have caused confusion with participants and guaranteed positive wording, which was a factor to obtain additional information. Dr. Simon's rubric thwarted questions that could have had more than one topic that is covered in a single sentence and creates a balance where questions are neutral;

furthermore, the rubric made certain questions did not lead participants to respond a specific way.

Interview questions were appropriate and understandable for the targeted population as well as gave participants an opportunity to respond within reason of his or her expertise. The technical language of the interview questions was suitable based on rubric expectations and each question was relevant to the participants' field of expertise as well as responsibilities in their respective careers. The interview questions were deemed valuable and sufficient to resolve the research problem within the qualitative case study. Moreover, questions were relevant to the topic and were able to discover information and/or phenomenon to answer the study's research questions. Finally, the interview questions were perceptible and precise to achieve the purpose of this qualitative research study.

Setting

The location for this qualitative research study was at the Pentagon, which is DOD headquarters in Arlington, Virginia. The Pentagon is the "world's largest low-rise office building" (Pentagon, n.d., Pentagon Facts section, para. 1) and is home to all service Departments. The Pentagon is comprised of approximately 28,000 military, federal civilian employees, and 3,000 government contractors. Its mission is to provide the military forces needed to "deter war and to protect the security of our country" (Department of Defense, n.d., Mission section, para. 1). The oldest government department in the United States, the Pentagon is responsible for specialized defense measures in order to protect national security as well as security with our allies abroad.

The Secretary of Defense, or SECDEF, is the most senior official who heads the Pentagon (the building) and the Department of Defense. SECDEF is also the primary defense policy advisor to the President of the United States (POTUS) and with POTUS' consent, the SECDEF has authority and control over the Pentagon (Department of Defense, n.d.). Lastly, the SECDEF is responsible for over 1.4 million active duty military service members, over 1 million National Guardsmen and Reserve personnel, and 700,000 federal civilian employees.

The Deputy Secretary of Defense runs day-to-day operations in the Pentagon and is SECDEF's next person in command. Cornell University (n.d.) stated the Deputy Secretary of Defense is the Chief Management Officer of the Department of Defense and exercises the powers of SECDEF when he is not in the position to or there is not a Secretary vacancy (para. 1). The Pentagon is compartmentalized into the following departments: Secretary of Defense, Office of the Secretary of Defense, Department of the Army, Department of the Navy, Department of the Air Force, Joint Chiefs of Staff, Defense Agencies, Department of Defense Field Activities, and Combatant Commands.

Participants

The research population in this study consisted of 15 senior officials who work and have offices in the Pentagon (with the exception of contractors that work outside of the Pentagon). Each senior official is the head of their own department (with the exception of participants who declined and referred other individuals as participants) and work in their own capacity from a civilian, contractor, or military perspective. All offices are departmentalized so that senior officials concentrate on professional expertise in their

areas. The 15 research participants (or population) were appropriate for this qualitative research case study due to their positions and experience with the F-35 JSF program; furthermore, members of the research population were specifically chosen due to their expertise within DOD, knowledge of the acquisition program, and decisions directly made that have impacted the fighter program (Bertaux, 1981; Latham, 2015).

The participants of this qualitative research case study were senior officials who directed the DOD, F-35 JSF program, and the defense budget (with the exception of participants who declined and referred other individuals as participants). Largent, Grady, Miller, & Wertheimer (2012) stated it is important in conducting interviews that the researcher understands participants are sensitive constituents and their protection should be top priority during this process. Criterion sampling was used for the participant selection process because it reviewed and studied "all cases that meet some predetermined criterion of importance" (Patton, 1990, p. 176). Inclusion criterion was used to select participants that are critical to the interview process. Yale University (2006) indicated in order to meet inclusion criterion, participants must have specific characteristics deemed qualified to contribute. The criterion for this study was each participant in the interview process either had professional expertise within the defense budget, DOD, and most importantly, the F-35 JSF program. If participants did not meet this criterion (exclusion), the interview could not have been conducted because they would not be able to answer the questions, which are critical to this research study.

Within the Pentagon, I received permission from DOD's Public Affairs office (Appendix G) to use conference rooms to conduct interviews. This prevented not only

bias in utilizing my office or senior officials', but also it made a professional, comfortable environment for both parties so each participant could speak honestly and freely without feeling intimidated. At the end of the interview, snowball sampling was utilized. Oregon State University (2010) stated that snowball sampling is a precise method in which participants are asked to refer other individuals as participants in a study. After an in-depth interview, it was beneficial to have additional experts that contributed to this qualitative research case study. This process occurred when participants who declined referred other individuals of expertise; this proved to be beneficial because the participants met the criterion. Participants, due to snowball sampling, received the same procedures with the interview process as initial participants.

The amount of participants in a qualitative research case study was very important to this process. The fact case study interviews can be lengthy in nature, it would be appropriate to keep interviews under 20. Belmont University (n.d.) expresses the number of participants for a quality research studies can be up to 20 participants. I keep interviews under 20 and was a maximum of 15 overall. Fifteen proved to be a good sample size to obtain data saturation. If you do not have a certain number of participants due to "data saturation," the research should annotate a maximum number (Belmont University, n.d.). The objective in this research study was to obtain at least 15 participants, unless there is insufficient data saturation.

Data saturation relates to the population size and is based on the amount of information given to a study. According to Mason (2010), "there is a point of diminishing return on a qualitative sample – as the study goes on more data does not necessarily lead

to more information" (para. 1). This happens because only one specific portion of data needs to be accounted to establish framework in data analysis. When there is not any new information report, data saturation is accomplished. It is more appropriate that the population size is smaller for data saturation because qualitative studies are consumed with large amount of data and larger populations would make data analysis very time-consuming and unrealistic. Glazner (2006) completed a case study on the F-35 Joint Strike Fighter enterprise, which concentrated integration strategies for the fighter. The thesis titled, "*Enterprise Integration Strategies Across Virtual Extended Enterprise Networks: A Case Study of the F-36 Joint Strike Fighter Program Enterprise*," was established to bring knowledge to the program and make suggestions on how to produce integration strategies for future production within the program. This study was based on "multiple site visits and dozens of interviews with people responsible for shaping the enterprise network and working within it" (Glazner, 2006, p. 83).

Krueger (2010) completed a dissertation titled, "Technology Transfer and U.S. National Security Policy: The Joint Strike Fighter," and discussed how the U.S. government made important decisions on technology transfer and develop new approaches since it is DOD's largest acquisition program. The researcher's method was based:

> on a comparative study assessment of the three multinational fighter aircraft programs in which the United States has participated since the mid-1970s, coupled with an analysis of twenty-house structured interviews conducted with

> various current and former actors within the DOD, Department of State, the Department of Commerce, as well as the defense industry. (Krueger, 2010, p. 7)

Such examples by other researchers showed that a case study design is quite appropriate for similar topics dealing with the F-35 JSF program. The researchers annotated in this study chose qualitative case study designs because there is additional information that needs to be obtained as well as understood. The F-35 JSF program is a very intrinsic and technical program, and as a result, there is a significant amount of information that not only needs to be deciphered, but also needs to be analyzed. In addition, there is a plethora of information that leaves unanswered questions. Case studies provide these solutions, especially for problem-specific data that involves the F-35 JSF program.

Role of the Researcher

The F-35 JSF program instantly became interesting once it was understood that this program was the largest acquisition program in American history. For a program of this magnitude, the fighter has great influence on the service Departments, but most importantly, social change. I became fascinated by the timeline and costs involved in its execution. Frequent delays became an ultimate concern due to scheduling errors, costs, and mechanical problems. This is a critical issue that could possibly cause a tripling affect with other factors involved in the program's production. In-depth research discovered multiple mechanical issues that were deemed a threat to Congress' execution of 2037 as well as its ability to stay on schedule became a negative factor for the completion process. Additionally, modernization is key to global superiority, protection

of American assets, and national security interests—that seemed to be affected because of production delays of American's new modernized asset. The nation's DSG stated modernization is needed in order to mitigate rising threats towards the United States, a tactic that is implemented in NSS. This problem entirely piqued my interest and I wanted to be the "private investigator" to obtain some significant unanswered questions.

There were multiple reasons why the F-35 JSF program became the main issue. I realized the most experienced individuals in the DOD could answer unanswered questions that the public may be afraid to ask by participating in this research study. Their standards and professional knowledge of the fighter program can make their participation critical as their influence promotes new ideas and awareness on the future of the fighter program, strategic planning, and national security. The congressional budget is a major factor in the program's production and scheduling delays and technical errors have caused additional funding for the program, which is a negative factor. If the program does not stay within the means of the budget, the program could possibly halt temporarily or indefinitely.

I was the interviewer (a data collection instrument) for this research study. In qualitative research, "the researcher as an instrument is an accepted and acceptable stance" (Xu & Storr, 2012, p. 3). The data collection included one-on-one interviews and asked open-ended questions, in which data were recorded, and then transcribed (Creswell, 2008). Based on my interest in this research, there could have been unintentional biases during the data collection process. Pannucci and Wilkins (2011) stated that interview bias determines how the data collected is gathered, recorded, and

interpreted. Additionally, potential biases could have been a factor when the researcher was the only interviewer during the entire interview process; this could have challenged the reliability of the study.

During the interview process, interviews were recorded with a digital recorder with consent of the participants and the Department of Defense Public Affairs office. The participants were asked to approve the device prior to the interview. It was also reiterated during the interview process to each participant that a recorder would be used for his or her appointment. After the interview process, all interviews were transcribed and coded. Each transcript was sent to the participants' offices to ensure validity of the interview and to make any changes, if applicable. This process was vital because it ensured data was processed properly in order to interpret each participant's intentions, thoughts, and statements to best of my ability.

My position in this research study was strictly professional. The participants knew me because I worked in the same organization and I interacted with them on a weekly basis, dependent upon on specific issues within the agency. They were not in my chain of command (i.e. direct supervisor, command, instructor, or principal) and had no authority or influence on my career. Additionally, they did not make any decisions that directly affected me in a subordinate way, and I did not influence them to participant due to my position within the agency. Their participation was strictly voluntary and they could choose to decline the interview process at any time.

Issues of Trustworthiness

Internal validity is a proper security concept in protecting the credibility and reliability of information. According to Indiana University (2014), internal validity is based on how well a researcher has a completed an experiment without being susceptible to confounding (para. 1). Mitigating confounding information in a study increases the higher visibility of internal validity. This qualitative research study's credibility and internal validity was based on data saturation. Fifteen participants were established as the amount appropriate for data saturation. In addition, this amount should be sufficient to conduct face-to-face interviews in order to obtain data saturation because some scholars have noted that 15 are the smallest acceptable sampling size (Latham, 2015). It was determined that this amount was appropriate and data saturation was achieved. Senior officials had separate opinions on the issue with the F-35 JSF program, but all had the same information based on the facts presented due to research.

Transferability refers to the process of readers influencing research studies. Colorado State University (2011) specified readers analyze the precise details of research studies and associate those findings with other findings that are in a setting they are most comfortable with (para. 1). If there is a modest amount of information that is comparable between the studies and/or settings, the readers can denote there is a probable chance to produce similar results. Strategies of transferability would refer much to the selected population size for this research study. Since the research question is relevant to a particular set of individuals, criterion sampling, based on inclusion sampling was considered appropriate for this study. According to criterion sampling, specific

individuals that have significant experience in the F-35 JSF program, the Congressional budget, and over strategic perspective of the program will be selected (if approved) to participate in this study. Inclusion stated that no one else could be selected as common knowledge or individual with informational awareness were not eligible for this study; it would solely have to be subject matter experts with advanced knowledge of the fighter program.

Data triangulation was the most appropriate tool to achieve dependability in this research study and was the strategy for the data collection process. Its purpose is to simply provide multiple methods to check the results of the data processed in order to have the same outcome. Data triangulation entailed researching multiple scholarly resources and collecting data to increase validity as well as reliability in a research study (University of Florida, 2013, para. 2). In data triangulation, I as the researcher used different sources such as governmental and scholarly sources, archival records, and selected participants. By using three different sources of information, the validity of the study was increased. Forms of analysis included AWC, CBO, CRS, GAO, NDU, RAND Corporation, The Royal Institute of International Affairs, SAC Testimony (i.e. government research documents) and *Air and Space Power Journal (ASPJ). It also included the Innovation Journal (IJ), Massachusetts Institute of Technology (MIT),* and *The Joint Force Quarterly (*JFQ), NDS, NMS, NSS, and QDR (i.e. archival documents) were used in conjunction with interviews for the basis of triangulation. Additionally, in-depth, face-to-face interviews with selected participants were conducted to expand further knowledge into the outcome of the research study. After interviews were

conducted and transcribed, the information was analyzed. During the data analysis stage, participants incorporated the dependability aspect of trustworthiness phases by providing and comparing specific ideas derived from the study to establish conformity with the results as well as any conflicts or discrepancies.

Confirmability was protected in this qualitative research case study; this technique determined what results could be confirmed or validated by other individuals in the research field (Trochim, 2006, para. 6). For the confirmability process, I, as the researcher checked the data throughout the dissertation. I ensured this study had the latest information and significant information that pertained to the F-35 JSF program that was relevant to this study. Furthermore, I made sure to contact my dissertation committee and informed them of new information (with positive or negative to the study) that was added to the study. I also justified the importance new information had on this study and how it would fill in the gaps with the unknown in addition to the face-to-face interviews. Finally, I completed data audits and ensured the data collection and analysis methods were not compromised.

Ethical Considerations

Hesse-Bieber and Leavey (2006) believed researchers needed to anticipate ethical issues in their studies because correct format and guidelines are needed to mitigate credibility concerns. Creswell (2009) emphasized the need for integrity and credibility as well as protecting participants involved in research to have a thorough, solid study. As a researcher, it is understood that “ethical questions are apparent today in such issues as personal disclosure, authenticity, and credibility of the research report, the role of

researchers in cross-cultural contexts, and issues of personal privacy through forms of Internet data collection" (Isreal & Hay, 2006, p. 1). As a researcher and doctoral candidate of Walden University, I acknowledged and adhered to the criteria outlined in Institutional Review Board for Ethical Standards in research. I made certain to abide by the policies of data collection, interview protocol, permission to conduct research, recording procedures, and transcription processes.

Prior to data collection, each interviewee was notified via email about the interview process. As mentioned in the Participants section, criterion and inclusion sampling were the foundation and deciding factors for interview participants. Criterion sampling is appropriate because each participant requested for the interview process has specific qualifications and experience in distinct areas that are needed for data analysis (Patton, 1990). Additionally, this type of sampling was critical for quality assurance (Schatz, 2012), which is needed to ensure data validity and reliability from the participants. Inclusion criterion is most effective because for this approach under criterion sampling is distinctiveness that is beneficial to research (Yale, 2006). For this study, participants have specific knowledge and experience within the F-35 program and the congressional budget. An email was sent to the participants to outline what was expected in the interview. Each participant was asked to sign an Informed Consent form (Appendix B) prior to the interview. This form enlightened each participant of his or her rights during the interview process. The informed consent included the following influenced from Creswell (2009, p. 89):

1. Brief summary of research study

2. Reason for selection
3. Brief summary of researcher
4. Purpose of the study
5. Procedures for interview process
6. Volunteer agreement clause
7. Risk and benefits of participation in the research study
8. Compensation, if any
9. Confidentiality clause
10. Contact information
11. Consent statement
12. Printed name/signature of the participant/date of consent
13. Printed name/signature of the researcher/date of consent

Interview protocol delineated from Creswell was the basis for the interview process. According to Creswell (2009), the Interview Protocol form (Appendix C in this proposal) should include the date, place, interviewer, interviewee, and briefly describe the research study, confidentiality, and informed consent followed by the interview questions (p. 183).

There were issues of recruitment for the data collection process because some participants declined due to busy schedules during the holidays. As mentioned previously, the researcher needed a minimum of 15 participants for face-to-face interviews in order to obtain data saturation. If the minimum were not met, data saturation would be jeopardized. After all interviews were completed, data saturation was achieved around the eighth and ninth participant's session. As each interview was

completed, themes and patterns became apparent. However, due to thorough research and review of scholars' work on data saturation and the appropriate sampling amount recommended (Bertaux, 1981; Latham, 2015), the original sample size of 15 participants were still interviewed for this study as a precaution. Additionally, there could have issues with the emails used to contact participants. The selected participants in this study are senior officials that have very busy schedules. There was a chance that they would not have time to review and sign consent forms as well as review transcripts and send an approval for the researcher to include in the dissertation. Furthermore, senior officials may not have felt comfortable signing consent forms or wish to review transcripts as their positions and prominence in the United States are highly visible, respected, and sensitive. To address these concerns, the researcher worked directly with participants to ensure they were aware of their responsibilities and was not misguided in any way in the intentions of this study.

To preserve the integrity of the data collected as well as maintain the ethical standards by Walden University's Institutional Review Board, I completed the following specific steps to ensure a quality and honest study was conducted while adhering to the policies and regulations of the university. The first step ensured participants were conscious of my role as a researcher, as well as my position as an active duty military member of the Air Force, having worked in the Pentagon for the Deputy Secretary of Defense. I did not influence their decision with my position or coerce any participant to participate in this research. Additionally, I ensured that my role as researcher was strictly

as a student at Walden University and I did not incorporate my military position during this process.

The second step ensured all electronic data (such as recorded interviews, videos, transcriptions, and scanned documents) were stored on my personal laptop and external hard drive, which are password-protected. No one was able to use my electronic devices and all equipment used for this research study has password-protected codes that only I, the researcher, have access to. Hard copies (paperwork) of information saved for the dissertation process was locked in a file cabinet at my residence (i.e. transcripts and emails). Furthermore, if any information from this research study was needed beyond the dissertation process (governmental publication or public affair distribution), I ensured to receive written consent by all participants involved, and if any participant opposed, I maintained normal procedures mentioned above. Open-source information was available to the public, so no procedures were necessary as unclassified information of the fighter program is accessible to anyone that has access to the Internet.

Next, I was only individual that had access to the information collected in this research. No one was able to access information from this dissertation without my consent. Exception to this rule would be point of contacts for the F-35 Joint Strike Fighter program office who gave permission to research this topic and who I provides updates to, security and policy review office who reviews for classified information, participants' military assistants and/or schedulers (for scheduling purposes), the supervisory dissertation committee, the Department of Defense Public Affairs office (for transcriber to assist), and university faculty members that are involved in this process. Most data

collection for this research was open-source, meaning that information is free to the public and can be distributed. Data collection from participants will still be disposed of in accordance with the National Archives and Records Agency (NARA) based on retention and disposition policies. Based on NARA regulations, I will shred and/or burn hard copies and delete electronic copies from personal laptop and external hard drive five years after this research study. Due to the fact that I will not collect sensitive and/or personal identifiable information for this research, there should not a disposition or retention timeline, but there is a plan in place if need be as mentioned previously. For replication purposes, I will maintain all open sourced information for researchers and scholars who wish to reproduce this study or expound on it in the future.

If a participant chose not to participate in the interview, all of their information was removed from the study and destroyed. It is important to express that the interview process is strictly voluntary and participants can choose to refuse participation and/or stop during the process at any time without retribution. Additionally, there were concerns that participants agreed in the beginning stages of the interview process, but withdrawal early, hindering the study. The researcher was prepared to ask additional participants that were recommended from the same offices or the individuals that are principal positions that should have similar knowledge on the F-35 JSF program. Finally, there was not any personal information of the participants' in the research unless they gave consent and none was requested (i.e. mailing address, email, telephone numbers, etc.). The only exception was if participants gave consent to release their positions and/or titles in

government, it will be included in the study. One participant did not want the position disclosed, so for uniformity, all positions of participants were shielded.

To mitigate the possibility that my position in the Pentagon could affect the fidelity of my data collection as an interviewer, I ultimately selected participants at DOD who were directly involved in the program that could effectively understand the research problem in this study. By making a decision to delimit to specific participants, it was easier to determine the establishment of each individual's understanding of the research study. Furthermore, it was important that participants were not at risk by participating in this research study. Senior officials of the United States top agencies were asked to participate in this research study and it was critical that their position as a public figure, their reputation, and safety were considered during this process. Creswell (2009) stated that participants should not be put at risk and their vulnerable populations, such as top leading officials, should be protected and respected (p. 89).

This qualitative research case study was based on the need for additional information on strategic planning concepts, modernization, and national security. The need for interviews were critical in discovering whether or not production delays within the fighter program essentially breaks down strategic planning, which is a requirement in the DSG. Participation in this study was crucial because participants interpreted their meaning of this problem and gave predictions based on their knowledge and expertise on the matter as well as the future of the program and the state of national security. Participation in this research was completely voluntary.

Due to each participant's sensitive, critical role as a senior government official, I contacted their offices and coordinated interviews through their military assistants, schedulers, or confidential assistants (for scheduling purposes). I explained to each participant's assistant the purpose of this study, the interview process, and why I requested their principal's participation. I did not influence or use my position to obtain an interview and I did not intimidate any of the assistants for participation. I did not contact any participants for data collection until I received approval from Walden University's Institutional Review Board. Permission was requested to quote participants' positions and/or quotes in the research study; since one participant did not want personal information disclosed, all participants' information was shielded for uniformity and privacy act purposes. Each participant was briefed that the interview would be recorded and transcribed for validity. All participants received an electronic copy of the transcript from the interviewer for review. Due to the position of the participants, their assistants were given permission to review, edit, and confirm (based on the participants' approval) the transcripts of the interview, with the approval and review of the participant. This step was not necessary since none of the participants did not request changes to their transcripts.

Ethical Protection of Participants

The main concern in the participants' processes their protection. In order to protect each participant, the researcher should obtain approval from Walden University's Institutional Review Board (IRB). Participants who participate in the data collection process were asked strictly on a volunteer basis. Participants were free to answer any

questions or declined any questions they deemed uncomfortable, harmful, or negatively impact the United States, Department of Defense, and the Department of the Air Force. Forms were established (see Appendixes) to ensure each participant's protection and confidentiality. Minimal risk was involved in this qualitative research case study.

Procedures

The following procedures were performed in order to request participants and obtain authorization to interview and collect/analyze data for this research study after Walden University IRB approves this proposal:

1. The DOD Public Affairs office was contacted to ensure information collected on this topic did not need to be reviewed and analyzed by their office. I received confirmation from one of the Public Affairs representatives that if the F-35 program office gave consent on permission to conduct research (see Appendix A) that there were no requirements from their office. The F-35 Program Office gave consent to conduct research on April 3, 2014.
2. The F-35 JSF program office received a copy of this proposal to review for sensitive and/or classified information as well as to approve for permission to conduct research on topic. This was prior to submission for approval from the Walden University Institution Review Board.
3. The Defense Office of Prepublication and Security Review (DOPSR) office received one hard copy and two disk copies of this proposal to mitigate inadvertent disclosure of sensitive and/or classified information of the F-35 JSF program. This office needs a copy of the proposal 30 days prior to

submission for approval from the Walden University Institution Review Board. The office approved this proposal on June 6, 2014.

4. Once the F-35 JSF program and DOPSR offices approved the proposal, I submitted an IRB application to my dissertation supervisory committee. The committee approved it and this proposal and IRB application was submitted to Walden University Institution Review Board requesting approval to collect data.
3. Walden University Institutional Review Board approved on November 7, 2014; once approval was received, the researcher made contact with the Air Force officer in charge of the production of the F-35 JSF program.
4. I used the initial contact e-mail established (Appendix E) to contact participants. The researcher had contact information from participants' respective office personnel and utilized the Department of Defense Global Access Listing (GAL) to obtain contact information. Request to use the GAL was approved by the Chief of Executives of the Secretary of Defense Communications office on October 23, 2014.
5. Public Affairs office was contacted to utilize conference rooms within the Pentagon, since this will be the location for all potential participants. I e-mailed a Letter of Cooperation (see Appendix H) to guarantee use of conference rooms within the Pentagon. The representative will be informed on specific dates and times of each interview to ensure the conference rooms will not be in use.

6. I interacted with the participants' offices to set up potential interviews, dates, and times.
7. I sent e-mails to the participants' offices a reminder of the interview, the nature of the time, date, time, and location.
8. At the beginning of the interview, I reiterated the nature of the study, instructions on the interview process, transcribing, review, and confidentiality agreement. I also addressed the participants' voluntary status to withdraw from the process at anytime, risk and benefits to participation, and sign the Informed Consent Form (Appendix C) prior to the interview.
9. Once the consent form is signed, I reiterated prior cooperation and approval for recording the interview (Appendix D), which the participant could still decline. If the participant still approved, he or she signed the Consent to Audio form prior to the interview.
10. Once participant signed all consent forms, I established a rapport to make the participant feel comfortable. This ensured both the research and participant are comfortable to move forward with the interview process.
11. Once rapport was established, the researcher started the recording. The researcher asked questions based on the participant's professional expertise (Appendix B). NOTE: Researcher became familiar with recording device prior to interview. During that time, follow up questions were asked for more clarity of a particular question. If this was case, a list of additional questions was added to the appendix section of the proposal.

12. After questions were answered, I ended the interview. At that time, the researcher stated to the participant the need for his or her assistance in the next phase of the interview process. I discussed the transcription process and informed the participant within five days a transcribed summary of the interview would be sent for review. The participant was asked to verify the accuracy of the summary. No response from the participant within 48 hours, I assumed there were no changes that needed to be made with the summary and moved on with the process. Participants actually made minor changes to the transcripts themselves for accuracy. It very intuitive this way because participants who had minor errors knew what to change and applied them to the transcript. This made the transcript more accurate.
13. Unless requested by the participant, all communication was via e-mail as well as supporting documents.
14. Audio recordings were transcribed within 48 hours of the interview and no identifying information (except “Senior Defense Official” or “Senior Military Official”) was associated with the transcripts.
15. The interview was transcribed (Appendix G) and a summary was established as noted in line 13.
16. Participants were reminded to verify the accuracy of the summary and make appropriate changes as noted in line 13. The e-mail for transcription process, please see Appendix F.

17. Due to the amount of participants requested and their busy schedules, I spent seven weeks completing interviews. During that timeframe, I ensured all transcripts and summaries were accurate before annotating findings. When this process was completed, participants were contacted via e-mail for the overall summary for their review. The participants were free to make any comments about the summaries during the verification process.
18. In addition to the interview, I researched information for the data collection. Researched documents such AWC, CBO, CRS, GAO, NDU, RAND Corporation, The Royal Institute of International Affairs, SAC Testimony (i.e. government research documents) and *ASPJ, The IJ, MIT, JFQ, NDS, NMS, NSS, and QDR* (i.e. archival documents) were used in conjunction with interviews for the basis of triangulation.
19. To ensure credibility and validity of data for this study, government research documents and archival documents were derived from scholarly databases such as Walden University Research Database, Google Scholar, Political Science Complete, Military and Government Collection, EBSCO Host, Sage Journals Database, JSTOR, RAND Corporation, and Catalog of U.S. Government Publications. Additionally, scholarly articles were chose from the Air Force Research Laboratory, Research Engineering Enterprise, National Defense Research Institute, Small Wars Journal, Congressional Research Service, National Academy of Science, and Air War College.

20. Interviews with the 15 participants were compared with the government research documents and archival documents to look for themes and patterns. The interviews and documents were also compared to determine if the data researched supported the interview statements. This was to ensure credibility of each participant's information given during the interviews.
21. Once all interviews were completed for the data collection process, I compiled all information (including the government research documents and archival records) and began the data analysis process via NVivo, the qualitative software program. NVivo was used to establish themes, patterns, and categories. Once the data analysis portion was completed, I wrote the latter chapters to annotate my results and finding for this research study.
22. Once approved by Walden IRB and published for public access, a final dissertation will be sent to all participants and big thank you for their patience, cooperation, and participants during this process. For the letter of recognition, please see Appendix I.

Data Collection

For this qualitative research case study, data were collected through in-depth, face-to-face interviews. Face-to-face interviews were the instrument for the data collection process. Another instrument that supported the interview were the interview questions, which covered the congressional, strategic perspective, and knowledge of the F-35 fighter program. Lastly, government research documents and archival records from scholarly databases were used to fill in the gaps with historic information that provided

guidance and established a baseline for issues that warranted the research questions. The instruments mentioned were sufficient for this qualitative case study because government records established the platform for the program's constant problems while the face-to-interviews and interview questions discovered phenomenon that supported as well as answered the research questions, which were the foundation of this study.

According to Kvale, "a qualitative research interview seeks to cover both a factual and a meaningful level, though it is usually more difficult to interview on a meaningful level for case studies" (1996, para. 1). Open-ended questions were asked to each participant based on their professional expertise. Each participant was allowed to answer each question freely as well as decline to answer any questions he or she saw fit. All interviews were conducted in conferences rooms within the Pentagon for neutrality purposes.

At the beginning of each interview, I spent some time briefing the participant about the interview and transcription process. When the consent form was signed, the researcher spent time establishing a rapport with the participant. Establishing a rapport made both the researcher and participant feel more at ease to have a successful interview.

There are three categories of interviews questions (Appendix B) for participants. Questions were unique to each participant's professional expertise. There are 5 questions and two subset questions for participants who have expertise in the overall perspective of the F-35 JSF program. Next, there are 6 questions and five subset questions for participants who have budget experience (i.e. congressional budget, defense budget, procurement, and acquisition). Lastly, there are 3 questions and 2 subset questions for

participants who are F-35 fighter experts. As stated previously, criterion sampling was the most important choice for participant selection because he or she needs to meet a "predetermined criterion of importance" (Patton, 1990, p. 176).

Each participant was questions from the three categories. It was understood that participants answers varied based on their expertise level and what they know about the fighter program. The data from each interview was compared to other participants to determine data saturation. For this case study, it was very important to determine if each participant (in their category) had common themes, beliefs, and perspectives on the same topic. This filled in the gaps to determine if the actual problem posed a threat. For instance, Saumure & Given (2008) expressed researchers' adamancy in collecting data to discover a phenomenon. They also stated the significance to achieve data saturation or theory may be inconsistent.

After answering questions, participants were asked about their overall opinion on the future of the fighter program in terms of indefinite immobilization. This was a strategy used for the participants to leave parting words about the topic as well as the interview. Again, it was understood that participants' answers would vary, but hopefully fill the gap that is currently under researched. At this point, the research questions posed in the study were the foundation of each interview process. Furthermore, the researcher asked each participant if there were anything additional they would like to add. If not, this will preclude the interview process.

An important factor during the interview process was the audio recording. Each interview was recorded with a digital recorder with the consent of the participants and the

Department of Defense Public Affairs office. The information from the recorder was transferred to the researcher's personal laptop for the transcription process. The interview will be transcribed accurately for the data analysis phase. An initial summary was drafted for each interview and e-mailed to the participant for review and approval. Each transcript was stored in a password-protected folder on the researcher's personal laptop. The participant's name was not disclosed during the entire process; he are she was referenced as "Senior Defense Office" or "Senior Military Officials" followed by a number (in the order the interviews were conducted). Due to the importance of the information collected and what each participant brought to this research, it was more beneficial to label them by this generic title rather than an alphabetical or numerical phrase. Each interview, transcript, and summary was in a separate file under the password-protected folder.

Interviews

Qualitative interviewing is an "adventure in learning about teaching in different countries, their cultural views, their problems and solutions, and how their practices are similar and different than our own" (Rubin & Rubin, 1995, para. 1). Interviews are all based on what an individual wants to know or would like to obtain in the end. In interviews, it is very beneficial that researchers and interviewers gain a significant amount of information and compare it to others. Interviews that are used in qualitative settings are simply formal conversations between an interviewer and interviewee to further knowledge on a specific topic. With such interviews, the interviewer can use an unstructured platform with an exclusive set of questions that are relatable to the research

study. Interviews in this research study were significant because the data from interviewees intermingled with the archival records and government research, which furthered the validity of this study. This is pertinent because interviews usually generate information on the subject at hand from human subjects whereas documentation and records result from books, official websites, journals, and other research papers.

Qualitative research interviews "seeks to cover both a factual and a meaningful level, though it is usually more difficult to interview on a meaningful level (Kvale, 1996, para. 1). Specific interview types were identified for this research: informal, general interview guide, standardized, closed, and telephone. For informal interviews, there are no formal boundaries when it comes to this particular interview. Questions are spur of the moment and usually asked during the flow of the interview. General interviews have the same questions to ensure the similar information is produced from each participant. This type of interview is more structured than informal interviews, but has a little freedom on how the interviewer receives information from the participant.

Standardized interviews are centrally based on open-ended question, which gives responses beyond a YES or NO answer. With standardized interviews, researchers have the ability to have a clearer picture of analyzing information and compare it to other interviews. Closed, fixed-response interviews are when interviewers ask each participant the same questions and there are multiple choices that can be chosen. These types of interviews are similar to surveys. Finally, telephone interviews are more conducive to researchers who have busy schedules and cannot meet participants in person. With

telephone interviews, an interviewer can gather a significant amount of data in a short period of time.

Standardized interviews were deemed very beneficial to this research study. Each participant was asked the same set of questions based on his or her expertise. Once the interviews were completed, they were transcribed, analyzed, and compared to other for commonalities and distinctions. This type of interviewing was important, as the data collected proved to be the foundation of this research study. In addition to the interviewer's role, each interviewee's participation was critical as there information was damming to this study and also provided additional participants who were qualified to be interviewed for this study. Their participation was very insightful and beneficial because those who could participate recommended their counterparts who were just as qualified. Such interviewees can be the contrary or assenting opinion needed in order to make a research study interesting and/or daring.

Interviewing may be complicated due to the amount of information generated from its subjects, but a number of steps must be followed in order to ensure clarity, validity, and accuracy. Such steps include selecting sample sizes and strategies for interviews, choosing participants, specific devices used to record, and the type of interview. Additionally, researchers must establish specific protocol, which is very important to the interview process. Such protocol must include a form with instructions on how the interviewer will conduct the interview and such provisions the participant should be aware of prior to the actual interview as well as providing information for the time, date, and location of the interview.

For this qualitative case study, interviews are beneficial because of the incessant emphasis on the research issue and how it relates to the actual case study. Another advantage for interviews is they bring forth precise viewpoints and this gives the interviewer the opportunity to make assumption, explanations, and conclusions. The method provides a considerable thought for the participants to be objective to the questions at hand and use the actual interview as a guideline to reassess the original research and discover the premise of conversation.

With such advantages of utilizing interviews, researchers must realize this method can provide many challenges and affect the research process. Such challenges can be sustaining participant population size by ensuring all participants keep their scheduled interviews and giving the researcher the amount of time requested. Additionally, there are some issues with credibility and trust to ensure participants are knowledgeable and experienced enough to give the utmost candor in their responses and know the topic to the best of their ability. For example, bias, inability to answer questions, and lack of memory could be very important issues that would affect a research study and its validity. Ethical considerations could pose another challenger as participants, who are invested in the F-35 program, could potentially obscure valid information with their personal opinions and beliefs and this could discredit their responses.

Additional challenges can be the responsibility of the researcher. Having the researcher as the interview can present bias it is his or her work. Furthermore, an interviewer is pressured to provide good interview questions, ensure clarity with interview protocol, interact in a positive manner with the participants, and most

importantly, flow through sensitive issues and/or questions as well as transcribe effectively (Creswell, 2007).

Face-to-face interviews were conducted for this qualitative research case study. The participants' responses were clear and concise so there was not any need for follow-up emails to request an additional interview. This particular method was preferred because it gave participants an opportunity to give honest responses about the issue and with each individual's expertise and knowledge of the F-35 fighter program, validity increasing, ensuring credibility with the topic. All participants who participated in the interview received interview questions prior to the actual interview. This was to help them prepare and be ready for the interview. Once interviews were completed, data collected from the digital recorder was transcribed, and sent to each participant for review. When each participant made changes or approved of the current transcription, he or she was debriefed via email for further information on this research study. The digital files were saved in a password-protected folder on the researcher's laptop computer and then stored on a backup hard drive. The primary instrument used in the interview process was the interview protocol, which is shown in Appendix C.

Government Research Documents and Archival Records

Researched documents such AWC, CBO, CRS, GAO, NDU, RAND Corporation, The Royal Institute of International Affairs, SAC Testimony (i.e. government research documents) and *ASPJ, The IJ, MIT, JFQ, NDS, NMS, NSS, and QDR* (i.e. archival documents) were used in conjunction with interviews for the basis of triangulation.

To ensure credibility and validity of data for this study, additional government research documents and archival documents were derived from scholarly databases such as Walden University Research Database, Google Scholar, Political Science Complete, Military and Government Collection, EBSCO Host, Sage Journals Database, JSTOR, RAND Corporation, and Catalog of U.S. Government Publications. Additionally, scholarly articles were chose from the Air Force Research Laboratory, Research Engineering Enterprise, National Defense Research Institute, Small Wars Journal, Congressional Research Service, National Academy of Science, and Air War College.

Archival records and government research documents were also the foundation of this qualitative research study. These documents were fundamental in the literature review and complimented the data collection and analysis portion of this study. It is important to that documentation supplements data collected by the researcher through interviews or any type of observation (McNabb, 2008). Documentation in this research was important because it served as an additional barrier in verifying and solidifying information given by participants during the interview process. For example, government approved and scholarly and/or peer-reviewed information could validate information given by the participant and transcribed by the transcriptionist to ensure credibility and trustworthiness. Furthermore, implications can be made from governmental research and archival documentation, which could lead to further research in the near future.

Data analyzed in archival documentation and governmental research records included journals, historical documents, congressional reports, research data, organizational reports, and official government data. These documents served as the

backbone of this study and were deemed reliable sources due to its repetitive review. All documents provided are updated with new information and/or changes within to readers have the utmost latest information. Such documents were deemed trustworthiness because they were not established specifically for research, instead, to address the concerns of the F-35 JSF program. Moreover, these documents proved exactness and clarity with names, statistical value, numbers, percentages, issues, delays, references, testimonies, and other characteristics relates to the issues within the F-35 program. As far as difficulties and/or weaknesses within using documentation was none. All research documents found were very similar with pertinent data identifying concerns. In the initial stages of the dissertation, it was difficult to obtain such research, but as the issues became more pertinent and congress experienced a sequestration and government shutdown, more research was completed and published within the past few years. Such ethical considerations with documentation used were low amount of bias due to official testimony from senior officials and opinions about the program's astronomical price due to production delays. Other ethical considerations were one partial interview that could not be rescheduled for the remaining questions missed due to the participants' schedule, general bias with the overall program, potential researcher and participant bias, and denial of access to specific information because it was deemed classified.

All data used in this research study is public accessible meaning any individual who has access to a personal computer and Internet can find this information free of denial access. Additionally, all information is unclassified and has been verified and confirmed by the DoD Prepublication and Security review office. Some participants

involved in the interview process recommended additional documents, which deemed were reviewing and essential to this study.

Data Analysis and Interpretation

This portion of the qualitative case study provides methods that were used for the analyzing and collection of data via interviews, governmental research records, and archival data. There were two significant mechanisms to data analysis: data management and data analysis. Once all data was gathered, it was managed, organized, and analyzed. In data management, researchers should have their processes in order. For example, a data collection process should be established, create plans for the study, participant selection, sample size, and establish the background of the qualitative research case study. Additionally, methods for data storage should be in place for archival documents, governmental research records, and interviews. Interviews were transcribed and organized into file folders on the researcher's laptop (Creswell, 2007). Government research documents and archival records were saved to the researcher's laptop and placed in specialized folders. Finally, in data management, the researcher should have the ability to access data collected and compare with other data for interpretation. To keep all information organized and ready for analysis, the researcher used NVivo qualitative research software program. NVivo was used for coding and generating reports to interpret analysis.

The last element in analyzing is data analysis, which has seven components. According to Sage Publications (2008), data analysis consists of: "(1) organizing the data, (2) immersion in the data, (3) generating categories and themes, (4) coding the data, (5)

offering interpretations through analytic memos, (6) searching for alternative understandings, and (7) writing the report or other format for presenting the study" (p. 209). Organizing the data is the most important because if information is unstructured and confusing, it can make the interpretation of results difficult. Data was organized based on the order of the interviews and this was the same step used for transcribing all interviews. Once information was organized and transcribed, it was uploaded into the qualitative software program where themes and patterns were generated (step 3). At this point, data was highlighted and saved and notes were taken for commonalities to induce brainstorming. This allowed predetermined codes to be created in the qualitative software.

Coding is one of the most important elements in data analysis. After forming patterns and themes, information from each interview that is relevant to a specific classification, or node as its called in NVivo, was copied and pasted in that category. This called for repetitive information that was reviewed. All similar and/or repeated information was sorted, highlighted, copied, and pasted to the respective classifications. When all interviews were completed and coded, the researcher interpreted the findings based on similarities in each statement. The interpretations of the findings served as a complete foundation of information that complimented the documentation used in the literature review.

The next step was searching for alternative understandings. All information from interviews was matter of fact and gave information on what would happen if the F-35 program continued to be in jeopardy. Alternative solutions deemed more problems and

expenses, which did not help the never-ending predicament. In addition to coding and finding alternatives, data was analyzed to establish parent classifications, dimensions, collections, themes, patterns, and clusters. This method significantly reduced conceptualization. Finally, the researcher interpreted the findings and generated a solid report from NVivo for this research study to ensure the analysis and interpretation of the information reflected in a written summary.

Using these 7 steps showed a proportional analysis of the data collected from interviews, archival documents, and governmental research records. The objective of the data analysis process was to identify suitable themes and patterns, in conjunction with the data to isolate distinctive evidence that may have developed from an established pattern (Creswell, 2007). When similar patterns were identified, this allowed for a more succinct categorization of information, which industrialized new nodes that correlated to the other data that was not classified.

One of the most challenging pieces to data analysis is interpreting information. When information is unraveled and interpreted, additional nodes are established in the early stages. At the same time, other classifications are re-examined to determine if new categories need to be produced based on previous inquiry (Creswell, 2007; Yin; 2009). Such interpretive methods were conducted based on straightforward, perceptive, and honest interpretation of the data collected with the intent to provide an understanding of the results. To finalize the data analysis in research, repetitive analysis was the standalone technique to identify and correlate relationships among nodes, themes, and patterns. With

this process, this qualitative research case study was able to foster additional analysis and explain such results through relevant tables and figures.

Multiple methods of data analysis were researched for this research by specific research authors. Yin (2009) talk about the 12-step analytic process and how overcome specific analysis approaches; as mentioned previously, Sage Publications (2008) covered the seven phases of managing data, Creswell (2007) discussed the Data Analysis Spiral, Thorne's (2000) emphasized the Qualitative Data Analysis Strategy, and Seidel (1998) utilized the Data Analysis Process. For this study, the seven phases of managing data were more conducive to the NVivo process and the procedures were self-explanatory for easier analysis and interpretation abilities (seven steps are noted in the data analysis portion previously mentioned).

Validation of Evidence

According to Creswell and Miller (2000, para. 1), there are eight specific validation strategies utilized by qualitative researchers:

- Prolonged engagement and persistent observation in the field
- Triangulation
- Peer review or debriefing
- Negative case analysis
- Clarifying
- Member checking
- Rich, thick description
- External audits

The most important element in ensuring validation of data is given in this research study. Throughout this process, my primary mission was to establish a rapport with each participant and have him or her comfortable with not only the process, but also the interview where some questions could have been uncomfortable or too complicated to answer. Having a great connection with each participant made them more forthright with the quality of responses, which gave me a very detailed and in-depth interview for the data analysis portion. Prior to and after the interview, all communication was via email, which provided a trail of conversation either between the participant or their schedulers/assistants, who set up the appointments.

Triangulation was another key to the success completion of the interview process as well as establishing validity in the evidence given. It is very intuitive for researchers to utilize different resources to offer corroborating evidence (Ely et al., 1991; Erlandson et al., 1993; Glesne & Peshkin, 1992; Lincoln & Guba, 1985; Merriam, 1988; Miles & Huberman, 1994; Patton, 1980, 1990). This is very beneficial to research studies because by using multiple sources to prove a theory or justify why research could be conducted, there is a significant amount of evidence that will make research credible. In this study, data triangulation served the purpose of having multiple sources such as interviews, government resource documents, and archival records to check for the same answers and results. Peer review was especially needed in this study because it offered an "external check of the research process" (Ely et al., 1991; Erlandson et al., 1993; Glesne & Peshkin, 1992; Lincoln & Guba, 1985; Merriam, 1988). Peer-reviewed work maintains a checks and balance system which keeps the researcher honest and credible. Individuals or

groups who conduct peer-reviews are usually scholars and can ask difficult questions, ensure interpretative methods, and provide honest feedback that would be conducive to the researcher.

I collected data via government research records, archival data, and face-to-face interviews. Different methods of various sources provided a good range of information to determine if F-35 JSF program production delays affect national defense guidance and the concept of modernization. Peer-review has been consistent throughout this process with the oral defenses (one and two) mandated for the approval of this study. The final peer review transpired with my supervisory dissertation committee and by Walden University IRB as mandated in the university's policies and standards.

Negative case analysis was considered and also accounted for in this research study. There was not a hypothesis considered in this study, but problems statements and research questions were revised as inquiries advanced throughout this research study. Understanding the potential bias as a researcher was acknowledged and identified in this research study. As previously mentioned, potential bias could be due to my position as an Active Duty military member with a general knowledge of the F-35 program, some participants are Active Duty members, myself and all participants were DoD employees or affiliated with DoD, and some of the participants knew me through my position at the Pentagon. To maintain my neutrality in this research, I used my university email address for direct communication between participants and their schedulers/assistants. I acknowledged my position as a student in this research study prior to interviews and all

contact information given during this process was based on my personal information as a student.

Member checking was an important part of validating all data collected. After each interview was transcribed, it was sent to each participant to review for revisions. No response assumed the transcript was good and could be process for analysis. A few participants had changes and made the corrections themselves. I found this to be more beneficial because they knew what was said and could change the information to for validity. Additionally, there were some words found to be unintelligible to the transcriptionist and participants knew the intended statement and were able to add those words for clarity. According to Stake (1995) participants should be very much be involved in the process of role directing in the case study. Additionally, they should be asked to examine rough drafts of the researcher's work to provide alternative language, "critical observations or interpretations" (p. 115).

Ensuring an in-depth description of the data collected can ensure transferability. This concept provides researchers the ability to facilitate readers to transfer information to other events; this can determine if findings can be transferred to other situations based on commonalities (Erlandson et al., 1993). I provided a thorough description of this research study as well as a comprehensive description of the participants' positions to ensure transferability. With such a methodical description of the research, respective readers will be able to determine if such information is important enough to transfer findings from this research study and apply it to others. Finally, external audits "allow an external consultant, the auditor, to examine both the process and the product of the

account, assessing their accuracy" (Erlandson et al., 1993; Lincoln & Guba, 1985; Merrian, 1988; Miles & Huberman, 1994). As statement from multiple authors, auditors should not have any type of connection to the study. With such strict guidelines for validity and accuracy in place with Walden University, there were no additional measures with this step.

Suitability & Aptness of This Research

The study was completed in its entirety by the researcher, who was responsible for all research materials, processes, data collections, and analysis. The researcher hired transcriptionists from company, Transcription Wing, to expedite the data collection process by transcribing all interviews. This qualitative research case study is based on a federal government acquisition, the F-35 JSF program. The primary contractor, Lockheed Martin's headquarters is located in Fort Worth, Texas. The DoD runs the acquisition and government aspect of the program and offices are located in the Pentagon, Washington, D.C. The Joint Program Office is located in Arlington, Virginia.

The most challenging part of this process was maintaining interview appointments established. After appointments were secured, some participants had to decline, reschedule, or cancel due to the holiday season and very busy schedules. Follow-up emails were sent for a couple of participants, which resulted in rescheduling or complete cancellation forcing new participants to be contacted. Participants who cancelled did recommend respective candidates, which was very beneficial because they were just as qualified to answer questions on the F-35 program. After eight weeks of scheduling, all interviews were successfully completed with fifteen participants.

No considerable costs were involved in this research study and there were no transportation issues. A digital recorder was purchased that had USB capability to upload interviews to the laptop. A combination lock briefcase was purchased so all interviews were protected in case of theft or destruction. With the exception of two participants, all have offices within the Pentagon and were willing to meet there.

Summary

The purpose of this study was to determine if F-35 JSF production delays directly affect national defense guidelines and how it correlates to modernization and globalization theories. As a result, this chapter solidified that a qualitative research case study approach was warranted over quantitative theory or mixed methods approaches. This justification proved that qualitative traits such as its specific orientation, generated theories, subjectivity, and lack of statistical information were pertinent in this study and assisted tremendously with the interviews as one of the primary sources of data collection. Furthermore, this approach was based on interpretative examinations and did not relish in explanatory qualitative studies. Instead, this study involved critical qualitative components given the theoretical framework designed for building concepts and theories on the lack of production, lack of modernization, and measure of vulnerability towards national security. Moreover, this chapter provided precise justification for using a single case study over multiple or more complex case study types as well as other approaches that are highly used in qualitative studies.

The primary purpose of this research study was to determine whether fighter production delays directly affect national security. Interviews were conducted based on

an inclusion sampling strategy, which provided selective participation for experienced individuals who were knowledgeable about the issue at hand. The researcher's purpose was to be the data collection instrument in obtaining information that would not only be relevant to the F-35 program, but provide answers to questions that were left in ambiguity about the fighter's total role in national security strategy. Additionally, the researcher's role consisted of researching governmental research documents and archival records that had specific findings as well. Data was analyzed following proper data management protocols and using an approved qualitative software program to report results. Such protocol involved reviewing transcriptions, data reflecting, formulating themes and patterns, coding, comparing, categorizing, and producing results to form a complete representation of what was collected.

With keeping the case study traditional with interviews and participants, researchers used "several well documented case studies, the guide then looks at application and methods including data collection and analysis" (Colorado State, 2014, para. 2). For this particular qualitative case study, semi-structured interviews permitted the researcher to give participants freedom to answer questions in a comfortable environment to ensure validity and accuracy of the answers from the interview. Furthermore, transcriptionists were hired and I completed the data analysis portion; both finished products ensured the validity and accuracy in the researcher's work. In addition, the quality of work was verified through validation strategies annotated in this research study. Procedures such as utilizing triangulation methods by using multiple scholarly sources, ensuring proper introductory and debriefing protocol were enacted, enforcing

informed consent documentation for protection and confidentiality of participants, and having the Supervisory Dissertation Committee as a peer-reviewed team to ensure proper protocol is being followed were completed.

Chapter 4: Data Analysis and Research Findings

Introduction

The basis for this chapter was the collection of data from individual interviews, government research documents, and archival records. In this chapter, I present findings to formulate a conclusion based upon the research questions provided. This chapter contains specific details on how information was generated, collected, and documented by using a qualitative software program to show emerging patterns and themes. The goal for this study was to gain a newfound understanding of the F-35 Joint Strike Fighter program and how production delays directly affect national defense guidance established by POTUS, SECDEF, and CJCS, who are responsible for the successful execution of U.S. national defense strategies. Additionally, this qualitative research study investigated whether or not modernization of U.S. advanced technology, such as the F-35 fighter, has a direct impact on air superiority as well the United States maintaining a "super power" position in global defense.

Through individual interviews and research involving government-archived records, I sought to answer the research questions: How do constant production delays within the F-35 JSF program directly affect national security? What is the future of legacy aircraft if delays persist? The subquestions were correlated to the relevance of national defense guidance to the F-35 fighter program and the consequences (if any) of lack of production and its effect on national security. Additionally, these subquestions were posed to determine whether production delays directly affect national security.

The beginning of Chapter 4 covers the context for this study and specific coding techniques used with assistance from a qualitative software program. The second part of this chapter presents the findings for the two research questions and three subquestions that were the foundation of this dissertation. Lastly, Chapter 4 addresses repetitive themes and patterns to prove that the primary issues presented in this study critically impact the future of the F-35 JSF program.

Background of the Study

On November 7, 2014, I received approval from the Walden University Institutional Review Board to begin the data collection process for my dissertation proposal. The approval number was 11-07-14-363643. Initial requests to participate in an interview were sent via email to 15 prospective participants (positions were identified in the IRB application), who were selected based on a predetermined sampling process from the Department of Defense. Two participants were from the Office of the Secretary of Defense; one was from F-35 Program Executive Office; four were from the Cost Assessment and Program Evaluation Office; one was from Acquisition, Technology, and Logistics; one was from the Secretary of the Air Force office; one was from the F-35 Integration office; one was from the Air Warfare Command; two were from the Department of Defense Comptroller; one was from the Office of the Chief of Navy Operations; and one was from the Deputy Chief Information Office.

Four participants declined due to traveling and busy schedules around the holiday season. The four who declined recommended other individuals who would be valuable participants, and they were invited to participate. Having alternate individuals

recommended by senior officials who were unable to participate was specified in the IRB application as a plan for the data collection process (Step 24, p. 17 of the IRB application). All participants interviewed met the predetermined inclusion criteria of knowledge of the F-35 Joint Strike Fighter program, experience with the Congressional budget, and an overall strategic perspective on the entire program.

In presenting such data, it was decided that if participants agreed, their positions would be disclosed in this study (Step 43L, p. 30). If one person declined to have his or her senior leadership position identified in this study, all participants' positions would be shielded for uniformity and confidentiality purposes. During the interview process, two individuals wished to not have their positions disclosed due to possible controversy with their statements, and as a result, participants were identified as "Senior Defense Official" with a numerical identification following and "Senior Military Official" with a numerical identification following. A total of 15 individuals participated, which resulted in "Senior Defense Officials #1-6" and "Senior Military Officials #1-9."

The most difficult aspect of obtaining participation for the interviews was the scheduling process. Senior officials are extremely busy, and the time period for the data collection was very close to the holiday season. Most officials planned to only be in their offices for a few days between November 15, 2014 and January 5, 2015, due to spending the holidays with Armed Forces service members and their families. The next challenge was maintaining appointments after they were solidified. There were some changes of dates and times because important meetings trumped the interviews. Another challenge was time constraints with the meetings. In the initial contact email, it was stated that

interviews would be between 45 minutes to an hour in length. However, 45 minutes to an hour was not always necessary because some participants answered questions quite efficiently, resulting in their interviews not reaching the time threshold, whereas others gave a substantial amount of information, which resulted in longer interviews. One participant did not answer all questions because a last-minute meeting was scheduled that affected the interview time period. Instead, the senior official referred one of his senior leaders to complete the interview and ensured that all questions were answered. The positive aspect of this was that so much information was given during the interview that it did not seem to affect the data collection process. Additionally, the interviewees provided quality, in-depth answers. All issues aside, 15 interviews were successfully completed. Four of the initial participants declined due to busy schedules but referred top senior officials who would be valuable participants in the study.

Data collection and analysis occurred from November 14, 2014 to January 12, 2014. Face-to-face interviews were conducted in unclassified conference rooms within the Pentagon in Washington, DC. The first interview was only 15 minutes in length, but the rest of the interviews lasted between 30 minutes and 1 hour. Each interview was recorded via Sony ICD-PX333 Digital Flash Voice Recorder, and transcriptionists were hired (procedure was approved by Walden IRB) from Transcription Wing from Civicom Incorporated. The transcriptionists transcribed each digitally recorded interview and returned transcripts to me within 48 hours. The transcripts were reviewed and immediately sent them to participants for verification of accuracy.

Three procedures were established for the interview process. To fulfill the requirement of answering the research questions identified, participants with expertise were needed to discuss the actual fighter jet, the initial budget, and the overall outlook of the program. Specific protocols were set in place to ensure that all experienced individuals answered questions relevant to their respective fields. There were three sets of questions, titled "Overall Strategic Perspective, "Budget," and "F-35 Specific." In addition to conducting the interviews, I investigated archival government records and websites for the literature phase as a foundation for this study.

A multitude of resources assisted with the data management and analysis portion of this study. Sources (and historical sources) for data analysis such as Aksamit (2009); Campion, Campion, and Hudson (1994); Creswell (2009); Dick (2002); Flick (2014); Foddy (1993); General Accountability Office (1991); Greaney (2010); Groat & Wang (n.d.); Hollowitz (1993); Kvale (1996); McNamara (1999); Pawlas (1995); Shrivastava (n.d.); Trochim (2002); Valenzuela (n.d.); Waite (2012); Watts (1993); and Wilkinson (2010) were significant in completing the analysis portion of this study. Research documents such as those of AWC, CBO, CRS, GAO, NDU, RAND Corporation, and the Royal Institute of International Affairs; SAC Testimony (i.e., government research documents); and *ASPJ, The IJ, MIT, JFQ, NDS, NMS, NSS,* and *QDR* (i.e., archival documents) were used in conjunction with interviews for the basis of triangulation.

To ensure credibility and validity of data for this study, I consulted government research documents and archival documents. Such data were derived from scholarly databases such as the Walden University Research Database, Google Scholar, Political

Science Complete, Military and Government Collection, EBSCO Host, Sage Journals Database, JSTOR, RAND Corporation, and Catalog of U.S. Government Publications. Additionally, scholarly articles were chosen from the Air Force Research Laboratory, Research Engineering Enterprise, National Defense Research Institute, Small Wars Journal, Congressional Research Service, National Academy of Science, and Air War College.

In addition to this section, in-depth research, understanding, interpretation, and note taking were involved to formulate the following: coding, specific themes, finding patterns, and developing categories. Other significant contributors were finding comparisons as well as disparities that would be crucial to this study. Data collected from the interviews were digitally recorded via Sony ICD-PX333 Digital Flash Voice Recorder and transferred to the researcher's personal laptop using the OS X Yosemite Version 10.10 operating system from Apple MacBook Pro. The audio recordings were saved in a password-protected folder titled, "Audio Interviews" and within the "Audio Interviews" there is a folder titled, "Transcripts" for safekeeping. To ensure the folder is password-protected, I did the following: clicked on "Disk Utility," clicked on "File," went to "New," then "Disk Image from Folder," clicked on "Audio Interviews," went to "Encryption" drop down box and clicked on "128-bit AES encryption (recommended), and then "Save." The following instruction appears: "Enter a new password to secure Audio Interviews.dmg. If you forget this password you will not be able to access the files stored on this image. Forgotten passwords cannot be retrieved." Apples' music program, iTunes, was the main software program for playback of all audio recordings to ensure

clarity and accuracy prior to sending to the transcriptionists. For backup purposes, the password-protected folders were saved on the researcher's external hard drive in case of an equipment or mechanical error. Electronic government research documents were saved in a regular folder (since government records are public, unclassified information) called "Scholarly References." These procedures ensured accountability and protection of all sensitive and unclassified documents.

Before data were collected, the researched established three categories: overall strategic perspective, budget, and F-35 specific information. These categories would be critical in determining if production delays affect national security. Initially, 10 codes were produced in order to find patterns and themes across the three categories. Such codes were "scheduling mishaps, social change, air dominance and superiority, information gap, modernization, national defense guidance, Navy, Air Force, Marine Corps, and software issues." The predetermined categories and patterns were established to correlate to the research questions presented in this study. In Appendix P, the coding structure is shown. By instituting codes, themes, and patterns, the researcher took notes and reviewed the hardcopy transcripts in order to find additional patterns and themes. The process was instrumental in solidifying and/or refining predetermined codes and patterns to find matching themes, removing unneeded or wanted codes, and including other codes/themes that were assembled. In the next portion of analysis instituted 28 additional categories such as "concurrency, fusion, low observable, stealth, acquisition, future scenarios, history of aircraft, multirole, contracts, engines, industry, recapitalization, total force package, variant, stealth capability, timetable, adversarial threats, capabilities, F-35

program, initial operability capabilities, political matters, national security issues, production issues, technology, budget issues, international partners and allies, and legacy aircraft." A final total of 38 codes were identified and used for coding and theming based on the transcribed interviews and government research documents. Coding from the qualitative software program is in the next portion of this study.

After coding was completed, each result was interpreted for this case study using data from the interviews, government research documents, and most importantly, the research questions and sub questions that this study attempted to answer. Next, relationships and dissimilarities were completed with common data along with instinctive analysis of the findings presented; additionally, such relationships served as the intention of surpassing the facts provided to the clear logic of the data presented. Lastly, the findings for each research question sought to link with specific categories and codes.

Setting

Fifteen participants were involved in this research study and initially was the selected sampling size. This sampling size has been deemed as the smallest sampling size acceptable in qualitative research (Latham, 2015). Participants were slated to answer questions concerning the F-35 program and data saturation was reached in the early stages of the data collection process but due to the predetermined amount of participants, interviews continued to analyze and interpret the results. Participants' names and positions within DoD were not disclosed in this research study. In order to maintain uniformity and consistency within these research participants were given the title, "Senior Defense Official" following numerical identification for civilian employees and "Senior

Military Official" following numerical identification for military employees. DoD Public Affairs office gave consent to use conference rooms throughout the Pentagon for the interviews. This arrangement made it easier and kept parties [the interviewer and interviewees] comfortable in a neutral environment. I, as the interviewer, briefly spoke on the background of the dissertation and discussed instructions for the informed consent, permission to audio record, transcriptions, and debriefing processes. Once the interviewees understood and consented to process, I turned on the audio digital recorder and the interview began. As previously mentioned, one of the challenges for this study would be the participant selection process. Some selected participants could not participate due to unforeseen circumstances such as busy schedules, travel, holidays, and so forth. Thankfully, each participant provided another individual with the same credentials that was able to answer the interview questions and it worked in the favor of this research study. In Table 3, the table depicts specific characteristics of the population chosen for this qualitative research case study.

Table 2

Study Population Characteristics

Job title	Military or civilian	Department or branch	Congressional budget & F-35 JSF	Strategic perspective of F-35 JSF experience	F-35 JSF knowledge experience
SDO	Civilian	DOD	Yes	No	No
SMO	Military	USAF	Yes	Yes	Yes
SMO	Military	USAF	Yes	Yes	Yes
SDO	Civilian	DOD	Yes	Yes	N/A
SDO	Civilian	DOD	Yes	Yes	Yes
SMO	Military	USA	Yes	Yes	Yes
SMO	Military	USMC	Yes	Yes	Yes
SDO	Civilian	DOD	Yes	Yes	Yes
SMO	Military	USAF	Yes	Yes	Yes
SMO	Military	USAF	Yes	Yes	Yes
SDO	Civilian	DOD	Yes	Yes	Yes
SMO	Military	USN	Yes	Yes	Yes
SMO	Military	USN	Yes	Yes	Yes
SDO	Civilian	F-35 IO	No	No	Yes
SDO	Civilian	F-35IO	No	Yes	Yes

Note. Researcher-developed table (instrument). SDO denotes Senior Defense Official and SMO denotes Senior Military Official. DOD stands for Department of Defense, USAF stands for U.S. Air Force, USA stands for U.S. Army, USMC stands for U.S. Marine Corps, USN stands for U.S. Navy, and F-35 IO stands for F-35 Integration Office.

Coding

NVivo software, a product of QSR International, was a qualitative program used for coding. The software was installed on Mac Book Pro's OSX Yosemite Version 10.10 operating system. This particular operating system was very intuitive for NVivo program. Transcribed files were easily uploaded to the system and made readily available for coding and classifying. The software program successfully established 38 primary codes or "nodes," as it is called in the system, and three critical categories were the foundation of this dissertation.

In order to feel comfortable and gain more knowledge from the NVivo program, I watched a number of tutorials provided by QSR International via YouTube. Also, the QSR International website provided additional tutorials as well as complimentary emails sent to my student email account. By watching the tutorials and reading complimentary information provided by the company, I was able to create codes as well as copy and paste information from the transcriptions to each classification or "node" in order to generate themes and patterns. With this program, I was afforded the opportunity to produce valuable results, which made the data collected very meaningful to this study. Coding was completed without difficulty by establishing classifications under the node section. For coding, I uploaded each transcription and saved it under a folder titled "Interviews," and then created a new node. Under each node, data from the transcription were analyzed, highlighted from single sentence to paragraph, and copied and pasted to the relevant classification. After all transcriptions were coded and classified, reports were produced for each category. NVivo was able to produce single codes as well as link codes from other data entered into the program and export files into reports. The program was instrumental in providing easy instructions on how to maneuver the coding process. Codes and classifications could be created, edited, renamed, moved, and deleted.

Three categories of Overall Strategic Perspective, Budget, and F-35 specific questions were established to manage the multitude of data that was collected for this dissertation. Additionally, 37 codes were created to show relevance, themes, patterns, and links from data generated from each interview. The codes were named scheduling mishaps, social change, air dominance and superiority, information gap, modernization,

national defense guidance, Navy, Air Force, Marine Corps, software issues, concurrency, fusion, low observable, stealth, acquisition, future scenarios, history of aircraft, multirole, contracts, engines, industry, recapitalization, total force package, variant, stealth capability, timetable, adversarial threats, capabilities, F-35 program, initial operability capabilities, political matters, national security issues, production issues, technology, budget issues, international partners and allies, and legacy aircraft. Initial coding themes and relationships are located in Appendix R. This appendix shows the relationship between the three themes and patterns that established the coding process. Major categories that were repetitive in nature are bolded. The codes emphatically aligned with the research and subset questions 1-4. In addition to Appendix R, Figure 4 illustrates the connection between the research and subset questions, the categories, and codes. It also shows how themes were developed from coding during the data analysis phase.

Protocol for Findings

Data collection was completed through face-to-face interviews, government research documents, and archival records. The following sections on the findings will be an incorporation of information from participants and supported by documentation researched throughout this study. For clarity and fluidity, participants were labeled as "Senior Defense Official #1," "Senior Military Official #2," and so forth throughout the section. Research government documents and archival records were cited in conjunction with participants' statements. Portions of this chapter will cover the findings as well as the summarizations of primary research questions 1 and 2 and sub questions 1, 2, and 3.

Findings of the Primary Research Question

The research questions sought to answer how production delays affect national defense guidance and what would be the consequences if continued immobilization affects the F-35 fighter's position in national security. Research Question 1 asked: How do constant production delays within the F-35 JSF program directly affect national security? Furthermore, the research questions were to determine if modernization of advanced technology is needed in order for the United States to maintain air superiority as well as remain the global force in national defense. The purpose of this research question was to investigate how continued production delays might affect national security interests if it directly violated guidance established that requires a modernized force. Additionally, this research question sought to fill an informational gap through interviews on three major issues that seem to immobilize the nation's largest acquisition program: budget issues, technological errors, and scheduling mishaps. Information collected for this study discovered that national security is highly affected and can cause extreme vulnerability to national security for years to come. Interviews conducted for this study as well as government research and archival documents exposed critical information that the United States faces extreme vulnerability due to the evolution of adversarial threats.

With sophisticated and wealthy terrorists today like the Islamic State of Iraq and Syria or ISIS, the United States cannot afford to just be technically current; the nation must be prepared for the future and remain a modernized country that consistently produces advanced technology. This is a critical strategy that requires long-term

acquisition and future planning. According to Sekulow, Sekulow, Ash, and French (2014), ISIS is the wealthiest terrorist group in the world with a means to take on enemies and annihilate their own as well as their enemies. Currently, the United States is their number one target and in order to maintain global peace, stability, and discipline, modernized forces and technology is demanded, not recommended. For the United States to maintain air superiority and keep its record as a global force, the nation must continue to be a modernized fleet, keeping its threat below radar. The need for a modernized force supports the modernization theory that advanced technology is needed in order for countries to control their environments (Huntington, 1968; Lipset, 1959). If the United States has the most advanced weaponry to protect the nation, there is confidence that the country can control its environment. Controlling the nation by protecting its resources and assets makes it easier to control enemies by being prepared for threats or attacks.

Production and Delays of the F-35

The F-35 JSF program was produced to save DOD a substantial amount of money during it production process and lifecycle period. By providing a multirole fighter to a single airframe, the fighter is one of the most impressive and unmatched capabilities globally seen to date. This is the distinction between the fighter and past acquisition programs the federal has established post Cold War. All 15 participants in this study made similar statements: “The fighter would replace all Air Force, Navy, and Marine Corps legacy inventory such as the F-15s, F-16s, A-10s, F-18s, and AV-8B” (personal communication, November 14 thru December 5, 2014). Scholars have presented the same findings that the fighter would replace all legacy aircraft for the Air Force and the Navy

(GAO, 2013; Gertler, 2014; Gertler, 2012; Sullivan et al, 2014). Furthermore, all 15 participants agreed the program was established to save the federal government a substantial amount of money while providing the "latest and greatest" technology to the world's warfighter.

With replacing legacy aircraft, the F-35 would be the top, dominant fighter in the world, alongside the F-22A, as the nation's largest threat deterrent in American history (Gertler, 2014; Gertler, 2012; McGarvey et al, 2013; Sullivan, 2014). At this rate, production seems to be on schedule, but there are many scenarios that could immobilize the program such as budget costs, scheduling slips, and technological software (Gertler 2014; Gertler, 2012). In addition, foreign military sales could potentially affect the program as lack of production increases the cost and labor per aircraft. These top challenges could be the success or failure of the F-35 fighter (Greaney, 2010; Wilkinson, 2010).

Current Program Management of the F-35 Fighter

The branches of service involved with the acquisition and development jointly manage the F-35 JSF program. Air Force and Navy service departments share responsibility on a two-year term, which is called the Service Acquisition Executive (SAE). When a service department serves as the SAE, the other service department is the F-35 Program Executive Office (PEO). Currently, the F-35 PEO is Air Force senior military official, Lieutenant General Christopher Bogdan and the Department of the Navy has SAE authority. Interviews identified that the Program Manager and SAE is of highest

importance when dealing with F-35 fighter's budget and working relationships with international allies and security partners.

Budget Inquiries

Before production delays existed, there was plenty of funding for this program in the initial stages. Congress approved a budget of $300 billion when the F-35 program was established in October 2001 (O'Rorke, 2009; Sullivan et al., 2012, Sullivan, 2010). As previously mentioned, the program is expeditiously nearing $400 billion, and it was not a number the DoD or the American public was anticipating. According to one of the 15 participants, billions of dollars that were invested into the program was money that was not needed at the time of the program's initiation (personal communication, November 14, 2014). In addition, all 15 participants agreed that congressional budget for this program is over its capacity and will continue to be an issue if production delays continue to exist.

The fighter's budget is the most challenging piece in the F-35 program. Research found that fiscal funding is dependent upon how many aircraft is produced and how much it will not only cost the service departments, but the nation's international allies and security partners (Drew, McGarvey, and & Buryk, 2013, Ozdemir, 2009). International allies and security partners play a critical role in the total cost of the fighter, especially during the production and concurrency phases (Greaney, 2010; Ozdemir, 2009). Data collected from interviews showed the more aircraft are produced on schedule, the more affordable the airframe will be. The more programs are delayed due to challenges, the significant increase of cost in each airframe. Furthermore, if the program continues to

linger on due to production delays, the aircraft will reach an insurmountable sum that could affect the United States and international purchases. Senior Defense Official #1 gave an analogy of how affordability is dependent upon production and quantity as stated:

> Each aircraft ends up costing less because having built 10 aircraft, you know more about how to do it, than when you built one. Having built a hundred, you know more than when you built 10 and that happens sort of logarithmically in a predictable way. We also know that there is a, what we call, a "rate effect" and so when you build more in any one particular year, you can run a factory more efficiently. You have more aircraft in production at once, which means a better, and more stable demand parts for the suppliers and so forth. So getting to larger quantities of production will significantly affect the cost per aircraft. It will end up costing more each year but less in total, but less per aircraft. So we've delayed some of the client progress down those cost reductions because of the lack of maturity of the program. (personal communication, November 14, 2014)

Numbers are very important in the American acquisition industry. If investors such as international allies and security partners cannot afford the inflation of the aircraft, then the amount initially agreed to purchase is null and void. Such issues can affect multilateral cooperation agreements the United States has with its international partners (Ozdemir, 2009). International partners and United States service departments have indeed delayed the amount of aircraft purchased and research shows this delay has raised the current number between $106-110 million. According to Ballard (2014), "the F-35

was plagued by cost overruns and fielding delays that raised the price per unit so high that the services were forced to purchase fewer units they wanted" (2015, p. 27). Senior Defense Official #4 believes the rough estimate for the fighter is currently between $100-110 million (personal communication, December 5, 2014). When buyers stop purchasing the airframe, the program becomes so expensive that product immobilizes for an undetermined period of time. The United States would like to mitigate this scenario by keeping production close to the timetable as possible. DoD has been working budget matters annually and its main concern is to ensure all money invested is used appropriated to continue aircraft development, software advancement, and other miscellaneous issues to keep the program on track. The key to keeping foreign investors and international partners interested with the F-35 program, it needs to stay affordable (Gertler, 2014; Drew, McGarvey & Buryk, 2013; Sullivan, 2014; Sullivan et al., 2012;).

Some concerns have been a constant sequence that money has been removed from the program (i.e. budget cuts, government shutdown, sequestration, etc.) theorizing that funds could be used at a later date, or deferred. The DoD has faithfully tried to stabilize the program to guarantee effective production, but was inevitably delayed with design and structure concerns. Another concern is concurrency among production, development, and testing. In this instance, aircraft are in a concurrency period where the fighters are still in production phase yet are training and flying missions at the same time. This particular method causes problems because anytime a specific aircraft has an issue within the production phase (which causes repairs and/or upgrades), the aircraft that are currently training for IOCs would have to be grounded and upgraded to the same

standards. Concurrency has been considered one of the main issues in the fighter's production delays (GAO, 2013, Gertler, 2014, McGarvey et al., 2013, Sullivan, 2014; Sullivan et al., 2014). Not only is this method time-consuming, but it also costs the department millions of dollars in the end.

This also causes currency cost, which the department has seemingly tried to avoid. Senior Defense Official #1 stated:

> The other advantage of that approach is it avoids what is called the "concurrency cost," where aircraft that we are buying in the earlier production lots will require extensive modifications later to bring them up to the final production standard. (personal communication, November 14, 2014).

The official went on to state the substantial amount of savings per aircraft depends upon certain modifications and used an analogy to describe concurrency among the fighter:

> If you buy 50 aircraft in a year and then later find that you need to do $2 million in modifications to each of them, you've accepted a hundred million dollar bill in the future year to fix them up. If you can buy 30 aircraft that year and use the money you saved to ensure that you're finding all of the things that you will need to change in the future years, you're saving significant concurrency cost, but these are complicated and challenging issues. (Personal communication, November 14, 2014)

A positive aspect to this dilemma is the federal government has formulated specific protections against concurrency costs, which mitigate over budget costs concerning

deficiencies. This is a critical policy when identifying deficiencies during the test phase for the fighter.

Other budget concerns were sequestration and government shutdowns, which were critical matters identified in this study. The most important component about congressional budget issues is the fighter program currently is not financially protected and can jeopardize the fighter and its entirety.

Senior Defense Officials #3 and #4" as well as "Senior Military Official #4 made comparable reports, which stated:

> The baseline for the F-35 JSF airframe was an estimated cost of $70 million at the beginning of the program. Now, it is safe to say that the airframe is now between $106-100 million per airframe (personal communication, December 4-5, 2014).

Over the entire production phase and lifecycle of the fighter program, there should be a total of 2,457 jets for the major service departments: Air Force, Navy, and Marine Corps (Drew et al., 2013; Gertler, 2014, Sullivan et al., 2014). In this procurement, approximately 14 fighters would be used for research and development and the remaining would be for production purposes. Moreover, such estimates showed the F-35A variant would be the highest in production, with the B variant in second highest production, and then variant C. Table 4 shows the annual F-35 procurement for quantities.

Table 3

Annual F-35 Procurement Quantities

FY	F-35 A USAF	F-35B USMC	F-35C Navy	Total
2007	2	0	0	2
2008	6	6	0	12
2009	7	7	0	14
2010	10	16	4	30
2011	22	13	7	42
2012	18	6	7	31
2013	19	6	4	29
2014	19	6	4	29
2015 (as requested)	26	6	2	24

Note. Figures shown are for production aircraft; table excludes 13 research and development aircraft. From *Title of Document*, by Congressional Research Service, 2012, retrieved from http://www.fas.org/sgp/**crs**/.../RL30563.pdf

It is common knowledge that the F-35 JSF program has exceeded its budget, which has caused problems with it production process. If the fighter program or any other federal agency is not protected from congressional budget issues, this can seriously affect production. Ultimately, the F-35's future will be compromised if it does not stay on its current timetable. Some scholars have suggested that CBO has offered a proposal to Congress to cancel the program and its entirety (Hartung, 2014). CBO claimed "replacing the F-35 with upgraded Lockheed Martin F-16s and BOEING F/A 18s would save $48 billion between FY2014 and FY 2013" (Hartung, 2014, p. 6)." Under 2014's defense authorization act, the bill funded nearly $6 billion for the production of 29 fighters, which included 19 35A's, six F-35B's, and four F035C's (Gertler, 2014). The appropriations bill actually funded closer to $5 billion with over $520 million in procurement, which procured the same amount of aircraft requested under the authorization act.

Such numbers under the authorization and appropriations act for 2014 showed there was stability with funding and production even with severe congressional budget issues. Fiscal Year 2015 projected reduced quantities, which could affect production and pricing for the fighter. According to Gertler (2014), the Administration "proposed FY2015 defense budget and would fund the procurement of 26 F-35A's for the Air Force, six F-35B's for the Marine Corps, and two F-35Cs for the Navy" (p. 4). Data suggested that there would be four fewer A variants, two B variants, and two C variants than 2014's projected procurement. The reason for fewer aircraft in 2015 is due to budget issues and projected cuts from the authorization act of the previous year.

With fewer aircraft requested, there are other challenges that affect the program. As mentioned previously, the F-35 JSF program is not only a joint service program, but also an international partnership that involves U.S. allies and security partners. When the fighter program changes in production, it also affects coalition forces either in a positive or negative manner. According to the Congressional Research Service, U.S. allies have shifted in their procurements for FY 2014 and 2015 as follows:

- "Australia accepted delivery of one F-35 in 2014 and 2015 and has announced a new order for 58 follow on aircraft.
- Canada has reopened its fighter competition and concluded an analysis of alternatives to decide whether to launch a competition or forge ahead with sole-sourced purchase of F-35's. Their procurement has been delayed until approximately 2018.
- Italy reduced its buy from 131 to 90 in early 2012.
- Japan has bought long-lead items to initiate production of its 42 F-35s.
- Norway has ordered 16 of the 52 jets it plans to buy in coming years, with the first jets to be delivered in 2017, a year earlier than planned, and the Norwegian parliament has already signed off on the increased budget needed for the deal.
- The Netherlands has reduced its planned order of 85 aircraft to 37.
- Singapore, which has been considering the F-35, deferred a decision.
- South Korea announced a 40-plan buy for 2014 with options to purchase another 20. First delivery is expected in 2018 (CRS, 2014, p. 6).

With constant budget issues, the qualitative research interview seeks to cover both a factual and a meaningful level, though it is usually more difficult to interview on a meaningful level for case studies DoD wanted to maintain stability with the same procurement on an annual basis. In previous authorization bills, 80 aircraft were requested up until FY 2015 for the A variant as well as 50 a year for the B variant (Navy and Marine Corps included). Such process would procure almost 700 aircraft by 2025. In 2010, former Under Secretary for Acquisition, Technology, and Logistics and Deputy Secretary of Defense, Dr. Ashton Carter established an Acquisition Decision Memorandum (ADM). According to Gertler (2014), "the ADM did not directly address maximum production rates or when they might be achieved, yet it extended the SDD phase by 13 months, and slipped full-rate production to November 2015" (p. 12).

In addition to Dr. Carter's ADM, Congress mandated other requests to reduce the production rate of F-35 fighters. As stated:

> "Division C of the Consolidated Appropriations Act, 2014 (P.L. 113-76), reduced the Administration's request for F-35 advance procurement in FY2015 by two F-35A's and one F-35C's" (Gertler, 2013, p. 12). Such reductions were requested in 2015's budget request.

Another issue thought to affect fighter production rates was the limited spending under the 2011 Budget Control Act or BCA. A substantial amount of aircraft would be reduced over the next three years, which would cause problems between the cost and production rates. In addition to costs and productions rates, developmental issues are another factor that is responsible for slower production rates. With constant budget issues

and slower production rates, the DoD is hopeful for FY 2015 Budget requests for the F-35 JSF program. Table 4 shows the Administration's FY 2015 request for Air Force and Navy research and development and procurement funding for the F-35 program. This also includes FY 2013 and FY 2014 funding level.

Table 4

Funding Request for F-35 Program

	Funding	Quantity	Funding	Quantity	Funding	Quantity
RDT&E Funding						
Air Force	1,129	___	856.4	___	611.7	
Dept. of Navy	1,281.4	___	631.5	___	1,029.5	
Subtotal	2,411.3	___	1,487.9	___	1,641.2	
Procurement						
Funding						
Air Force	2,906.3	19	3,355.9	19	4,032.6	26
Dept. of Navy	2,031.2	10	2,528.2	10	2,290.8	8
Subtotal	4,937.5	29	5,884.1	29	6,323.4	34
Spares	281.0		172.8		349.8	
Total	7,629.8	29	7,544.9	29	8,314.4	34

Note. Figures in millions of then-year dollars; FY 2013 and FY 2014 figures shown for reference. Figures shown do not include funding for MilCon funding or research and development funding provided by other countries. Advance procurement requested in FY2014 for future years is included in the procurement amounts shown. From *Program Acquisition Costs by Weapons System,* by Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, March 2014.

Initial Operational Capabilities

The F-35 fighter has experienced many delays over the past decade, but positive rhetoric has shown that IOCs for all service departments will be on track for the next few years. IOCs for all variants were scheduled between March 2012 and 2015, but former Deputy Secretary of Defense, Dr. Carter stated that the Air Force and Navy departments would schedule mission requirements for 2016. Inevitably, the Marine Corps IOCs were delayed. With such delays, Congress became involved and mandated testimony to the changes within IOC dates. This formal statement ensured modifications for IOCs were addressed in Section 155 of the National Defense Authorization Act for fiscal year 2013, as stated:

> F-35A initial operational capability (IOC) shall be declared when the first operational squadron is equipped with 12-24 aircraft, and Airmen are trained, manned, and equipped to conduct basic Close to Air (CAS), Interdiction, and limited Suppression and Destruction of Enemy Air Defense (SEAD/DEAD operations in a contested environment. Based on the current F-35 Joint Program Office (JPO) schedule, the F-35A will reach the IOC milestone between August 2016 (Objective) and December 2016 (Threshold)… F-35B IOC shall be declared when the first operational squadron is equipped with 10-16 aircraft, and US Marines are trained, manned, and equipped to conduct CAS, Offensive and Defense Counter Air, Air Interdiction, Assault Support Escort, and Armed Reconnaissance in concert with Marine Air Ground Force resources and capabilities. Based on the current F-35 JPO sch3edule, the F-35B will reach the

> IOC milestone between July 2015 (Objective) and December 2015 (Threshold)…Navy F-35C IOC shall be declared when the first operational squadron is equipped to conduct assigned missions. Based on the current F-35 JPO scheduled, the F-35C will reach the IOC milestone between August 2018 (Objective) and February 2019 (Threshold). (USN, USMC, & USAF, 2013, para.1)

In addition to new IOCs dates and requirements, all service departments will remain with projected IOCs as well as distinctive software packages that are specific to each variant. Nine of the 15 participants agreed that IOCs will stay on track with the Marine Corps beginning in the early 2015 and the Air Force will follow in 2016. In reference to the Air Force and Marine Corps IOCs, Senior Military Official #1 stated:

> For the Marine Corps, it's going to be the Commandant that declares IOC, and for the Air Force it's going to be COMACC and they both have set out to Congress, here are there requirements that we need, and here are the capabilities that we need. So the Marines are somewhat on track. The Commandant has come out in the last month or so and said, 'hey, we might be one or two months behind.' They'll have the plans so the production rate won't change. They've got the planes, they have already paid for those. The same thing for the Air Force IOC, we just signed the contract for our rebate, which will support getting us the airplanes to IOC. Really the question is beyond IOC, what number of airplanes are we going to have to recapitalize our fleet? So I think IOC is pretty much not a

> risk to your production but its more risk to do the software and the capabilities that are required. (Personal communication, November 17, 2014)

The Marines are currently faced with modification issues with the F-35 and because the production line is concurrent, there are hundreds of aircraft flying while they simultaneously in the manufacturing state. Development still will not be completed for the next few years and that something that can negatively affect successful IOCs. With what the Marines currently face with modifications (since they are the first to conduct missions) they will have to go back and modify all their jets to the capability that is mandated for IOC. This process will make IOCs very challenging. With such disputes, the Marine Corps is still on track for the summer of 2015 and the Air Force will be in the summer of 2016.

Senior Military Official #7 also stated on IOC issues:

> ...the good new there is that the Air Force IOC and the Marine Corps IOCs are pretty much on track independent of any further or future production delays. By the way, the six years that the program is behind are all in the past... we'll never catch up those six years. We would never expect we could but from a production perspective. The actual production line on where we expect airplanes to be delivered is less than six months behind now. Since 2011, when we rebaselined the program and we're actually catch up. So the Marine Corps IOCs and the Air Force IOC are based on current schedules that we have that include the potential four to six-month delay. So they set those dates based on us being able to deliver airplanes and deliver capability on the baseline program that we haven't shifted.

> So from that perspective, the Marine Corps IOC and the Air Force IOC are almost unaffected by production. (Personal communication, December 31, 2014)

Based on communication from one of the participants, it is clarified that production delays will not affect military operations in terms of IOCs. Instead, there are going to be other issues with the F-35 that is going to make it difficult for IOCs. For example, weapons and maintenance systems are a major concern for the F-35, as they are not fully mission ready. With IOCs projected in seven months, the Marines will have a short period of time to have such systems mission operable so each aircraft (10 by July 2015) in IOC can be considered a combat-ready capability as opposed to joint a training jet. The Air Force has 12 to 24 planes that need such modifications by the summer of 2016. In terms of IOCs being affected by production delays has proven through interviews weapons and maintenance systems are more to worry about than manufacturing.

Scheduled Delays, Software Issues, and Structural Damage

According to Hartung (2014), "cost is not the only problem, the fighter has exhibited serious performance issues from problems with the high-tech helmet that is supposed to feed essential information to the pilot to constant scheduling concerns" (2014, p. 6). It is known that scheduling mishaps have contributed to F-35 fighter production delays since its SDD period. With budget costs nearing half a trillion, it is difficult to make any progress with an unstable budget and technological errors. Other issues such as grounding aircraft to due to emergency issues, erroneous fires, in-flight issues, and scheduling mishaps could delay production for an indeterminate period. All

fifteen participants stated the issues addressed in this study affect the fighter program's production progress.

There have been multiple errors, which have delayed the F-35 fighter in the production phases. As recent as 2013, there were "two issues found in testing that were significant enough to cause temporary grounding of the F-35 fleet" (DOT&E, 2014, pp. 33-39). In testing, there were internal cracks found in the engine blade and disproportionate usage of hinge attachments in a single jet, which affected all aircraft that were in the testing unit. In the same year, there were structural cracks found on multiple phases of testing, which affected the engine and its parts. Michael Gilmore, Director of Operational Test and Evaluation stated:

> On-ground testing of the Air Force and Marne Corps versions of the fighter revealed significant findings of cracks on five occasions in fuselage bulkheads, flanges, stiffeners, and engine mounts that will require mitigation plans and may include redesigning parts and additional weight. (Gertler, 2012, p. 8)

In the summer of 2014, the F-35 suffered an engine fire on the flight line during takeoff at Eglin Air Force Base in Florida (Gertler, 2014). The fire caused the entire fleet to temporarily ground for an indeterminate period of time. Investigative reports stated the issue was a complete engine failure when the rotor broke off from the engine, which landed in the fuel tank and ignited. Program Executive Officer for the F-35 Lightning II Joint Program Office, Lieutenant General Christopher Bodgan, stated:

> "the engine failure and subsequent fire that halted testing of the F-35 were the result of micro fractures in one of the three-stage fan sections that compress air

> before it enters the engine...these sections are lined with a polymide material designed to rub against fan blades to reduce pressure loss" (DoD, 2014, para. 4).

In addition to internal and structural problems, the F-35 fighter has faced software issues. The fighter has repeatedly had issues with its sensors and weapons systems, which have affected the internal bay of the aircraft as well as other airframes. Software issues continue to be the greatest challenge for the F-35 JSF program. Frank Kendall, Under Secretary of Defense for Acquisition, Technology, and Logistics stated, "I'm concerned about the software, the operational software…And I'm concerned about the ALIS [Autonomic Logistics Information Systems], that is another software system, basically that will provide the logistics support to the systems" (Mehta, 2014, p. 2). Lt. General Bogdan, also stated a thorough concern for the fighter's software issues to the House Armed Services Subcommittee on Tactical Air and Land Forces [in regards to Blocks 2B, 3I, and 3F software]. He testified:

> For the 2b capability that the U.S. Marine Corps is going to use to declare IOC in limited war fighting capability, we are tracking 206 individual capabilities within the software. And those are what the U.S. Marine Corps need to declare IOC. As of today, 80 percent of those have been verified as good to go. We have 20 percent left. And I have two more increments of software to go this summer before I finish flight-testing for 2B at the end of the year. My assessment and my look at the technical risk in the flight test program are that I am within 30 days of completing 2B on time. So, that's fundamentally very, very little risk in delivering software wise the capability for the U.S. Marine Corps…3I capability for U.S. Air

> Force also I'm quite confident. They have extra year for us to get it right before they declare IOC and it has the same capability as 2B. So, fundamentally, there are some time margins built into that. Complexity of the software that worries us the most…software development is always really, really tricky…We are going to try and do thing in the final block of this capability that are really hard to do. Among them is forming software that can share the same threat picture among multiple ships across the battlefield, allowing for more coordinated attacks. And finally, the last capability, the 3F capability, that's the one I'm most concerned about in terms of schedule delay. I would tell you today if we don't do anything else and we just continue to perform the way we are performing right now and not getting any better, we're going to be somewhere four and six months delays on that software. It's as simple as that. (U.S Congress, 2014)

The primary challenges behind software are the dimension and intricacy of the code. There are millions of code lines, which caused schedule delays for the block software. Such issues called for a modification of the software between block 2 and 3. After modifications were made, offices responsible for system upgrades performed a review in 2014 to improve software practices.

One of the most critical software issues the fighter faces is ALIS or the Autonomic Logistics Information System. ALIS provides the "IT backbone and capabilities to continuously capture and analyze the fleet's overall readiness, in support of current and future war fighters across the United States services and the world" (Lockheed Martin, 2014, para. 1). This software is vital to the airframe because it

provides the pilot with real-time, secure information on maintenance, technicalities, and training, which are part of pre-positioned approaches, which makes the jet efficient and effective. There have been testing and development issues with ALIS and it is a damming matter because it is the "core of operations, maintenance, and supply-chain management for the F-35, providing a constant stream of data from the plane to supporting staff" (Gertler, 2014, p. 15).

Problems were identified in the testing phases such as diagnostic system performance, fault detection, and false alarm rates. Such failures in testing have resulting in termination of the enhanced diagnostics program. The DoD and JPO decided to not continue this part of the program for the remainder for the production phase (Gertler, 2014). ALIS upgrades are uncertain on performance as the DoD will continue finish ALIS and have it released in 2016. In addition software challenges alike ALIS, there were other issues found during reviews that the Senate had to take into consideration when it came to the decision making process of the fighter's future. The helmet mounted display system, the tail hook, and the fuel dumping systems were deemed failures in testing, which required a Critical Design Review or CDR. The helmet mounted system is the most critical part to the fighter's dominance in air superiority (Hartung, 2014). According to Lockheed Martin, this system "provides pilots with unprecedented situational awareness. All the information pilots need to complete their missions – airspeed, heading, altitude, targeting information and warnings – is projected on the helmet's visor, rather than on a traditional Heads-up Display" (LM, 2014, para. 1).

The helmet's purpose is to increase the pilot's awareness with a quick response to specific missions as well as threats (Hartung, 2014). The pilot will be able to see through the helmet anything of importance such as allies, threats, altitude, speed, and so forth, instead of traditional concept of looking at a dashboard display. The technical issue with the helmet was its maturation. Developers were unsure if the helmet was combat capable due to lack of night vision clarity. To ensure the helmet's successful execution, Congress decided to award an alternative helmet contract. BAE system was awarded primary contract in 2011 after constant problems with the "jitter in display data on the visor" and poor resolution for "night-vision capability" (Gertler, 2014, p. 8).

F-35 Fighter Milestones

With constant delays, technological errors, and budget costs, the F-35 fighter has accomplished some noteworthy milestone since its establishment in the early to mid 1990's. Lockheed Martin was awarded the primary contract to build and develop the F-35 Joint Strike Fighter, which would be the largest acquisition program in American history (Gertler, 2014). Pratt and Whitney and General Electric would be responsible for the aircraft's engine and alternate engine program (Gertler, 2014). The purpose of the SDD phase would be to develop each variant in order for to reach the preliminary IOC phase. With delays and software issues, the fighter is approximately six years behind in production and about three to four years behind in IOCs. The F-35 proved to be in a stable condition where IOCs are still on track with it first mission in early 2015. Table 5 shows the fighter milestones since its establishment. Finally, the F-35 JSF program, even

though in extensive debt, has created over 125, 000 jobs in 46 states to boost the United States' economy (Hartung, 2014).

Table 5

F-35 Variant Milestones

	First flown	Original IOC goal	Current IOC estimate
F-35A	December 15, 2006	March 2013	2016
F-35B	June 11, 2008 First Hover: March 17, 2010	March 2012	2015
F-35C	June 6, 2010	March 2015	2019

Note. Prepared by Congressional Research Service based on press reports and Department of Defense testimony.

Summarization of the Findings for the Primary Research Question

It is understood that the F-35 program has faced many challenges, which have caused delays in its production. In-depth research has deemed major issues such as block software, complexity with lines of code, ALIS, engine cracks, cracks in the fuselage bulkheads, flanges, stiffeners, and engine mounts, structural damage, engine fires, helmet mount systems, tail hook, excessive wear on the rudder hinge attachments, sequestration, and government shutdown, to name a few, entirely affect the production line for F-35 fighters. In addition, ambiguity with the congressional budget and rising costs nearing $400 billion (and will continue) has proven that the program has reached an astronomical price that Congress, the DoD, JPO, and taxpayers were not prepared for. With such

issues, key players established and implemented a specific review program in order to mitigate future issues with the same program as well as provide alternatives if there were not other solutions.

Concurrency was considered “a colossal acquisition failure’ for its production chaos since initial establishment. Building aircraft and testing them while still in the production phase costs the federal government additional millions (which were not projected in the initial budget) because issues found in production stage have caused units to ground aircraft for modifications and upgrades. Acquisitions, Technology, and Acquisition chief, Frank Kendall, stressed concern for concurrency issues during the SDD phase:

> Putting the Lockheed Martin F-35 Joint Strike Fighter into production before flight testing had started was acquisition malpractice...the program had started with the optimistic prediction that were good enough at modeling and simulation that would not find problems in flight test. (Gertler, 2014, p. 30)

Such concurrency concerns have reflected with congressional budget, which allots funding annually for the fighter program. As previously mentioned, the initial budget for the F-35 JSF program was $300 billion (Gertler, 2014; McGarvey et al., 2013; O’Rourke, 2009; Sullivan et al., 2014). Now that it is nearing $400 billion, raise in cost have raised concerns about the fighter’s future. Research on this issue showed that federal government programs, even highly sensitive and critical entities, are not protected from congressional budget matters. If another sequestration or government shutdown happens in the near future, the F-35 program would suffer budget cuts just like other agencies.

Additional concerns proved that the cost of the each fighter jet would increase as long as production delays ensue. When the program was established, each fighter was approximately $70 million. According to Congressional Research Service (2014) the average now is about $108 million. The purpose of the joint program was affordability for the United States, its international allies, security partners, and foreign military sales customers. If the fighter jet is no longer affordable, and not within the means of initial investment, players could possibly withdraw from the international alliance and jeopardize the program (Greaney, 2010). This will indeed affect national security and economic standards since this the largest acquisition for the United States. Most of the fifteen participants agreed that constant issues with the fighter due to production delays, which affects progression. Additionally, all participants agree that the budget, scheduling unpredictability, and software issues are the primary reasons for constant immobilization.

Findings for Subquestion 1

Sub question 1 asked: How are production delays in the F-35 fighter relevant to National Security Strategy (NSS)? This sub question of the primary research question sought to conclude whether production delays with the F-35 JSF program affected national security. Moreover, this sub question wanted to prove or disprove if modernization of advanced technology is a primary concept in sustaining air superiority in addition to national security interests. Modernization theory is an important concept to this subset question because innovation of weaponry is the key to protecting national security. Modernization is also a policy that is outlined in the NSS and other national defense guidance that is mandated for a technologically advanced force. Data were

collected through interviews and government research documents, which revealed production delays, do affect national security interest.

National Security Strategy

The National Security Strategy is a document established by the congressional executive department that entails the United States' major national security concerns and how the President's administration plans to handle them (NSS, 2015). NSS is derived from the Goldwater-Nichols Act (a valuable political exposé on specific matters affecting national security) and the National Military Strategy is a supporting document to determine how the U.S. Armed Forces will deal with such national security issues outline. Making decisions on national security issues is extremely important because the executive department mitigates security concerns and also deals with foreign affairs issues. U.S. national security protects its own affairs by continuing to keep international allies and security partner relationships afloat. Having a global coalition protects the United States and its partners against dangerous, adversarial threats.

NSS is a critical piece to the puzzle because it has 5 purposes for existing. First, the executive department works heavily with Congress to exemplify the President's vision for national security by requesting specific programs and funding to mitigate major concerns. Once Congress approves such vision and legitimizes request, the executive department works extensive with international parties (who foreign coalition forces) to address global national security issues. Next, the executive department works with political leaders to request the President's acknowledgement on such issues and work on a strategy to enforce. Then political leaders and senior officials work together with the

executive branch to formulate a defense policy. Lastly, once a strategy is agreed upon, parties work together with the President establish an update NSS and publicize it for awareness.

Through interviews, government research, and archival records, production delays with the F-35 fighter proved to be relevant to NSS in terms of what resources the United States uses to deter aggression. All 15 participants agreed production delays affect national defense guidelines to a certain extent. Furthermore, the NSS is updated dependent upon current threats and the severity of vulnerability toward the United States. For example, the NSS was updated in order to determine what specific tactics and methods need to be used to defeat al Qaeda and the Taliban. The NSS, which was updated in 2010 (and still the current NSS), stressed specific relationships with the Muslim community as well as what type of engagement of cooperation was needed defeat insurgents and terrorist. The main purpose for the updated strategy during this time was to determine how the United States could assist the Middle East in establishing democracy and economic development. The United States worked with coalition forces and civilians of respective countries in the Middle East to ensure a permanent and stable government. Additionally, if the NSS proves to be successful, the United States had to show that there was positive interagency dexterity to ensure valuable methods for public diplomacy to win the hearts of the civilian population.

According to interview with Senior Military Official #7, national security is very important to the F-35 program for various reasons. The participant expressed:

> From a purely national security perspective, giving the United States the freedom of action to respond anywhere on the global militarily at the time of our choosing and the place of choosing and the way we chose to do that is a very, very important tool for national security. To be able to do that, you have to have the capability to do that and the world is a very complicated place and there are many different levels of threat. There are many different scenarios in which the United States might have to respond. What the F-35 program does for the President and for the Department of Defense and for the people of the United States is it gives them the ability now and in the future to respond to many levels of threats in a manner in which we choose to do so. Primarily, the F-35 is built for the high-end threats that we may see in the future, the state actors and our adversaries who build very sophisticated defensive systems, who build very sophisticated and technologically advanced offensive and defensive systems that would counter what we would try and do. So from a national security perspective, the F-35 provides the Department and the President many different ways to respond to threats in the world. (Personal communication, December 31, 2014)

The NSS covers greater involvement with China, Russia, and India as well as discusses nuclear proliferation, terrorism, and climate change. The importance of this document clearly shows that specific strategies are drafted based on the current threat, global issues, and foreign policy. The F-35 fighter is an asset needed to maintain not only air superiority, but to deter global aggression. The NSS is the foundational piece on how

advanced technology is needed in order to defeat 21st century threats and the fighter is the current and future 5th generational piece to the puzzle.

In general, NSS is a pertinent document that is essentially established to protect national security. If it is executed but not implemented, it can directly impact national security. In regards to the F-35 program, it is proven that lack of production rates annually can in fact affect national security. The service departments involved with the program are heavily depending on this fighter jet to replace its legacy inventory. The DoD and JPO have made a commitment to produce F-35s on time for the affordability aspect for the service departments, international allies, and security partners. If these agencies do not maintain their commitments and deliver the jets on time, all parties will have to pay a substantial amount of money per frame, which was not a part of the deal. With that said, all parties will have to sustain legacy aircraft, killing annual budgets as millions are needed per year to keep them mission ready.

Another issue on how lack of production with the fighter can affect national security is a less capable airframe. When you rush the production line in order to meet timelines, the downfall is the jets do not possess the maximum capability they should have. When buyers accept less capable planes that means they are accepting aircraft that may not be able to perform at utmost levels, which can affect protecting the United States as well as it allies. This puts NSS in a very vulnerable state because the fifth generation asset is not in a position to be the top airframe to maintain air superiority, the nation cannot respond to current or future threats because of lack of advanced capability.

Air Dominance & Superiority

Air dominance and superiority is crucial to maintaining security and global stability. The United States has maintained air superiority since the Korean War and in order to maintain such dominance, specific criteria have to be met (Aksamit, 2009; Ozdemir, 2009). Military servicemen and woman have to be full equipped, trained, and most importantly, have advanced technology. Air superiority is one of the greatest advances the United States has maintained for over 50 years. There are few countries that have specific assets like the United States to gain air superiority and that are why it is important to stay on track with fifth generation resources to ensure adversaries do not come close to having such technology. Seven of the 15 participants expressed that production delays with the F-35 fighter will decrease or even lose air dominance that the United States has obtained since the Korean War. According Senior Military Official #7, the United States is the best country in the world when it comes to technology, military, and training. Adversarial countries are currently working on fifth generation resources as well, but it does not come close to what the F-35 can do (personal communication, December 31, 2014). Without air superiority, it is very difficult for countries to have a strategy to deter threats from the air to the ground. Air dominance is a major tactic is supporting land and sea operations during wartime.

It is very important that there continues to be a large technological gap between the United States and adversarial countries. As long as the gap does not shrink, the United States can continue to maintain air dominance, but new and improve threats are making it difficult for the nation to stay ahead. The F-35 JSF is currently the 21st century

aircraft for the United States and it is the airframe that is to sustain air superiority. The F-35 increases "combat capability and improves war-fighter integration" (Basham & Rouleau, 2015, p. 15). Currently, the fighter is the most innovative, stealth platform that represents the United States most secure answer to defeating adversarial threats. Some concerns the United States faces is the fact F-35s are behind in production by approximately 6 years and that time can not be restored. There is a positive implication that production is currently only 6 months behind, and that is a process that has improved over the past 2 to 3 years. As long as the production line stays on track, the United States will remain in a safe position.

Through interviews it has been proven that air superiority is an important concept when it comes to national security. Senior Military Official #7 made the following statement on air superiority:

> I think one of the things that is not very well publicized or thought about...is when you own the sky and you have air superiority, air supremacy anywhere in the world and you can establish that anywhere in the world, it provides freedom of action on the ground that would otherwise be very, very difficult. (personal communication, December 31, 2014)

The United States has sustained air superiority since the 1950s, which is also is the last time U.S. Armed Forces were killed from enemy airpower. This is a skill that requires experienced leadership, discipline, training, past history, and most importantly advanced technology to maintain air dominance.

Another ability the United States has that few other countries possess, as stated by Senior Military Official # 7 is the power to established "air superiority at anytime, at any place on the globe" (personal communication, December 31, 2014). The United States has the capability to project aircraft carriers, fighter units, long-range bombers, and other technologically advanced warfare systems all over the world and be combat ready. Not only are forward deployed assets great strategic tactical for combat, but it a very intuitive position to provide the assistance across the world such has humanitarian relief, border patrol, securing our allies' borders, and so forth. None of this can be conducted if the United States does not control the airspace and the F-35 JSF is the primary fifth generation aircraft that is the next step maintaining airs superiority. According to Senior Official #7's parting comments on air superiority: "They [American citizens] don't realize how important that is that you can't do anything on the ground unless you own the sky above it" (personal communication, December 31, 2014).

Summarization of the Findings for Subquestion 1

Interviews, archival documents, and governmental research records discovered that national security strategy is directly affected by F-35 program production delays. If the fighter continues to face production delays in the future, it could jeopardize national security, by not being prepared for future threats. National defense guidance specifically states that the United States must be prepared for current and future threats and by being "prepared," the nation mandates advanced technology and weapons systems (NMS, 2004; NSS, 2015; QDR, 2012). Additionally, through interviews, government research documents, and archival records, it was acknowledged that the NSS is a critical piece to

national security's puzzle. The NSS stresses the need for advanced technology and evolution of modernization in order to maintain air dominance and protect national security. With that said, the importance of having the F-35 program is to ensure the United States has proper national security tools for the future to support and defend the country and the nation's allies as well as meet all strategic guidance. Without national security, there would not be any guidance on how to handle national security interests and foreign policy.

In addition to the importance of national security includes air dominance. Findings from sub question 1 proved that air dominance is a pivotal technique in national security strategy. It is the key to maintaining global peace, stability, and security. Air superiority is also an excellent tactic to key adversarial threats away as well as protecting international allies and security partners. As previously mentioned, the United States has maintained air superiority since the 1950s and in order sustain such dominance, the nation has to remain vigilant, trained, skilled, knowledgeable, and most importantly, technologically advanced.

Findings for Subquestion 2

The second sub question asked: How are production delays in the F-35 fighter relevant to National Military Strategy (NMS)? This sub question of the primary research question explored whether NMS is relevant to the production delays within the F-35 JSF program. Also, the researcher explored whether the NMS is affected by modernized ideologies. Data was collected from interviews, archival records, and governmental research records revealed that NMS is a critical piece to national security, which is

impacted when lack of modernization affects strategic methods delineated in national defense guidance. Additionally, it was discovered that the modernization theory and the globalization perspective relate to this subset question because NMS is a derivative of the NSS, which is based on innovation and advanced technology. Modernization and globalization are both theories that are based on the continuance of socio-economic development throughout countries (Mehlika, 2013).

National Military Strategy

NMS derived from NSS "describes the critical role which the Armed Forces will play in helping to achieve our Nation's objectives" (NMS, 1995, para. 3). NMS exemplifies the same procedures, strategies, and political matters as the NSS, but centers much of its policies on how Armed Forces will be utilized in protecting national security. A primary concept of the NMS focuses on U.S. servicemen and women to determine how they will "stay in the fight and win the Nation's wars whenever and wherever called upon" (NMS, 1995, para. 4). As mentioned in this study, it is critical that the United States maintain its advance capability to deal with multiple global issues at one time. NMS is not entirely focus on combat and warfare, but there are specific issues such as nuclear proliferation, humanitarian relief, natural disasters, economic issues, and global warming conditions that happen at any point in time.

A global force and particularly well-built country can deal with these issues simultaneous without losing power. This is all dependent upon experience, skill, training, education, and most importantly advanced technology. U.S. Armed Forces have special training and can deal with multiple contingencies concurrently because they are forward

deployed and have embedded units globally in order to sustain operations. Like NSS, NMS is updated based on current and future threats as well as new roles service member would need to perform based on global climate. Such matters as the international environment, national military objectives, the strategy, military capabilities, regional instability, weapons of mass destruction, transnational dangers, peacetime engagement, deterrence and conflict prevention, and power projection are goals to be achieved in the NMS.

Interviews, government research documents, and archival records disclosed that national military strategy is relevant to the production delays within the F-35 JSF program. Six of the 12 participants believe that NMS is a critical derivative of national defense guidance. According to Senior Military Official #1, NMS and other national defense guidance are needed in order to stabilize how American handle global situation. The participant stated:

> If we know what the threat is out there and we know our defense strategic guidance, what our requirement is, and that is laid out...have defense strategic guidance, we have national security guidance, we have the QDR, then I'll say, here are the things we have to do. And those things that we have to go do are deter and defeat threats. The other thing we have to do is hold targets at risk and any access denied area. So if we're going to be required to do that, then we're going to need the F-35 or we're going to need something equivalent. (Personal communication, November 17, 2014)

Ultimately, it is the DoD's responsibility to ensure programs stay on track, especially with procurement of weapons systems, to continue national security objectives. Having the F-35 at a low production rate after 13+ years of its establishment is considered a vital matter, as modernized assets should be mission ready for today's current threats. This fighter was supposed to be ready for 21st century adversaries and it is still in production, development, and testing phases. Full production of the program is not scheduled to be initiated until 2019 and based on the current threat and how it will affect the future is a critical matter, which the DoD takes all responsibility. A chance to really test the fighter's ability will be in early 2015 as the Marine Corps begin IOCs. This is a step forward considering what needs to be implemented over the next four to five years to have the fighters fully mission capable. There is a possibility that fighters might have to experience concurrency phases during IOCs, but that is a chance this program faces as it is currently behind in production.

Advanced Technology & Modernization

It is important to have advanced technology in order to maintain current and prepared for future threats. The significance of having the F-35 is to ensure the United States has the tools needed to fully support and defend the country by protecting national security. The F-35 enhances wartime capabilities and improves national security strategy (Basham & Rouleau, 2015). In order to so, the United States is tasked with protecting the homeland, its surrounding borders, and its allies' borders. Advanced technology must meet all strategic guidance that has been established. All 15 participants voiced that modernization is the key to global stability, economic balance, and ensuring security. As

stated by Senior Military Official #1, "we have to bridge the gap to whatever the next technology that we need for air dominance, for the Air Force, and the Navy, and marines, like eight other partner nations" (personal communication, November 17, 2014).

The United States currently faces competition in advanced technology with countries that are not considered international allies: China and Russia (QDR, 2014). China is working on the Chengdu J-20, which is a stealth, dual-engine fifth generation aircraft who is expected IOC is in the next two to 3 years. This airframe has the potential to be a capable asset for the Chinese and in the run for advanced technological warfare, but it still has issues that are prolonging its production. According to Slate (2014), China's 21st century weaponry is quite similar to the U.S.'s fighter, especially the exterior. The scholar also stated, "China has compromised the F-35 JSF program...the United States has lost over $300 billion of research and development, not including loss in foreign sales, as well as considerable military advantage in the realm of stealth technology" (pp. 59-60).

Russia's fifth generation aircraft, the T-50, is a stealth, single seat, dual engine that will be operational in 2016. Just the like the F-35, Russia's advanced jet is a multirole whose use is for air superiority and ground attack operations. With adversaries working on fifth generation, it is crucial the United States stays the global force by having modernized, advanced technology. The current issue with the F-35 is it still falls short on software and technology. Once IOCs begin in the next few months, much needed capabilities will not be ready by the time the Marine Corps begin their training.

Two factors that make the F-35 more dominate than any other fighter in the world is stealth and fusion (Gertler, 2014; McGarvey et al., 2013; Sullivan, 2014). Stealth is the ability to proceed, move, or act in a covert way. This capability is important because the fighter needs some level of stealth ability to be able to get into denied areas. This capability is one of the main components of the F-35 fighter and will be a core element for the United States international allies (Gertler, 2014; McGarvey et al., 2013; Sullivan, 2014). Stealth technology is based on the next-generation aircraft as well and a major development for programs all over the world.

The United States plays a critical role for current and future aerial operations and stealth is its "kryptonite." Stealth is such a vital component for the war fighter that a lack of this technology is believed to cause global problems. According to Air Force technology (2011), "stealth capability features heavily in the designs for virtually all next-generation fighter platforms currently under development. The highest profile of these is US-led systems affects production of the JSF' (para. 9). Producing a stealth capable fighter mandates having the complete sense of balance between stealth, maneuverability, and affordability.

Fusion is one of the F-35 fighter's more prominent aggression deterrence capabilities. According to Lockheed Martin on the fighter's sensor fusion:

> It enables pilots to draw on information from all of their sensors to create a single integrated picture of the battlefield. All of the information gathered is then automatically shared with other pilots on their network using the most modern data links. These data links, such as the Multifunction Advanced Data Link

> (MADL), will enable pilots to share data with other strike as well as other airborne, surface and ground-based platforms required to perform assigned missions. (2015, para. 1)

The greatest concept with fusion is the pilot does not have to look at the dash board for information on the jet, its surroundings, allies, enemies, and so forth, it has the capability for the pilot to look between his or her legs to see through the plane below.

Mission systems that create a great balance with the stealth and fusion capabilities are the AESA Radar, Distributed Aperture System (DAS), Electro-Optical Targeting System (EOTS), Helmet Mounted Display Systems (HMDS), and Communications, Navigation and Identification (CNI) system. These particular systems are the F-35 fighter's avionic schemes, which collect and share information with the pilot, its allies, and operations on the ground and sea. The F-35 has the most vigorous communications systems of any other fighter jet known to date. In addition to the communications classifications, it is the only jet to have an intense capability to incorporate line of sight operations through its mission performance.

The AESA radar is devised to have pilots interact with specific targets long range while providing enhanced capabilities such as effective responsiveness during mission operations. Lockheed Martin describes the AESA as:

> A radar designed to enable F-35 pilots to effectively engage air and ground targets at long range, while also providing outstanding situational awareness for enhanced capability. AESA's solid-state technology and elimination of

> mechanical moving parts will enable the radar to far surpass current standards for systems reliability. (2015, para. 4)

The main purpose of this radar is that in conjunction with low observability and internal storage, the pilot can use the AESA system to reach ground targets from longer range without detection.

Next, is the F-35's DAS is situational awareness system. The primary function of the DAS is the real-time resolution the system gives the pilot see the entire environment around them. Northup Grumman's system has "six infrared cameras mounted around the aircraft and provides the ability to detect and track approaching aircraft from any angle; the DAS also greatly reduces the potential for mid-air collisions and virtually eliminate surprises" (Lockheed Martin, 2015, para. 5). The DAS system is incorporated with other sensors and radars so if something is detected with the fighter, the systems will provide analysis to warn the pilot of any forthcoming threats.

If there are numerous threats the pilot faces, the DAS system can "identify the highest value targets and recommend the order in which to deal with each threat" (Lockheed Martin, 2015, para. 6). With this concept, pilots are given a considerable advantage over others, and with such a complex technique, must contemplate specific options on how to respond in dangerous situations. Lastly, DAS provides the following:

- Missile detection and tracking
- Launch point detection
- Situational awareness IRST & cueing
- Weapons support

- Day/night navigation
- Fire control capability
- Precision tracking of wingmen/friendly aircraft for tactical maneuvering.

(Lockheed Martin, 2015, para. 7)

EOTS is another sensor that is pretty significant to the F-35 fighter. According to Lockheed Martin, EOTS is the "world's first and only senor that combines forward-looking infrared (FLIR) and infrared search and track (IRST) functionality" (2015, para. 8). Not only is this sensor an original functionality, but it is a stealthy system that is interlinked with the fighter's computer system and provides accurate air-to-air and air-to-surface targeting capabilities.

As mentioned previously, the fighter's helmet mounted display system "provides pilots with unprecedented situational awareness" (Lockheed Martin, 2015, para. 8). This particular helmet provides all data needed to successfully accomplish air mission. This includes "airspeed, heading, altitude, targeting information and warnings – is projected on the helmet's visor, rather than on a traditional heads-up display" (Lockheed Martin, 2015, para. 8). The helmet is linked to the DAS systems' infrared cameras, which provides distinct vision to see through the actual airframe (day and night time vision).

Finally, the CNI system is the "most advanced integrated avionics system ever engineered" (Lockheed Martin, 2015, para. 9). This system supplies pilots with almost 30 different avionic functions and using such technology give pilots the ability to proceed concurrent essential mission operations such as "identification friend or foe, precision

navigation, and various voice and data communications, while greatly reducing size, weight and power demands" (Lockheed Martin, 2015, para. 9).

Modernization is an important factor as the modernization theory is based on key objectives that support national security strategy. The F-35 fighter is an aspect that is part of the growth in modernization that the United States has obtained to maintain global dominance. With current production delays, the F-35 will be forced to mix with legacy aircraft. Senior Military Officials #2 gave an example of legacy aircraft and the F-35:

> F-15E, which is a strike aircraft, which is a variant of the F-15C although not as much as people would argue but it's that the E is a prime example of that – certain F-16s will still want to stay around the block 50s plus and the 60s that are coming out right now. They have some capability in there and they will transition as, by they way the F-35 goes on through its production cycle. There's going to have to be a few other types of aircraft. I mean you look at B-52, it is 50 years old. They're just putting different weapons on there from a standoff perspective. What you'll see as F-35, F-22s and a couple of the high-end, let's say F-15Es in block 60 or 50 of [16 and going] and they push the door on the rest will be more standoff; they will be backup aircraft, etcetera. It's going to be a combination of that but we need to update ships, we need to update the ground pieces whether that's armor or the ability to do anti-armor, Marine Corps has a lot of different systems that they need to update. They just got the V-22 and etcetera. (Personal communication, December 1, 2014).

Summarization of the Findings for Subquestion 2

Interviews, archival documents, and governmental research records discovered that advanced technology is a pivotal factor in national security as well as the F-35 JSF program. If the fighter continues to face production delays in the future, the advanced technology that makes the F-35 the most powerful asset in the world will no longer be a top contender for air superiority. National defense guidance specifically states the United States must be prepared for current and future threats and by being "prepared," the nation mandates advanced technology and weapons systems. The NSS stresses the need for advanced technology and with the evolution of modernization, it is a required policy in order to maintain air dominance and protect national security.

The importance of having the F-35 program is to ensure the United States has proper national security tools for the future to support and defend the country and the nation's allies as well as meet all strategic guidance. Without national security, there would not be any guidance on how to handle national security interests and foreign policy. In addition to the importance of national security includes air dominance, which requires advanced technology. Findings from sub question 2 proved that air dominance is a pivotal technique in national security strategy in which advanced weapons systems for combat warfare is needed. It is also proved that the evolution of advanced weaponry is needed in order for the United States to maintain its global dominance. Modernization is the key to maintaining global peace, stability, and security.

Findings for Subquestion 3

Sub question 3 of the primary research question was intended to answer if production delays of the F-35 JSF program directly affect national security. Sub question 3 asked: How do production delays of 5th generation aircraft directly affect national security interests? Apart from sub question, which is similar to sub question 2, sub question 3 found that lack of production does affect national security interests. This sub question candidly asked participants if the F-35 fighter directly affects national security. All fifteen participants stated that lack of production with the fighter affects national security in some aspect and to a certain extent. Additionally, this sub question produced consenting as well as opposing statements on whether the fighter was the sole modernized asset responsible for protecting national security.

Thirteen participants believed production delays entirely affect national defense guidance, stating the United States should be mission ready in terms of being a modernized force in order to prepare for present and future threats. This is also a mandated policy that involves modernization principles. Two of the 15 participants believed that the fighter is needed and affects national security to a certain extent. They stated the F-35 fighter is critical piece to the puzzle with the incorporation of other advanced technologies to ensure economic balance, global stability, and most importantly, protection of national security. Furthermore, this question sought to determine the importance of the fighter in reference to modernization and globalization theories.

International Allies & Security Partners

The United States has a special relationship with the following countries: United Kingdom, Italy, the Netherlands, Turkey, Canada, Australia, Denmark, and Norway. Countries such as Japan, South Korea, and Israel have been interested in the program for many years (Greaney, 2010; Ozdemir, 2009, Wilson, 2009). These allies have invested and contributed a substantial amount of funding towards the F-35 JSF program. Israel and Japan are currently foreign military sales customers and are very important stakeholders within the program. The 8 countries participate under the Memorandum of Understanding (MOU) for the SDD and Production, Sustainment, and Follow-On Development (PSFD) phases of the program. All partners have assisted the United States with research and development of the F-35 and have participated in the Initial Operational Test and Evaluation (IOT&E) phase of the SDD.

International allies are expected to purchases over 600 fighters with United Kingdom buying the most. According to Gertler (2014), the UK is most prominent partner with the largest monetary commitment. Even two of the UK's aerospace companies, BAE and Rolls-Royce, have to contracts to work on the F-35 JSF program. As mentioned previously, there were changes within international orders due to constant production delays (Gertler, 2014; McGarvey et al., 2013; Sullivan, 2014). Canada has delays its procurement until 2018 due to ambiguity of a full purchase of the aircraft. Italy reduced its procurement by 68% and Norway has only procured 16 of the 52 fighters it initially planned to purchase. The Netherlands reduced its acquisition by 44% and Singapore deferred on whether or not they will purchase F-35s.

Table 6

F-35 Projected Unit Recurring Flyaway Cost

$M (2012)	F-35A	F-35B	F-35C
Airframe	66.0	76.8	78.2
Engine	11.7	28.7	11.5
Total	77.7	105.5	89.7

Note. Includes hardware costs over the life of the program and assumes 673 international sales. Office of the Secretary of Defense, F-35 Projected Unit Recurring Flyaway Cost. Retrieved from *Selected Acquisition Report (SAR): F-35 Joint Strike Fighter (F-35)*, December 31, 2013.

Summarization of the Findings for Subquestion 3

Primarily through interviews, it was discovered legacy aircraft critically affect national security guidelines. Such issues violate national defense guidance based on modernization and globalization theories. It is mandated that advanced technology is constantly evolving to stay current with adversarial threats. Much information researched acknowledged all service departments as well as international allies, security partners, and foreign military sales customers are currently using legacy aircraft and will continue to them over the next few years. With such a damming strategic shift in national security guidelines, it is very risky to utilize such aircraft to deter advanced threats. Additionally, it have been proved that using legacy aircraft is very expensive, cutting millions of dollars from the congressional budget to maintain its shelf life.

Findings for Research Question 2

The research question asked: What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur? This question was intended to determine the future of aged aircraft if production delays with the F-35 continue. Data collected through interviews, government research, and archival documents showed legacy aircrafts' shelf life would be extended due to constant delays. Similar to data collected from research sub question 3 acknowledged that modernization and global theories are the foundation of this research study and are ideologies that correlate legacy aircraft issues. The social and advanced development of the fighter program and its relevance to innovation was predicated on the modernization and globalization theories.

Legacy Aircraft

Through interviews, government research, and archival records, it was revealed if the United States continues to fall further behind and do not modernize the nation could put the country at risk. The F-35 has been established to replace almost every tactical fighter for Air Force and Navy (including Marine Corps) service departments in addition to the fourth generation, the F-22A, and few of the F-15 fleet. The F-35 will replace the Air Force A-10s and F-16s and for the Navy, the fighter would replace the F/A 18 and AV-8B (Gertler, 2014; Greaney, 2010; McGarvey et al, 2013; Sullivan, 2014). It would also replace some the U.S.'s allies' legacy aircraft as well. The DoD is looking at a procurement of 3,000 aircraft including purchases from U.S. international allies and security partners. About 2,400 of those aircraft will be for DoD acquisition.

Primarily through interviews, research discovered that the continuance of legacy aircraft would affect the congressional significantly. All participants agreed legacy aircraft are crippling the congressional budget to sustain their lifecycle. Additionally, constant funding provided to maintaining aircraft will affect future funding for other pertinent programs (Gertler, 2014; Sullivan, 2014). It is very expensive to maintain old aircraft and keep them combat ready. Using legacy aircraft will not only continue to hurt the budget, but distract the F-35 from its production. Utilizing old aircraft will especially hurt the Air Force as the service department relies heavily upon its F-15s and F-16. According to Senior Defense Official #1:

> Actually, I don't think the Air Force has a choice but to find the way to afford both [legacy aircraft and F-35s] because we won't have enough that F-35s to man the combat Air Force that the nation will require for many years to come. So what the Air Force is really doing is, gradually retiring elements of the legacy fleet. As you know they are proposed retiring the A-10 fleet over the next few years, for one example. They will be gradually retiring those as they begin to buy the F-35. (Personal communication, November 14, 2014)

The purpose of the F-35 is to modernize the aircraft fleet for all service departments. It is in this aspect of providing advanced technology to have better capabilities required to counter future threats and protecting American as well as coalition national security. Senior Military Official #1 concurred with "Senior Defense Official #1" in reference to legacy aircraft by stating:

> I would say that we are a parity at best to falling slightly behind...the threats that we see out there for our fourth gen fleet, the F-16s, F-15s that we have out there. We have F-22s as fifth gen aircraft but we only have 188 of them. It's just not enough to meet our national security objectives. (personal communication, November 17, 2014)

The current age of the United States fighter fleet is 25 years old, which pertains to the Air Force. The fleet has been reduced almost 50% with approximately 2,000 aircraft in inventory. With the issue of reducing the fighter fleet, what is left has seriously aged. A lot of wear and tear has been due to the war the aircraft has faced for the past 13 years fighting in Iraq and Afghanistan. If the production delays continue to slip with the F-35 JSF program, the full execution of the program will go beyond its expected timeline of 2037 and legacy aircraft will be forced to stay in operation.

It does not matter how much funding Congress gives to maintain fourth generation aircraft, when an adversary's fifth generation aircraft faces it each, the fourth generation will not be successful. The nature of the beast is continuing to spend money on older aircraft will give the adversary a great advantage during combat. The downfall is you cannot prolong aircraft to make it stealthy and survivable. No matter the speculation about legacy aircraft, it is about physics and it has to be designed for advanced technology. The F-35 was designed to be technologically advanced and replace legacy aircraft, not compliment it. The most important factor for legacy aircraft is they do not have the stealth capabilities the F-35 has and you just cannot modernize legacy aircraft to match a fifth generation fleet.

In response legacy aircraft, Senior Military Official #2 stated:

> If you want to think about where we were years ago, we are basically a two-set up airplane, right? We have the F-15C, if you could think of it that way because that's kind of your high-end air-to-air is a primary air-to-air with some multirole, the F-22 is primarily designed air-to-air and we added that later on and the F-35 is a multirole kind of an airplane whether we can mass produce and produce numbers. (personal communication, December 1, 2014)

The longer legacy aircraft age, the more contracting companies have to a substantial amount of work that may prove to be unworthy. They have to complete a plethora of engineering and rebuilding of engine pieces to ensure the aircraft continue to fly safely in the air space. This process costs the DoD a substantial amount of money and to get each aircraft up and running infectiously impacts the short-term money where congressional budgets are at right now. Getting the F-35 fighters out on time with the appropriate quantities will result in proper retirement of legacy aircraft, which is the key to cost savings for the DoD.

Senior Military Official #7" spoke on legacy aircraft by stating:

> The services are counting on this airplane [F-35] to replace legacy airplanes. If we don't achieve the commitments we've made to them as a program office, if we don't deliver those airplanes when they expect them with the capability they expect, one, they're going to have to spend a lot more money keeping the legacy airplanes in fleet. Two, they're going to have to accept less capability and accepting less capability in a strategic sense simply means we may not be able to

> do some of the things that we want to do someday or have to do someday to protect us and to protect our allies. You don't see that today and it's hard to quantify but it's a reality. It's a reality that if you don't have the capability that we plan on having, somewhere down the line, your options for the way you respond to the world and to threats will be different because you just don't have that ability to do what you need to do. We don't ever want to tell the President of the United States or the American people that we can't do something even if we know it's the right thing to do and it's the way we need to respond that we can't do it because we don't have the capability to do that. That's the biggest problem if we don't get this program done. We'll be left with legacy airplanes that can't do the things the F-35 can do. It will cost us more and we will limit our options as a world leader. (Personal communication, December 31, 2014)

The issue with legacy aircraft is it affects U.S. international allies and security partners as well (Gertler, 2014; Sullivan, 2014). Eight partners and three foreign military sales countries have invested in the F-35 to bolster their defenses and assist the United States with global issues. It is important that the U.S. has international allies and ensure they are just as capable so can assist as well as protect their own national security. Senior Military Official #7 stated:

> They [international allies and foreign military sales] can fight their own battles, and they need to do things, they don't have to always to turn to the United States and ask up to help and that's a really good thing. As a world leader, we want to be able to give our allies the best and the same that we have so they can help us and

> we can help them when it comes to take action if necessary and so are allies are really counting on the airplanes too just like we are. (personal communication, December 31, 2014)

Since legacy aircraft has been an issue for DoD, the Air Force has had to extend the life of F-16s and the Navy will have to extend the life of the F-18s. International allies, Canada and Australia, have announced that they will have extended their F-18 fleet. When airplanes are forced to extend their life, a major strategic shift is mandated, which makes new strategies difficult. Such shifts can give adversaries an opportunity to catch up with their advanced technology.

Summarization of the Findings for Research Question 2

Findings from research question 2 expressed that international allies and security partners are heavily affected with the production delays within the F-35 JSF program just as much as the United States. When there are constant delays, it affects the amount of aircraft that are procured. Currently, 4 countries have either deferred or reduced the amount aircraft they initially purchased. With a reduced amount of aircraft purchased, the rise in cost will be momentous. Below, Table 7 shows the common themes from participants and how their responses during the interviews assisted answering the research questions on the F-35 JSF program. Figure 4 shows the commonalities between the classifications or "nodes" and the research questions established for this research study.

Table 7

Research Questions and Themes

Research questions	Themes
How do constant production delays within the F-35 JSF program directly affect national security?	- The F-35 would replace legacy aircraft. - The program was created to save taxpayer money. - The JSF program is the largest acquisition to date. - The budget is over the initial established amount and will pose a problem if delays continue. - Concurrency is one of the major issues that have caused production delays. - Grounding aircraft, erroneous fires, in-flight issues, scheduling mishaps, and software issues were issues that caused production delays.
How are production delays within the F-35 JSF program relevant to National Security Strategy (NSS)?	- Production delays affect national defense guidance to a certain extent. - Production delays will decrease or lose air dominance that the U.S. has maintained since the Korean War.
How are production delays within the F-35 JSF program relevant to National Military Strategy (NMS)?	- Modernization is the key to global stability, economic balance, and ensuring security.
How do production delays of 5th generation aircraft directly affect national security interests?	- Lack of production with the fighter affects national security in some aspect. - Production delays entirely affect national defense guidance.
What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur?	- Legacy aircraft are crippling the congressional budget to sustain their lifecycle.

Research Questions	Categories Established	Codes Derived from Data Analysis
RQ1: How do constant production delays within the F-35 JSF program directly affect national security?	Overall Strategic Perspective Budget F-35	Acquisition, **budget issues**, contracts, F-35 Program, industry, International Partners & security partners, **modernization**, **political matters**, scheduling mishaps, social change, software issues
S1: How are production delays within the F-35 fighter relevant to National Security Strategy (NSS)?	Overall Strategic Perspective Budget F-35	Future scenarios, informational gap, modernization, **national defense guidance**, **national security interests**, **political matters**, **modernization, technology**
S2: How are production delays within the F-35 JSF program to National Military Strategy (NMS)?	Overall Strategic Perspective Budget F-35	History of aircraft, initial operational capabilities, **national defense guidance**, **national security interests**, Navy, Marine Corps, Air Force, **modernization, technology**
S3: How do production delays of 5th generation aircraft directly affect national security interest?	Overall Strategic Perspective Budget F-35	**Air dominance**, **capabilities**, concurrency, engines, **F-35 Program**, fusion, multirole, production issues, social change, stealth capability, legacy aircraft, low observable, technology, timetable, total force package, variant
RQ2: What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur?	Overall Strategic Perspective Budget F-35	**Air dominance**, **capabilities**, **budget issues**, maintenance, 4th generation, initial operational capabilities, upgrades

Figure 4. Research questions to coding categories, patterns, and themes. Bold denotes multiple codes in other categories

Conclusion

Chapter 4 discussed how data were collected and analyzed in order to come to the finality of this research study. It also explained how documentation was researched, generated, and collected in addition to face-to-face interviews. This research also produced findings and results that acknowledged the F-35 JSF program production delays affect national defense guidance to certain extent. The primary research questions attempted to explore the degree of potential risk the United States would face by not having the latest fifth generation aircraft mission ready due to production delays. The sub questions attempted to determine whether modernization played a key role in national defense guidance. Additionally, determining whether national defense guidance is violated because modernization is warranted in protecting the United States. (NSS, 2015) was pivotal in this research.

Data were collected via interviews, archival documents, and government research records, which found that production delays affect national security as well as its national defense guidelines. In addition U.S. strategies, research deemed that lack of modernized assets violated national defense guidance, as advanced technology is necessary in order to protect American interests, resources, and national security. Three issues discussed in this study deemed to be true in nature. Technological issues, scheduling delays, and budget costs are major challenges to the F-35 JSF program. Fifteen participants from the interview portion of this study agreed that such shortfalls within the program are a direct threat to national security and violates the policies established by the defense leaders such as POTUS, SECDEF, and CJCS. There was opposition as to whether or not national

security was seriously affected based on the F-35 being the sole modernized asset to deter aggression. Some thought the F-35 fighter was a piece to the puzzle in conjunction with other modernized aircraft such as bombers and naval carriers. Others believed there is a combined force in mitigating global threats that the fighter is the fifth generation asset of the future, which deemed its presence as necessary as airpower is the most important concept as a super power. More importantly, the opposition expressed that the United States would be in a serious state of vulnerability if its sole assets to thwarting threats was the F-35 fighter. The F-35 fighter has been deemed a critical piece to the nation's strategic puzzle and it takes a number of technological advanced assets in order for the United States to protect American resources and national security interests.

It was discovered in this research an obvious connection between F-35 production delays and violating national defense guidance, which puts the United States in an uncompromising position when it comes to safety and protection. As promising threats such as al-Qaeda and ISIS are rising globally and rapidly, the United States needs to be mission ready in order to thwart the war on terrorism. During the data collection process, the F-35 fighter was described as a critical piece to the puzzle. Without this specific piece, which is considered airspace superiority, the national security strategy is in jeopardy creating an imbalance with national defense guidance.

Overall, data collected via interviews, government research documents, and archival records discovered key issues that should be addressed for future research within the F-35 program. National security guidelines are policies established by POTUS with significant guidance from senior military and civilian officials on how to strategize

depending on specific scenarios. If guidance is violated, the mission to protect national security is severely compromised. There are multiple challenges within the fighter program beyond its control such as funding, software issues, and scheduling slips. Furthermore, results from the data collection process revealed modernization and globalization theories laid the foundation for this research study as both concepts are incorporated into national security policies. Chapter 5 identifies the findings from the data collected and analyzed and commits to the purpose of placing the results in the context of academic literature for this research study. The next chapter also includes implications for social change, recommendations for action, further action, and further study.

Chapter 5: Summary, Recommendations, and Conclusion

Introduction

This qualitative research case study was established to obtain a deeper and solid understanding of the F-35 Joint Strike Fighter program and how production delays affect national defense guidance. Additionally, this study was designed to answer specific research questions and subquestions to determine whether lack of modernization and production delays affect national security strategy that is delineated in guidance mandated by the President of the United States, the Secretary of Defense, and the Chairman of the Joint Chiefs of Staff. The National Security Strategy, National Military Strategy, National Defense Strategy, and the Quadrennial Defense Review function together as national defense guidance and are critical policies that are required and enforced by POTUS. Such guidance states that modernization is required in order to maintain a superior, dynamic force as a dominating, technologically advanced country (NMS, 2004; NSS, 2015; QDR, 2012). The research questions were pivotal in this study and laid a solid foundation as to where the United States will stand as a global force and maintain air superiority with or without the F-35 fighter program. The research questions were as follows: How do constant production delays within the F-35 JSF program directly affect national security? How are production delays within the F-35 fighter program relevant to National Security Strategy (NSS)? How are production delays within the F-35 fighter program relevant to National Military Strategy (NMS)? How do production delays of fifth-generation aircraft directly affect national security interests? What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur?

The primary objective of these two research questions was to determine the extent to which production delays within the F-35 fighter program produced a measure of vulnerability for America's national security. Without modernized, fifth-generation assets, would lack of modernized forces increase the risks? And if so, at what cost is the United States willing to accept such risks now that terroristic threats have increased in the past decade and primarily target the world's greatest force? Subquestions were intended to extend the research questions by investigating the nature as well as the characteristics of the F-35 JSF as illustrated in national defense guidance. All sub questions were pursued to find challenges as well as critical concerns the fighter faced and currently faces as a case study on the evidence of constant production delays. Furthermore, these sub questions were produced to identify deficiencies and provide improvement strategies and specific measures to realize the crucial need for the F-35 fighter to remain on or close to its full execution cycle.

Data collected through interviews, government research, and archival documents were analyzed through qualitative software and revealed that the budget, scheduling mishaps, and technological errors have been highly responsible for the production delays of the F-35 JSF program. Additionally, interviews supported that constantly delaying the fighter would inevitably put the nation in a great state of vulnerability in relation to adversarial threats. The United States will also risk its place as a global force and may lose air superiority if the fifth generation is not efficiently and effectively running missions. The F-35 JSF is today's answer in fighting air combat wars. By the full life cycle of the program, new acquisitions will be established to fight future threats.

Evidence from interviews also produced positive responses on behalf of the F-35 JSF program. Even though production delays have temporarily immobilized the program, production is currently stabilized and is on track, according to interviews with senior officials. The Marine Corps is currently on schedule to complete IOCs in the summer of 2015, and the Air Force will follow in 2016. The fact that IOCs will continue on schedule shows that the DoD is comfortable with the current status of the fighter to conduct flight-testing missions. With that said, there are still ongoing issues within the F-35 fighter program that will determine its destiny in the next 5 to 10 years.

The F-35 JSF program was established in the early to mid-1990s to create a more affordable, stealth, supersonic airframe to deter current and future threats (McGarvey et al., 2013; O'Rourke, 2009; Ozdemir, 2009; Sullivan, 2014, Wilkinson, 2010). The program was also established to benefit multiple service departments as well as the United States international allies and security partners in the fight for global peace and stability (Gertler, 2014). With such a dominant face, the F-35 provides guaranteed air superiority in which the United States is much more powerful and damming. The concept of the joint fighter meets the needs established in national defense guidance, which requires the nation to have a modernized and advanced technological force to maintain global dominance.

Condorcet's modernization theory and globalization theory were critical to the foundation of this study and served as its theoretical framework. Based on interviews, it was determined by all participants that modernization is needed in order for the United States to maintain a global force position. The F-35 JSF is the most innovation program

to date, and it is needed in order for America to face the latest adversarial threats. The globalization perspective was deemed critical because its concept was based on the need for advanced between countries social development (Mehlika, 2013). The F-35 JSF is an international program in which eight international allies and security partners have a vested interest in terms of funding, national strategy, multinational cooperation, and global peace and stability. Archival records and government research documents linked the academic literature to a technical program. The philosophical concepts of progressing, advanced, and developing were interlinked with protection, security, and stability.

Interpretation of the Findings

The primary research questions concerned how F-35 JSF production delays affect national defense guidance. Data were collected through interviews, archived records, and government research documents, which disclosed downfalls of production delays and a high probability of vulnerability for the United States if the fighter does not stay on track during its production phase. Research and interviews indicated that budget concerns, software issues, and scheduling delays are critical areas significantly affecting the fighter and its finality (Gertler, 2014; Hartung, 2014; McGarvey et al., 2013; Ozdemir, 2009; Sullivan, 2014). Investigations also showed that the longer the production phase, the increase in cost, the increase in cost, the higher the price tag for the fighter (Gertler, 2014; Sullivan, 2014). A higher price tag for the fighter would result in a reduction in sales, and a reduction in sales would result in an economic and national security failure for the United States. A specific amount of aircraft is needed in order to have a strong,

dominant force. In the initial deal with the DoD, Congress, service departments, and international allies/security partners, approximately 2,500 aircraft would be procured, which were considered sufficient for mission requirements. If the same amount is not sold, national security requirements change when dealing with aerial support operations.

Legacy aircraft has already suffered for the past 13 years in Operation Iraqi Freedom and Operation Enduring Freedom. Constant maintenance is required to keep worn aircraft operable, and at this point, this is a very expensive situation for the United States, as the F-35 is a multibillion-dollar program whose cost keeps increasing annually (Greaney, 2010). Service departments are to retire legacy aircraft in the next 5 to 10 years; this includes the Air Force's A-10s and F-15s/16s, the Marine Corps' Harriers, and the Navy's F/A 18s (Hartung, 2014). The Air Force's current aircraft are nearing their cycle at a rapid pace, and with the production stoppage of the F-22A Raptor, the F-35 would be the standing force in America's dominance.

These findings supported the notion that the F-35 program affects national defense guidance and that the measure of severity is increasingly high as aerial support and air combat are significant factors in the strength of a country's dominance and protection of critical assets. This is a matter that represents the concerns in globalization theory (1990). Lack of modernization affects global social development between countries. In this case, the United States and its eight partners have invested in the fighter program. The literature review identified patterns in costs, software issues, and scheduling problems and determined that the fighter would be a very expensive investment if production continued to immobilize sporadically. The literature review also

indicated that modernization is a key factor in the dominance and air superiority of a nation; the United States is currently the dominant force in terms of weaponry and advanced systems. Condorcet's theory (2003) supports this issue, in that there is a lack of modernized assets to protect the United States from adversarial threats. The globalization perspective indicates that lack of modernization due to immobilization of a particular aircraft (in this case) stops the progression of social development between countries. If the F-35 fighter is not being produced, sales drop, which in return causes countries to be disinterested because the price increases. The key to the fighter is affordability. If immobilization of the production phase causes the jet to increase in sales, it is no longer affordable as advertised at its establishment. In-depth research and interviews determined that modernization is a vital, mandated component in national defense guidance and that lack of production delays affect the requirement established by POTUS, SECDEF, and CJCS.

Additional findings also lent support that the United States needs technologically advanced assets in order to maintain its air superiority and protect national security. Without a consistent budget this cannot happen and the fighter will continue to be in jeopardy since the program is not protected from budget issues such as sequestration and government shutdowns. Republican Representative from Arizona, Congressman Trent Franks stated, "the Obama budget seriously threatens our ability to sustain our homeland security and overseas obligation (Republican Study Committee [RSC], n.d., para. 2). Congressmen as well as members from the Senate understand the risks and express their sentiment on not being able to fund program properly due to constant congressional

budget issues. According to RSC (n.d.), the budget is a damming issue and national security will be affected if there are budgets in the future. The committee gave the following statement in reference to impending cuts on programs: “Some of these cuts significantly threaten America’s ability to guarantee air dominance. Achieving and maintaining dominance in the air during wartime is a trademark of the U.S. military and many conservatives feel the budget proposal undermines the mission.” (RSC, n.d., para. 2). Republican Senator from Missouri, James Talent stated, “Air dominance is the cornerstone mission of the Air Force. Unless the skies are cleared of enemy forces, the rest of America’s military, bombs, non-stealthy strike fighters, ground forces, and naval vessels, cannot operate safely” (RSC, n.d., para. 3).

Findings about production delays and how it affects national security were validated by interviews as well as archival government research documents. The data collected emphasized that production delays are a major factor within the F-35 JSF program and it will impact national security negatively if delays continue or the program is immobilized for a significant period of time. Each interview noted that the F-35 fighter is a critical component to national security and without it the United States will not be ready for the fight against adversarial threats. In reference to the seriousness of national security, Senior Military Official #7 stated:

> From a purely national security perspective, giving the United States the freedom of action to respond anywhere on the globe military at the time of our choosing and the place of our choosing and the way we choose to do that is very, very important tool for national security. To be able to do that, you have to have the

> capability to do that and the world is a very complicated place and there are many different levels of threat...the F-35 program does the President and for the Department of Defense and for the people of the United States is it gives them the ability now and in the future to respond to many levels of threats in a manner in which we choose to do so. Primarily, the F-35 is built for high-end threats that we may see in the future. (Personal communication, December 31, 2014)

Former Air Combat Command Commander, General John D.W. Corley also stated:

> Direct attack of mobile or moving targets will grow difficult after 2015 and the new threat environment will be at 'full flush' by 2020...intelligence analysts expect that foreign nationals – China and Russia specially- will by the early 2020s have fielded not one but two new fifth generation fighters comparable to the best in the Air Force stable. These and other potential adversaries will have sophisticated ground-based air defenses. Even today, those modern air defenses are considered deadly to legacy fighter. (RSC, n.d., para. 8).

Through archived data and government research documents, it was discovered technological advancement is a critical element to maintaining superiority (GAO, 2013; CRS, 2013; Gertler, 2014; Greaney, 2010; McGarvey et al., 2013; Sullivan, 2014, Wilkinson, 2010). It is evident that the need for air dominance is a very important component for global power, to maintain security stability, and economic success. There are many concerns that such major threats as China and Russia will be close enough to surpass the U.S. record of over 60 years as a power force to be reckoned with (Slate, 2014). Additionally, there is uncertainty for the world if either of the two of the countries

becomes the outspoken global nation because security will be a magnificent factor, especially in how they approach global issues and participate in foreign policy.

This study showed modernization and globalization theories were the foundation in air dominance, global superiority, and worldwide stability, which is presented in this research. These theories are the sustenance behind the F-35 fighter program and the issues it currently faces. Even though some participants stated the fighter's production process is currently stable and on track, the program may be derailed due to technological errors and budget issues in the future. This resulted in the number of production delays due to congressional budget matters and software issues over the past 13 years. Finally, the findings on production delays with the fighter showed the magnitude of concern for the F-35 JSF program and this matter needs to be heavily emphasized to Congress. As of 2013, the F-35 fighter is the number one acquisition program, so it has been acknowledged that it is a vital program within the DoD, but it needs to be addressed as a vital program to Congress and consider protection from budget issues.

Particularly, the findings of this case study on F-35 production delays and how it affects national defense guidance were congruent with the problems that were identified: budget, technological, and scheduling. The program also showed modernization and globalization theories are two categories that provided a foundation for the direction of this study. Modernization as defined by C.E. Black is the "process by which historically evolved institutions are adapted to the rapidly changing functions that reflect the unprecedented increase in man's knowledge, permitting control over his environment" (Latham, 2000, p.7). S.N. Eisenstadt historically defined modernization as the "process of

change towards those types of social, economic, and political systems that have developed in Western Europe and North America from the seventeenth century to the nineteenth and then have spread to other European countries and in the nineteenth and twentieth centuries to the South American, Asian, and African continents" (Englewood, 1966, p.1). This concept is needed in order for countries, entities, and institutions to be prepared for evolution. Modernization elements are especially for social evolution; similarly, Spencer and Durkheim (1993) believed social evolution was a major factor for countries to establish autonomy and validate effective economy control. In other words, modernization is an ideology, which is studied to ensure countries mandate effective economic control of their nations, which has a significant part in protecting national security. Without economic stability, countries become vulnerable to adversarial threats and other global issues that can affects its citizen population, critical infrastructures, and sensitive assets.

Since the beginning of this research, I have found multiple definitions of globalization, which are relevant to this topic. Scholte defined globalization as ...stands [globalization] out for quite a large public spread across the world as one of the defining terms of late twentieth-century social consciousness" (Reich, 1998, p. 3). McGrew outlined globalization as:

> Multiplicity of linkages and interconnections that transcend the nation states (and by implication the societies) which make up the modern world system. It defines a process through which events, decisions and activities in one part of the world can

> come to have a significant consequence for individuals and communities in quite distant parts of the globe. (Reich, 1998, p. 3)

Cerny implied that globalization "redefines the relationship between territoriality and authority, shifting authority from the level of the state to supranational and sub-national units, perhaps offering most to grasp onto in operational terms but precious little in causal terms" (Reich, 1998, p. 3). He also added globalization is "a set of economic and political structures and processes deriving from the changing character of the goods and assets that comprise the base of the international political economy-in particular, the increasing structural differentiation of those good and assets" (Reich, 1998, p. 3).

Multiple definitions of globalization expressed in this research study were needed to show its importance in reference to modernization, global issues, international trade/policy, and national security. Additionally, the importance of globalization is based on worldwide amalgamation among countries that is based on universal perspectives, ideologies, and cultures (Mehlika, 2013). America's relationships with its allies and security partners are dependent upon similar values, views, and policies that are in the best interest of world peace, national stability, and effective security measures. Working with other countries and forming international relationships builds strength and unity. That is why the F-35 JSF fighter is so important. The United States currently has an international agreement with eight other countries to buy the fighter. When you present the most reliable, stealth, supersonic fighter known-to-date and share it with allies, it is more difficult for adversarial threats to attack. If researchers were to agree that production delays affect national defense guidance because it violates the mandate of a

modernized fleet, then the findings of the production delays are grounded in literature and in the theoretical framework of modernization and globalization theories, which of the foundation of this study.

Sub question 1 questioned how constant production delays affect national security. The study disclosed through interviews and archival documents that productions delays do affect national security. All participants agreed the F-35 fighter is considered a piece to the puzzle in reference to critical deterrent assets against adversarial threats. As a piece of the puzzle, the fighter works in accordance with bombers, naval carriers, and other reconnaissance devices. If the fighter is not a part of the equation, it will ruin the dynamics of the other capabilities that work in conjunction with this fifth generation asset, especially during wartime. Billions of dollars have been contributed to this program annually and its main objective is to protect national interests and assets. Without this integrated piece, it breaks down national defense guidance that suggests the United States requires modernized assets in order to maintain air superiority and stability.

The findings from interviews identified necessary information that correlates national security to modernization. Modernized efforts at a large capacity are needed in order to run a nation smoothly and effectively. Without modernization, countries tend to fall behind with technology and are vulnerable to national security issues due to lack of economic growth, strength, and security. When a country does not have modernized systems and/or advanced technology to preserve its assets, it is susceptible to major threats. Additionally, countries without advanced technology could require a significant

amount of time to recover. Interviews discovered that the F-35 fighter is a modernized asset that is needed in order to be effective against new world threats.

Moreover, findings on how production delays affect national security emphasized the need for the program to stay on track because of more potential budget issues. In order for the program to stay on schedule, there specific objectives the fighter must complete. For example, initial operational capabilities or IOCs need to run effectively for all service departments to test the capabilities of the aircraft (Gertler, 2014; Sullivan, 2014). At the same time, fighters will continue to be in the production phase as well as testing, which is another expense as concurrency of production can cost hundreds of millions. In part, the F-35 is relevant to national security because it deflects modernization rules and requirements that are embedded in national defense guidance. As the F-35 JSF as the most modern asset for the U.S., it is dependent upon congressional leadership and DoD senior officials to ensure that mandates in national security are abided by to maintain security stability.

Sub question 2 reflected on how production delays within the F-35 program correlate to National Military Strategy. NMS is a document established by the Chairman of the Joint Chiefs of Staff (CJCS), which emphasizes the primary role strategic concepts based on military capabilities (NMS, 2004). According to the former CJCS, Richard B. Myers:

> The NMS derives objectives, missions, capability requirements from an analysis of the national security strategy, the national defense strategy, and the security environment ...the NSS and NDS provide a broad strategic context for employing

> military capabilities in concert with other instruments of national power. (NMS, 2004, p. 2)

NMS is primarily a derivative of NSS and other national defense guidance, which establishes specific objectives in obtaining and maintains strategic power. This strategic method centralizes on military interests and how to reach certain objectives through joint operations and exercises. At this level, the NMS encourages CJCS to work feverishly with all Service Chiefs and combatant commanders to come to common goal with addressing required capabilities and assessing risks.

As the NSS identifies homeland defense to the United States, NMS provides information on how militant involvement is critical to protecting the United States abroad and domestically. Under NMS, "Armed Forces use their capabilities to secure strategic air, land, sea, and space approaches to the United States and its territory...when directed, the Armed Forces employ military capabilities at home to protect the nation, the domestic population and critical infrastructure from direct attack" (NMS, 2004, p. 2). In addition, under NMS, the United States must work with international allies and security partners with amalgamation of military capabilities in order to prepare for possible attacks from adversarial threats or natural disasters.

The production delays within the F-35 program are relevant to NMS because this document stresses the need for modernized capabilities and advanced technology in order to protect the United States. According to the NMS, "the threat posed by adversaries, especially those that possess WMD/E [Weapons of Mass Destruction/Explosives], is so great the United States must adopt a global posture and take action to prevent conflict and

surprise attack" (NMS, 2004, p. 2). It is important the United States attains specific objectives in order to shape the security environment on a global level. By having international allies and security partners, the United States is guaranteed to have a greater chance of mitigating aggression as well as set permanent procedures in place to prepare for combat if deterrence techniques are inadequate.

Analysis of interview transcripts disclosed a plethora of information on how the F-35 fighter is critical to national military strategy. Some qualities issues, which have delays productions, emphasized how military strategy is weakened because the vital piece to the puzzle is missing from the equation. The fighter is still in the production phase of the program and will continue to be for approximately five more years. Transcripts also revealed the dilemma between constant production delays, how budget issues affect its progression, how software issues may be the new matter of the fighter's time, and how this all affects national security. There were also challenges in determining the measure of vulnerability the United States would face without the F-35 mission ready at this moment. Through interviews, participants revealed the lack of production of for the F-35 could adversely affect national security, there are other components that still exist that could assist in protecting national security, but a specific cost (i.e. legacy aircraft, naval carriers, and other aircraft). More about alternatives for the F-35 fighter will be discussed under findings of research question 2.

Sub question 3 correlates with sub question 1 on how fifth generation assets directly affect national security. With sub question 1, data was collected to determine production delays affect national security based on specific elements that need to be

adhered to. Modernized systems and advanced technology are needed according to national defense guidance established by POTUS, SECDEF, and CJCS. Production delays with the fighter break down guidance outlined, which is a violation of national security standards. Sub question 3 investigated whether the F-35 production delays directly affect national security. Interviews expressed that inconsistent delays and fifth generation assets that are not currently ready directly affect national security. According to Senior Military Official #4:

> You would argue that by virtue of not having that airplane [F-35] we have more risk...we've accepted more risk by not allowing to have that airplane available when it was supposed to be available and that could put national security in jeopardy. (Personal communication, December 1, 2014)

Research question 2 discovered the fate of legacy aircraft if production delays persisted. During much interviews and governmental research, it was revealed that all service departments will extend their in order to maintain combat missions until the F-35 is fully up and running (Gertler, 2014; Sullivan, 2014; Wilkinson, 2010). The downfall to keeping legacy aircraft mission operable is that it will be a very expensive bill for the federal government, compromising other federal agency funding. It is known that it costs millions of dollars to keep aged aircraft combat ready and the "wear and tear" on fourth generation assets definitely puts national security in jeopardy. It is imperative that the F-35 JSF program is fully operational, sooner rather than later, to ensure preparedness for 21st century threats.

Research Questions	Categories Established	Codes Derived from Data Analysis
RQ1: How do constant production delays within the F-35 JSF program directly affect national security?	Overall Strategic Perspective Budget F-35	Acquisition, **budget issues**, contracts, F-35 Program, industry, International Partners & security partners, **modernization**, **political matters**, scheduling mishaps, social change, software issues
S1: How are production delays within the F-35 JSF program relevant to National Security Strategy (NSS)?	Overall Strategic Perspective Budget F-35	Future scenarios, informational gap, modernization, **national defense guidance**, **national security interests**, **political matters**, **modernization, technology**
S2: How are production delays within the F-35 JSF program relevant to National Military Strategy (NMS)?	Overall Strategic Perspective Budget F-35	History of aircraft, initial operational capabilities, **national defense guidance**, **national security interests**, Navy, Marine Corps, Air Force, **modernization, technology**
S3: How do production delays of 5th generation aircraft directly affect national security interest?	Overall Strategic Perspective Budget F-35	**Air dominance**, **capabilities**, concurrency, engines, **F-35 Program**, fusion, multirole, production issues, social change, stealth capability, legacy aircraft, low observable, technology, timetable, total force package, variant
RQ2: What is the future of legacy aircraft if delays such as the F-35 program continue to occur?	Overall Strategic Perspective Budget F-35	**Air dominance**, **capabilities**, **budget issues**, maintenance, 4th generation, initial operational capabilities, upgrades

Figure 4. Research questions to coding categories, patterns, and themes. Bold denotes multiple codes in other categories.

Implications for Social Change

Results from this study further augmented how production delays affect national defense guidance and impact relationships with foreign policy and strategic matters. Implications for social change involved policy-related consequences due to continued delays and their impacts on national security interests as well as relationships with international allies and security partners. This included sustaining international alliances and global security partnerships that have significant interest embedded in the F-35 fighter program. At this time, the United States has a multilateral cooperation agreement with eight countries, security partners, and foreign military sales customers to procure a specific amount of fighters as a global coalition force (Gertler, 2014; Greaney, 2010; Ozdemir, 2009; Sullivan, 2014). National security is America's most valuable obligation to maintain global powers and protect national interests. Additionally, the necessity for national security ensures continued existence through political endeavors, international relations, economic stability, and power projection.

If there are inadequate practices to protect national security, then the United States faces inevitable vulnerability to adversarial threats, which can compromise the federal government's strategic methods against global and domestic enemies. This can make it very difficult to deter aggressors in the present and near future. Additionally, when national security standards are not adhered to, it is very difficult maintain the "global power" title as the number one force in the world. It is imperative that the United States maintains a strong political standing as well as preserve a respectable standard to keep such international programs on a track when it is a multi-billion dollar program that

affects a variety of players. With such a large acquisition program, it is mandated that specific requirements stay on task.

The F-35 fighter was produced to be an affordable program for all service departments as well as international alliances, security partners, and foreign military sales customers (Bolkcom, 2007; Gertler, 2014; McGarvey et al., 2010; Sullivan, 2014; Wilkinson, 2010). What makes this program distinct from other acquisition programs is its size, multinational cooperation, and the fact the F-35 is multirole airframe (Ozdemir, 2009). Through analyzed interviews, it was determined that production delays for the fighter affect social change to negatively impact relationships with international allies. This fighter is based on a modernization requirement for the United States that emphasizes the need for an advanced weapons system to deter future aggression. This aircraft was created as the primary solution to emerging threats against national security interests. In combination with modernization and globalization theories, the fighter represents social change and how it will solely change the world as latest and greatest fifth generation aircraft known to man. It also represents social change because it is projected to be the most affordable, powerful asset, which should result in the United States maintaining air superiority and boost maximum participation with international partners. The affordability clause and purchase of sales from other countries will boost economic growth (Gertler, 2014; Sullivan, 2014).

The F-35 JSF also provides the opportunity for the United States to increase military operations with international partners and exercise critical scenarios, which provide security and peace at a global level. The primary objective is to protect American

national security interests and international alliances while establishing global peace, stability, and producing economic growth. In order for the United States to sustain global force power, strategic plans have to be implemented by the guidance established. The F-35 fighter satisfies those requirements by offering stealth, supersonic capabilities that no other fighter jet can fulfill. Furthermore, the fighter is the epitome of air superiority based on technological advancements developed over the past two decades to fight and conquer adversarial threats.

Condorcet's modernization and Giddens' globalization theories have a deep, rich impact on social change in this study. Social change is a very important element, for not only academic research and literature, but also social-economic development from the lowest level. No matter if research studies make a small change or a global difference, it is still significant because it gives researchers, scholars, and experts the ability to bring to reality to new information introduced to academia. All information developed in research given an opportunity to bring change to the world.

Social change is an important aspect of this study, as the United States wants to maintain global peace and stability as well as keep positive relationships with its allies and security partner. China is right behind the United States when it comes to one of the largest and most innovative economies in the world. In addition to their closeness in dominance, the country has a 21st century fighter that is very similar exterior and resemblance to the F-35 fighter (Slate, 2014). Right behind China is Russia, a large militant force, who wants to continue to innovate and dominate. In order to promote and protect global stability, the United States needs to strengthen its relationships with its

international allies and security partners. The POTUS and SECDEF will be responsible for acknowledging continuous modifications and keep foreign policies current to inform the nation on new strategies as well as assist in mitigating potential threats at a global level. For the Air Force and Navy (including the Marine Corps), the key to identifying current threats and ensuring the United States prepared for adversarial attacks is the F-35 Joint Strike Fighter. For national security, the fighter is the most prominent aircraft in protecting national security.

Social change in this study focuses on the United States' larger picture of establishing global security, sustaining air superiority, and strengthening international relationships with its allies, critical issues need to be handled at home. In order for the United States to handle global issues, there needs to be a better understanding of national security issues and how they are handled by Congress and DOD. Taxpayers need to understand how their money is spent and be educated on programs that require a substantial amount of funding. The F-35 JSF program is one of the largest and most expensive acquisition programs in American history. If taxpayers knew more about the history of the fighter program, there would not be any misunderstandings of its capabilities as well as understand the importance of its mission. American citizens need to be educated and know that the most innovative assets are required to protect the nation and keep it safe. In this case, the F-35 fighter is the "latest and greatest" asset of the 21st century to maintain air superiority so the United States can continue to be the global force and protect national security.

Recommendations for Action

The results of this study afforded recommendations that were made in order to further improve the F-35 JSF program. Such recommendations proposed to senior leaders were to further promote stability of the program and maintain thorough oversight to ensure it stays close to its projected timetable as well as mitigate continued costs. Some recommendations included additional steps that are not currently performed by senior leaders and agencies that are not involved with the program that may be beneficial to its success. Internally, suggestions were offered to officials and individuals who make direct decisions on the program and for external purposes, suggestions were made to those who do not have an indirect effect on the program, but do research to formulate worse/best case scenarios on behalf of the program.

Budget

All participants from past interviews agreed the F-35 JSF program is not protected from budget issues such as lack of a congressional budget, sequestration, and government shutdowns. In fact, there are no programs that are funded by the federal government that are protected from congressional budget issues. Information from government research documents and archival records also confirmed the F-35 program is not protected from congressional budget issues (Gertler, 2014; Sullivan, 2014; Sullivan et al., 2014;). This provides a catastrophic dilemma if the government does not make decisions on a fiscal budget each year. In March 2013, the nation faced a sequestration that put the economic in a downward spiral. A government sequestration is a term:

> Adapted by Congress to describe a new fiscal policy procedure originally provided for in the Gramm-Rudman-Hollings Deficit Reduction Act of 1985—an effort to reform Congressional voting procedures so as to make the size of the Federal government's budget deficit a matter of conscious choice rather than simply the arithmetical outcome of a decentralized appropriations process in which no one ever looked at the cumulative results until it was too late to change them. (Johnson, 2005, para. 1)

The sequestration process highly impacted the fighter community, which resulted in grounding aircraft in 2013. According to Gertler (2013), aircraft were grounded in addition to loss of workdays for civilians and agency shut downs. Additionally, test flights that were conducted at the time of sequestration found major issues with the F-35 that could not be further pursued until the restriction of grounded aircraft was lifted. The same year the nation experienced a government shutdown, which affected the fighter community once again. This shutdown resulted when Congress did not approve appropriation of funds before the cutoff date, which was September 30, 2013. The Republican led House agreed to provide funds through December 15, 2013 as long as Democrats agreed to specific revisions under the Obama Care program. When Democrats denied the bill, government shutdown happened on October 1, 2013 where 800,000 federal defense civilians were furloughed. President Obama did not sign a temporary spending bill until October 17, 2013 to restore the government (DoD, n.d).

With major congressional budget issues that have affected the F-35 program in the past, it is recommended that Congress and the DoD strengthen their relationship and

Congress have more strict measures on the budget environment. Scholars researched that CBO suggested to Congress to cancel the F-35 program entirely (Hartung, 2014). According to Hartung (2014) it would save the federal government almost $50 billion dollars to leave the program and concentrate on upgrading legacy aircraft. Congress should continue to approve fiscal budgets in an appropriate manner to where the fighter program is not in jeopardy to possible indeterminate immobilization without considering to cancel the program. It may be a bold recommendation or a suggestion that it is not within the scope of culpability, but it is known when Congress does not approve budgets at the specified annual suspense (September 30th of every year), detrimental effects put all federally funded programs at risk. The year 2013 was a prime example that production delays ceased twice due to sequestration and the government shutdown. These delays were in addition to other issues the program has faced over the past decade.

Given the critical role the budget plays in the F-35 JSF program, it is imperative that the DoD strives to be more vocal as advocates in maintaining the budget projected on the program's lifecycle as well as protect the budget from congressional issues as much as possible. In order for the fighter program to be successful, money is the key to its completion. These endeavors could vary from revising, establishing, or re-examining policies and regulations that could augment the way Congress does business. Furthermore, such changes in policies and regulations from the DoD could influence Congress to revise and/or produce new laws and regulate budget undertakings to protect the largest acquisition to date without effecting and/or compromising other federal agencies set budgets.

Another recommendation that could benefit the fighter program is restructuring the budget platform. According to Gertler (2014), the DoD requested $7.8 billion for fiscal year 2015 to fund the F-35. For 2015, this would fund only "26 A-variants, 6 B-variants, 2 C-variants, and continuing development" (Gertler, 2014, para. 3). This is $2.4 billion increase from last year's budget as well as an additional request over $520 million for advance procurement. If there was a stabilized amount of funding annually, there should a constant production of the fighters by the year's end.

Concurrency

Interestingly enough, most participants talked about the biggest impact the fighter faced since its initial debut, which is concurrency production. Merriam-Webster defines concurrency as "simultaneous occurrence of events or circumstances" (2014). As concurrency relates to the F-35, much flight test is instantaneous with production as well as IOCs. This particular course of action was considered beneficial for the program because it allowed unwavering manufacturing, which produces rapid delivery and provides a larger supply chain. According to Lockheed Martin (2014), "because of currency, early production aircraft require some retrofits to implement changes based on flight test discoveries" (para. 5).

Suitable recommendations on currency issues would be to only use this measure when absolutely needed to avoid spending millions of dollars pulling operational fighters to ground for upgrades found in the testing phase. At this rate, Lockheed Martin has stated that concurrency production has lowered cost estimates approximately $500

million due to more effective methods and added positive initiatives to make upgrades and software more proficient.

Fighter's Software Issues & Fifth Rebaseline Initiative

With constant production delays with the F-35 JSF program, there has been speculation that the fighter jet may not complete the testing phase on time. Testing was to be completed almost four years ago, but reports stated that it could be after 2018 until the jet is fully completed with testing. Continued usage of testing trial and errors could extensively damage the billion, which is already strained. According to news reports, the fighter is now suspected to cost the federal government $1 trillion dollars by the 2037 lifecycle of the jet (Drew et al., 2013; Gertler, 2014; Greaney, 2010; Sullivan, 2014). Testing errors along with new and past issues will surely surpass the $1 trillion dollar mark. In addition to testing errors, the exposed report identified senor mechanisms, defective sensors, electrical systems flaws, and structural cracks. With electrical issues known as one of well-known issues, the other mechanical issues seem to be newly introduced to the program. The most important element to the new concerns about the fighter's software issues is the ultimate reason for its existence; it may not have the stealth capability the program suggested. As mentioned in the previous section, concurrency was a failure to the fate of the fighter and was instrumental in production delays.

With new and past errors with the fighter, it would be respectively benign to conduct a fifth rebaseline to survey the program in an attempt to avoid another Nunn-McCurdy breach. There were four rebaselines over a 10-year period. The first rebaseline

was established in 2004 because there were some weight and performance issues with the fighter and the second rebaseline was due to over budget costs and scheduling mishaps. The third rebasline "exceeded critical cost growth thresholds established by a statute – a condition known as a Nunn-McCurdy breach" (Inspector General [IG], 2013, p. 2). The Nunn-McCurdy Breach refers to:

> Title 10, U.S.C. 2433, Unit Cost Reports (UCRs). This amendment to Title 10 was introduced by Senator Sam Nunn and Congressman Dave McCurdy in the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 1982. Requires that Acquisition Category I (ACAT 1) program managers (PMs) maintain current estimate of Program Acquisition Unit Cost (PAUC) and Average Procurement Unit Cost (APUC). If the PAUC or APUC increases by 25 percent or more over the current Acquisition Program Baseline (APB) objective, or 50 percent or more over the original APB objective, the program must be terminated unless the Secretary of Defense (SECDEF) certifies to Congress that the program is essential to national security. (Defense Acquisition University [DAU], 2012, para. 1)

Due to a breach in the Nunn-McCurdy Act, the DoD had to revise the program to ensure it would not happen again in order to avoid termination of the program and its entirety. A safety measure in place would be SECDEF's power to ensure Congress this program is a critical asset to national security. The last fourth rebaseline "continued extensive restructuring actions during 2011 and 2012 that added more funding, extended schedules, and further reduced aircraft procurement quantities in the near-term" (IG,

2013, p. 2). In the spring of 2012, the fourth rebaseline was finalized that added restructured program actions and new budget requests.

A fifth rebaseline should be in future practices to ensure issues are not repetitive. Each rebaseline was constructed for specific reasons and different problems within the fighter program. Since there are drastic, recurring issues that have been identified over the past 10 years that cost a significant amount of money, it would be dependent upon the Joint Program Office (JPO) and the DoD to ensure that such matters are mitigated.

National Security

Initially selected as the JAST program, the F-35 fighter has become a vital problem in the federal government because of Congress' trepidation about the budget issue. Such budget issues and cost concerns can prelude implication for national security. There is no denying that the F-35 JSF is the nation's number one asset in protecting national security for the 21st century (CRS, 2013; GAO, 2013; Sullivan, 2014). The problem that arises is the severity of vulnerability America will face if the fighter continues to experience production delays and compromise its current timetable. Congressional support has bolstered during the constant delays of the fighter and it has been addressed in many government research records. The Senate has acknowledged the need for the F-35 fighter. According to the Congressional Research Service, "the committee believe the continued development and funding of all three variants of the F-35 Joint Strike Fighter is critical to maintaining U.S. air dominance" (2014, p. 38).

According to the DoD and JPO, the F-35 fighter is leading proposition in the face of national security for the United States. To show the importance and criticality of the

JSF program, the DoD expressed to Congress to need to continue the program when the fighter exceeded its budget threshold breached the Nunn-McCurdy Act in 2010. When Congress approved it continuance, the program rebaselined once again in 2012 ensuring it would not exceed thresholds again.

Based on interviews for this research study, statements have expressed that the F-35 fighter is in a much more stable process, but issues such as software, budget, and time can continue to affect production. It is speculated that if the DoD is constantly stands down jets and suspend units due to such issues, this will inevitably affect national security.

Senior Leadership Seminar

It is detrimental to the success of the F-35 JSF program to have efficient and effective communication between all senior government and industry officials as well as those who are directly and indirectly involved with the fighter (personal communication, December 31, 2014). Data collected from interviews revealed all participants were primarily on one accord with the purpose of the largest acquisition, why it exists, the current problems, and specific decisions that were malpractice for the F-35 fighter. There were different statements on how production delays affect national security in the aspect of the entirety of the program or as a piece to the puzzle with other deterrent technology. As mentioned under the national security portion, the severity of the vulnerability America's national security will face is a different perspective from some participants. It is believed to be a vital deficiency in its seriousness of the production phase when the criticality levels are unbalanced based on statements during the interview. In other words,

when you have some participants state the vulnerability is high but the F-35 is only a piece to the puzzle while other interviewees state production delays are not only a high vulnerability point for national security, but air superiority is the most supreme detergence against aggression can pose conflicting theories of the seriousness of production delays.

It would be very beneficial for all senior leaders (military, civilian, and industry) to come together for an annual seminar to mitigate ongoing issues within the program to ensure it stays on track. This would be a good platform for all senior leaders who make decisions that directly affect the program to collaborate and cover all areas from the budget, technological and weapons system issues, scheduling mishaps, and status updates to ensure clarity and accountability. It is believed this would be a setting that does not happen too often, but it is intuitive that this be a mandatory requirement for all senior leadership who accept the position and/or role to be involved with the fighter and attend seminars to enhance its success. Moreover, this seminar should be distinct from other round tables because it should address every single detail of the fighter to move its production, testing, and IOCs in the right direction.

According to Senior Military Official #7, there are currently annual conferences where key leadership (DoD military and civilian), representatives from the 8 international partners, security partners, and foreign military sales attend, but there are specific issues that warrant a more in-depth review of the program. For example, industry leadership should be included (if not already) and since the program is an American led program, specific conventions should be tailored to key leaders within primary contractors

(Lockheed Martin and Pratt and Whitney) and DoD components (Greaney, 2010; Ozdemir, 2009). There are specific matters that should be covered at considerable levels (sensitivity of information), which not all representatives invested into the program should have a "need-to-know."

An important area of study that should be further explored for production delays of the F-35 JSF program is considered ending concurrency production. The DoD has to fund millions of dollars maintaining legacy aircraft over the next few years that it would be very intuitive to cut costs in ways that would be beneficial to the fighter program. Concurrency production is another issue that costs the government millions when returning the fighter back to the production line for modifications. The participants for this research study were a part of the DoD agencies that work directly and make decisions of the F-35 program. Speaking with these participants again the future to discuss concurrency issues would likely generate additional information on this particular challenge. Additionally, it may be possible that such participants could inspire different scenarios on how to testing F-35s and avoid continuous modifications.

The current Acquisition, Technology, and Logistics Chief, Frank Kendall, referred to the concurrency production as "acquisition malpractice" (Gertler, 2014, p. 30). Former program manager, Admiral David Venlet described concurrency as "fundamentally a miscalculation" (Gertler, 2014, p. 30). Looking more in-depth into currency production might search for specific consequences of how concurrency costs can be reduced or if concurrency can be removed as part of the production process. Additionally, a look into concurrency could potentially speed up the production process if

other solutions are identified. A perceptible characteristic about concurrency in this study is the constant need for modifications after the jet is taken off the production line and set for testing. If the maximum amount of modifications, upgrades, and issues were mitigated prior to testing, there would be a substantial amount savings.

According to Gertler, "the degree of concurrency in the F-35 program, in which aircraft are being produced while the design is still being revised through testing, appears to make upgrades to early production aircraft inevitable" (2014, p. 19). The cost of upgrades depends on the issues and the type changes that need to be made during the testing process. The downfall to this issue is the cost of the aircraft does not include modifications, upgrades, or errors. This study concentrated only on F-35 production delays and how it affects national defense guidance. It incorporated advanced technology and how modernization and globalization theories served as the foundation of the study. Seeking to find out if production delays violate national defense guidance served as purpose of satisfying the existing gap in literature focused more on national security requirements. There is a possibility dissimilar outcomes would materialize from additional research studies that exclusively focus on gaining further understanding of production delays within the F-35 program. A possible research question could ask, can the removal of currency production mitigate F-35 JSF delays? What constitutes an effective and effective production line for the JSF? How can mitigation of concurrency production be measured?

Recommendations for Further Study

It is very intuitive that this particular qualitative research case study continues for additional information on the budget, technological errors, and scheduling matters. The Nunn-McCurdy Act breach should have called for a thorough investigation alongside in-depth research to determine the initial budget that was set almost 13 years ago and why funding was not interjected to prepare this program for such problems. Data collected from interviews suggested additional funding in the initial budget was not projected for future problems with the F-35 JSF program.

Furthermore, it would be intuitive to research the concurrency process and how it continues to affect the production aspect of the program. Concurrency within the fighter program has been quoted as "acquisition malpractice" and I believe in order to understand its process, a researcher should further investigate this method. Researcher could gain an in-depth knowledge on concurrency to determine if it would be more beneficial to maintain this practice or if it would be cost-effective to seek other alternatives when it comes to production, testing, and training.

Another area of study would be the affect production delays have on international partnerships, security partners, and foreign military sales. Ozdemir's (2009) thesis titled, *"Analyzing the Multi-National Cooperative Acquisition Aspect of the Joint Strike Fighter Program"* thoroughly discusses the international investment with the F-35 fighter program and the cooperative agreement allies and the United States. I believe additional research should be conducted and centralize on countries that have previously invested in the program and obtain their opinions towards the program's progression. Moreover,

there are security partners and other allies that are interested in the fighter but have not invested and others have deferred their accounts. It would be a very interesting research to gain knowledge on the future of the fighter program if international partners and security partners decide to leave the program and how it will affect the United States, its economic balance, political standing, and national security strategy.

Importance of the Study

This research study is important because interviews, archival data, and government research records revealed F-35 production delays affect national defense guidance on a specific level. Furthermore, data collected discovered that lack of modernized assets put U.S. national security at risk, which can compromise the nation's super power status. Out of 15 participants, 13 agreed the fighter's constant delays would put national security at risk because DoD is currently depending on 4th generation aircraft as its combat warfighter. Additionally, the nation's adversaries are using their 5th generation aircraft and it is a great possibility that the U.S.' legacy aircraft will not match to the latest technology. Surprisingly, two of the fifteen participants expressed that the F-35 fighter is not the sole asset to protect national security. It is a "piece to the puzzle" that works with other technologically advanced systems in order to successfully confirm to strategic guidelines on national security.

With much information from documentation and interviews, there is still an informational gap on how the F-35 directly correlates to national security strategy. Additional research should be conducted to determine the severity of vulnerability if the F-35 program does not make its full execution or is truncated. As the program claims

more notoriety in the media, satire magazines, and scholarly research, there is a strong need for additional information. Current research as of 2014 and 2015 is now supporting the F-35 fighter's need to exist and provides "cut throat" consequences if the program continues to face issues. Even though there is current research concerning F-35 delays and how that affects DoD, national security, and international partners, there is a serious need for additional studies to concentrate on how its mission directly affects national security and the overall strategic picture for the present as well as the future. Figure 5 shows a direct correlation on how production delays affect national defense guidance.

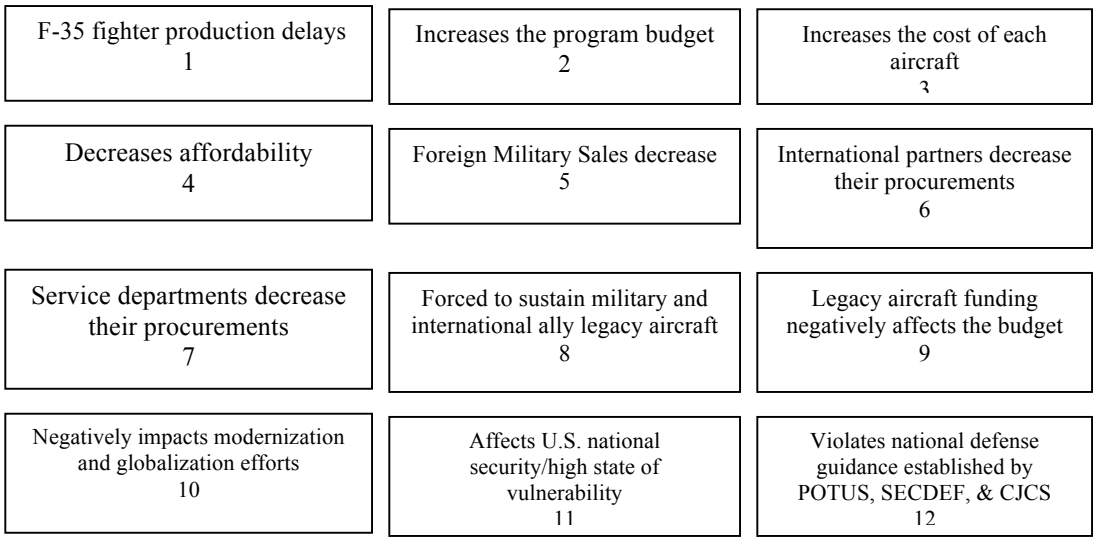

Figure 5. Correlation between F-35 fighter production delays and national defense guidance. Research-developed link.

Academic Literature & Informational Gap

The dilemma is there is insufficient research as to whether F-35 JSF program production delays affect national security. There has been a plethora of research that acknowledges the fighter's periodical immobilization, which is technologic/software,

scheduling mishaps, and funding issues. Those issues have been discussed in numerous scholarly works (Drew et al., 2013; Greaney, 2010, Hartung, 2014; McGarvey et al., 2013; Sullivan, 2014), but there has been inefficient on whether issues direct affect national security. Through academic research, the F-35 JSF became more than just a fighter program, but an educational phenomenon. There has been limited research in academia on the topic because the F-35 fighter is a governmental program, which is based on technical and complicated data. Government research facilities, military personnel, and civilians have researched the F-35 in-depth and specialize in the program's issues, history, and current status.

There is significant amount of information that is not known about the fighter and is worth studying in academia. This program alone has single-handedly created over 125,000 jobs in 46 states as well as jobs in over 50 countries, which has boosted the U.S.'s economic development (Hartung, 2014). The largest acquisition program in American history is responsible for international and alliance relationships to produce an airframe that can be a "piece to the puzzle" in maintaining global peace and stability. With such uniqueness, technicality of the airframe, and how much it affects a global society, the fighter still leaves unanswered questions to its future and if it will stay on the current timetable to be the "active" 21st century aircraft for the United States.

The United States has the most prestigious research facilities in the world to study the F-35 fighter in order to enhance its capabilities. Government research facilities such as the Air Force Research Laboratory, the Congressional Research Service, Defense Advanced Research Project Agency, Defense Technical Information Center, National

Defense Research Institute, and the Rand Corporation has provided a substantial amount of data on the airframe's establishment, historical background, foreign military sales, international partnership, and current status. Its global program has received much negative attention, which has affected the fighter's overall goal to be the most dominant weapon in the world. According to scholars, the fighter's constant delays question the timetable over the next 20 years for the fighter's full production (Drew et al., 2013; Greaney, 2010; Ozdemir, 2009; Sullivan, 2014). Additionally, constant delays make it difficult to determine whether national security is directly affected.

The purpose of this study was to identify the information gap between the F-35 JSF program and national security. It was not known how constant production delays within the F-35 JSF program directly affects national security and this study gave key findings on what directly affected the fighter's mission. Also, this study was to acknowledge an informational gap between lack of production and modernization. This research study will be a great asset in academia in terms of understanding national security and what is needed in order to protect it. This study serves a purpose to inform the United States community that advanced technology is a key factor in protecting national security, which is a modernized movement. The modernization theory proved to be a guideline in expressing national defense guidance mandates. The globalization theory is a perspective that countries progress through social-economical development. Both theories have proved to be requirements for the F-35 JSF program when it comes having the latest technology to protect U.S. national security interests. The informational gap in this study has served the purpose to find a connection between national security

and modernization. Through this research study, researchers and experts can continue spread knowledge about the F-35 JSF fighter and how the largest acquisition program in history can continue to influence global development through international alliances and multinational cooperation to accomplish global security, stability, and peace. Through academia, continued research can be conducted to service other aspects to the F-35 JSF program.

Researcher's Reflection on Research Study

The thorough review of this qualitative research case study on whether or not production delays affect national defense guidance was predicated on multiple assumptions. It was presumed that constant production delays affected national security to where American interests would be at stake as well as be susceptible to adversarial threats. Additionally, it was assumed such delays violated policies, which were outline in national defense guidance established by senior leaders such as POTUS, SECDEF, and CJCS. Furthermore, it was predetermined that production delays affected relationships between United States and its international alliances and security partners because an increase in delays resulted in an increase in the price of each fighter jet, which would affect the amount purchased based on initial procurement. Finally, production delays would drive the cost to an exponential number that it would be unaffordable for all U.S. service departments causing them to rely on fourth generation assets that are considered up to par with 21st century threats.

Considerably, extensive research in addition to data collected from interviews and archival government documents corroborated all postulations for this study. Such

approaches showed consistent information that production delays in fact affected national security, but to what extent in terms of severity and dangerousness to the American public and national interests. To such degree, much research proved production delays have existed and will continue to exist whether or not the program has improved significantly with more streamlined manufacturing. Research also showed that one of the major issues with budget increases was due concurrency methods.

All participants in this research study supplied honest and straightforward responses to the interview questions. Data was collected from all 15 participants in a professional and pleasant way. The communication and rapport between the participants and I, as the researcher, was based on a mutual respect and understanding one's position during this study. In general, every participant gave vital and extremely useful information, which was the success of this entire study. It individual was exceptionally helpful and very supportive of my endeavors with the F-35 JSF program. Some participants could not participate due to busy schedules and sensitive issues out of their control but was kind enough of to recommend other participants that would be very intuitive to the interview process. Not one individual declined the interview due to disinterest or any negative connotation; each individual ensured me a through data collection process because the F-35 JSF program is a respectable and interesting topic.

As for my thoughts about the severity of national security vulnerability due to production delays, the research disapproved this contemplation. Some participants from the interview stated the F-35 fighter is just apiece to the puzzle while others believed the fighter is the sole aggressor deterrent because air superiority is the determining factor in

being a global force. Despite the opposition to whether national security is highly affected or not, this finding did not show that the F-35 JSF program importance was diminished. It will continue to be the most highly critical program as well as the largest acquisition in American history.

The coding process was an interesting experience for the analysis of this research study. NVivo software, a product of QSR International, was particularly instrumental in the analysis portion and was proven to be quite beneficial. The tutorials via YouTube and the help menu on the QSR International web site showed me how to upload interviews, build folders, create nodes (or classifications), and how to produce reports based on the amount of statements selected for each category. Such tutorials made it easier for me to analyze in a much meaningful and constructive way. Additionally, NVivo was exceptionally accommodating during the coding and theming processes in which specific codes could be updated, edited, renamed, moved, consolidated, and/or deleted.

Conclusion

This qualitative research case study sought to gain a deep understanding of the F-35 JSF program and how production delays affect national security. It also sought to understand how modernization is a key factor for ensuring advanced technology affects national security standards. Furthermore, this study attempted to explain repercussions when national defense guidance is violated because such guidelines outlined in policies are not followed, resulting in a less modernized force to face new adversarial threats.

Finally, this case study wanted to address the informational gap on the consequences of production delays, which denotes modernization standards that are not

sustained because of constant issues such as budget costs, technological errors, and scheduling mishaps. The findings of this research study revealed that national security is affected by F-35 production delays and researchers as well as senior officials involved with the fighter need to emphasize the severity of these matters alongside increasing costs. The benefits of having the largest acquisition known to date afford the opportunity to have a nice size budget to work on the world's largest defender. The benefits and findings within this study represent critical components to social change in reference to international relationships and how to maintain those relationships to maintain global stability and peace.

Just like any other acquisition programs, the F-35 JSF program was faced with challenges and significant matters such as budget costs, technological errors, and scheduling mishaps. The positive aspect is that such challenges are not impossible. There were a number of solutions provided by participants as well as government research documents that found to be beneficial in alleviating such matters. These include establishing annual seminars with each and every single senior official who makes a direct decision on the fighter program, better communication habits with challenges, and avoid past methods that did not work in the past in hopes of a much more manageable, stable, and cost effective program.

Serious issues were identified with jeopardizing the program such as concurrency, software issues, budget costs, and scheduling errors. Participants who are experienced in budget issues agreed that concurrency was the driving factor with increasing the costs for the program; they agreed there should be more cost-effective avenues to keep the

program on track. Again, the same issues acknowledged uncertainty on whether the fighter will stay within the timeline of 2037. All participants have identified that IOCs will stay on track for years 2015 and 2016 pending any catastrophic dilemma, but there is still ambiguity on if future problems will cause the program to immobilize again for an undetermined period of time. The current risk the fighter faces is ongoing software issues and the budget; this will continue to be the life or death of the fighter. Unless there is additional research to follow this study on production delays in correlation to national defense guidance, there will be a question as to whether United States will be ready for future threats.

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Appendix A: Permission to Conduct Research

TO: Walden University Office of Research Integrity and Compliance, Institutional Review Board for Ethical Standards and Research

FROM: TSgt Monique M. Maldonado, Student ID 00363643

SUBJECT: Permission to Conduct Research on F-35 Joint Strike Fighter (JSF) Program

1. I am an active duty Technical Sergeant in the United States Air Force who is also a doctoral student with Walden University in the PhD Public Policy and Administration program. Per Walden University's Office of Research Integrity and Compliance, Institutional Review Board for Ethical Standards in Research, a doctoral student must receive permission from any respective agency to conduct a research study in their specialty or field.

2. This request letter is to grant permission to research based on the follow topic:

Possible Effects of F-35 Joint Strike Fighter (JSF) Program Delays on Defense Strategic Guidance (DSG) and National Security Strategy (NSS)

Brief synopsis: I will be conducting an in-depth study on how production delays within the F-35 JSF program affect requirements outlined in the DSG and implemented through NSS. There is an informational gap on how modernization or technological advancement of aircraft affects national security interests and American assets. As outlined in the DSG, modernization is needed, as emerging threats require new technologies. The concern remains as continued delays may threaten the program's execution of 2037, which can potentially affect national security.

3. If approved, I will request to conduct a series of interviews with the following participants:
- DOD senior officials
- Military senior officials
- F-35 Program Manager and experts
- Financial and budget experts

Each interviewee requested has a direct impact on the F-35 JSF program and interviews will be critical to my research as it will explain the seriousness that the nation's budget has on the program's production.

4. All research, interviews, and surveys completed on the F-35 JSF program for this dissertation will be UNCLASSIFIED. To ensure classified information will not be disclosed inadvertedly, the dissertation proposal and final dissertation will be submitted

to Washington Headquarters Services Security and Policy Review office prior to submission at Walden University.

4. Thank you for your assistance.

1st Ind, (ORGANIZATIONAL OFFICE)

I have reviewed this request to its entirety and recommend approval for TSgt Monique M. Maldonado, student ID 0036343, to complete her research study and dissertation on the F-35 Joint Strike Fighter. If you have any questions or concerns, please contact me at phone number or email. Thank you for your assistance.

SIGNATURE BLOCK

Appendix B: Informed Consent

You are asked to participate in a research study that addresses the F-35 Joint Strike Force program. This is an independent research case study and is not endorsed or sponsored by the United States Air Force. The statements and questions addressed by the researcher do not represent any individual who is associated or employed by the United States Air Force. The researcher is the only member of the Air Force that represents these questions but only in the capacity as a Doctoral Candidate.

You were selected for this research study because of your knowledge of the fighter program, defense budget, and can contribute beneficial information to this particular topic. Please read this form to its entirety and feel free to ask any questions you have prior to consent of participation in this study.

Monique M. Maldonado is a researcher and Doctoral Candidate at Walden University and will be conducting this study. Monique has been an active duty Air Force service member for 12 years and takes pride on conducting research on one of the nation's largest acquisition programs to provide insight that affects the Department of the Air Force. Hopefully, this research makes a positive difference.

Purpose of this Study

The purpose of this study is to determine if possible effects of production delays within the F-35 Joint Strike Fighter Program affect Defense Strategic Guidance and National Security Strategy. The researcher wants to gain a better understanding and ascertain if lack of current technological advancements of 5^{th} generation aircraft due to mechanical errors, software issues, costs, and scheduling mishap will affect national security interest as modernization is needed to face emerging threats in the United States.

Procedures

If consent to this study, you will be asked:

- Meet researcher for a face-to-face interview where you will be able to discuss any aspects of the F-35 JSF program at the unclassified level as well as answer questions unique to this study.
- After the interview, review a transcription of the interview to ensure researcher summarized your statements correctly.

Volunteer Agreement

Your participation in this research study is strictly voluntary. This means you can opt to decline to an interview or have your interview removed from this research. If you decide to participate, you can still decline during the study. You can decline to participate anytime during the research process and you may decline to answer any question that

may be considered harmful or negatively affect the United States and the United States Air Force.

Risks and Benefits of Participation in this Study

It is a possibility some questions may be uncomfortable to answer. Please feel free to decline questions that appear to be uncomfortable or may impact the United States and the Air Force in a negative manner.

There are no benefits for your participation in this study. Nevertheless, your professional expertise on this matter will be noted as well as quoted and/or paraphrased in this research study, with your permission. This information can be used to modify certain program to change the ways certain mishaps are handled within the fighter program without causing delays. Additionally, this information can possibly be an "eye-opener" for Congress, the Department of the Air Force, Navy, and other agencies involved to advertise the importance for this program to be completed in its execution year. Additionally, potential conflicts of interest may arise due to our positions within the Department of Defense. I will ensure in this research study that I only serve in the capacity as a PhD candidate and researcher for Walden University. My position as a military service member working in the Deputy Secretary of Defense office is irrelevant to this process.

Compensation

None

Confidentiality/Privacy

With your permission, your statements will be quoted and/or paraphrased in this research study. Your information will not be used outside of this research study. Also, with your permission, the research will include position (no names). If you choose not to have your position referenced, the researcher will/must maintain your anonymity. You may keep copies of all paperwork during reviewed, briefed, and signed during the interview process. All information will be kept confidential and data will be kept secure on a personal laptop, in a password-protected folder. The personal laptop will be kept in a locked cabinet when not in use. Finally, data will be kept for a period of at least five years, as required by the university.

Contacts and Questions

If you want to talk privately about our rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210.
The researcher will give you a copy of this form to keep. (for face-to-face research_

Consent Statement

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By signing below, I consent and understand that I am agreeing to the terms described above.

Name of the Participant (PRINT) _____

Signature of the Participant _____

Date of Consent _____

Name of the Researcher (PRINT) _____

Signature of the Researcher _____

Date of Consent _____

Appendix C: Interview Protocol

Creswell's Interview Protocol for Data Collection during an Interview

Time:

Date:

Location:

Interviewer:

Interviewee:

Prior to interview, describe the research study, confidentiality agreement, and informed consent

Interview Questions

Strategic Perspective Questions

1. Why is it important to have the F-35 Joint Strike Fighter (JSF) program?
    a. What is its purpose other than being affordable and replacing hundreds of aircraft?
2. It is known that the F-35 fighter is the largest acquisition program in Department of Defense (DOD) history. What makes this program different or distinct from past acquisition programs?
3. If the program is not completed by the projected year 2037, what does not mean for DOD?

4. The Marine Corps is projected to use the F-35 JSF program in 2015 and the Air Force in 2016 for military operations. If production delays persist, what will happen for projected IOCs?
5. Can the incompletion of the fighter program affect national security? If so, how? If not, why not?
6. Is modernization of aircraft needed to protect American assets and interest?
    a. Are production delays of the program considered failure to modernize by not having an effective 5th generation program to deter 21st century threats against the U.S. and our allies?
    b. Is the F-35 fighter the only future modernized asset that can protect national security interest from an aerial perspective? If not, can we continue to use legacy aircraft? Why or why not?

Budget Questions

1. Is there approximate number of how much the fighter program will save DOD once completed (i.e. over its lifecycle)?
2. Is there a particular timeline in saving DOD costs that would be beneficial to the congressional budget (in terms of discretionary spending and sequestration)?
3. According to GAO (2013), DOD initially allotted $300 billion for the fighter. Now it is nearing $400 billion, if not over, to develop and procure 2,457 aircraft through 2037. Is it possible for DOD to approve a new budget to subside over budgets costs and cover scheduling slips and technical errors?

   a. What is the possible effect of the fighter program if a budget cannot be approved?
   b. Is there special funding for this program that is protected from sequestration and any other budget issues?
4. When the budget was approved for the fighter program, did DOD factor in unforeseen events that could possibly affect the current budget?
   a. If so, what type of the plan was implemented regarding unforeseen events?
5. With the new budget potentially approved for 2015, will this affect the fighter program?
   a. Will it negatively or positively affect the fighter program since there has not been an official budget approved since 1997 (with the exception of President Obama's omnibus spending bill in 2009)?
6. Can the Air Force afford to continue use of legacy aircraft if production delays continue with the fighter?
   a. It is known the fighter will eventually replace F-15s and A-10s. Can there be technological and weapons systems upgrades that compare to the F-35 fighter?
      i. If so, will upgrades be considered in accordance with modernization of aircraft to deter threats mandated in DSG and NSS? If so, what is the purpose of the fighter program?

F-35 Questions

13. What are the present/future major challenges that may affect the fighter program?

14. Besides production delays, technological errors, and scheduling slips, what are some other risks that the fighter program could possibly face?
15. Do production delays affect the contract that Lockheed Martin has with DOD?
    a. What other contractors involved (i.e. Pratt & Whitney, Northrop Grumman, BAE) and how are the delays affecting those contractors?
    b. Is there a possibility that the contract with Lockheed Martin will end due to constant delays?

Appendix D: Consent to Audio and/or Video Recording

I understand and acknowledge researcher, Monique Maldonado, will be recording audio and video during the interview. The purpose of recording the interview will be to ensure accuracy during the data analysis process. Researcher, Monique Maldonado, will be responsible for transcribing the interview; the recordings and transcriptions will be deleted after the entire dissertation process.

Please check place an "X" from one of the following below:

1). _____ I consent to have my interview recorded, transcribed, and to use my transcripts for the dissertation process.

2). _____ I do not consent to have my interview recorded, transcribed, and to use for the dissertation process.

The above permission is in effect until the end of the dissertation process. It is understood that if approved, the audio recordings will be deleted after verification of accuracy of the transcriptions. All transcriptions will be saved on a password-protected folder on a personal laptop at the researcher's residence. The transcripts will be destroyed immediately after Walden University has approved the dissertation as well as the approval for graduation.

Name of Participant (PRINTED) _____

Signature of the Participant _____

Date of Consent _____

Appendix E: Initial Contact E-mail

Good Morning/Evening (Participant),

My name is Monique Maldonado and I like to ask you to participate in a research study.

I am a Doctoral Candidate at Walden University. In order to fulfill the requirements to obtain a Ph.D. in Public Policy and Administration, I am conducting a qualitative research case study on the F-35 Joint Strike Fighter program and how production delays affect Defense Strategic Guidance and National Security Strategy. As a Doctoral Candidate, I am also an active duty Air Force service member with 12 years of service, who has a general knowledge of the fighter program. I became interested in this topic because of the incredible need for technological advancement air superiority and national security interest.

If you agree to this study, you will be asked to:

a. Complete a 30 – 45 minute interview with the researcher in a conference room within the Pentagon
b. Provide consent to audio and video recording to ensure accuracy during the data analysis process
c. Provide consent to have recordings transcribed to ensure the interpretation of your statements are accurate

During the interview process, I will ask you a series of questions that relate to the F-35 JSF program based on your professional expertise. No precise hypotheses are being tested and this qualitative research case study is intended to gain understanding of how continued production delays break down strategic planning that are outlined in the Defense Strategic Planning and National Security Strategy.

After the interview, I will e-mail you an electronic version of the transcripts and ask that you review the information for accuracy. If you find any errors or the interview was transcribed inaccurately, I will make the appropriate changes to ensure utmost accuracy. You have the right to retract and/or clarify any statement you made that has been transcribed. Revised copies of the transcriptions will be e-mailed to you in a summary of the results.

Your participation and professional expertise is definitely appreciated and extremely valuable to this research study. Additionally, your participation in this research will immensely assist in filling an information gap in the current literature involving Congress, the Department of the Air Force, the F-35 program, and national security. Your insight will provide a complete understanding of the F-35 program and how it is critical to the United States.

Your consideration to participate in this qualitative research study is greatly appreciated. If you have any questions or concerns, please do not hesitate to contact me at your earliest convenience. If you would like to participate in this study, please respond to this e-mail or call me at the information listed below.

Once again, thank you for your consideration and I am looking forward to your response!

Very Respectfully,

Monique Maldonado

Appendix F: E-mail Transcript Process

Good Morning/Evening (Participant),

Thank you so much for your participation in this research study. Your willingness to provide your professional expertise is much appreciated.

If you do not mind, please take a few moments to review the electronic transcript document attached. This is to ensure that was captured during the interview process is accurate and that anything you stated was not misinterpreted.

If you approve of the transcript, there is no further action is required. No response will be confirmation that the transcript is accurate and can be used in the research study. However, if you disagree with anything annotated in the transcript, please e-mail the statements in question, and I will make the appropriate changes. If you find any error or the interview was transcribed incorrectly, I will make the appropriate changes to ensure utmost accuracy. You have the right to retract and/or clarify any statement you made that has been transcribed. After changes have been made, I will send an updated summary and e-mail for your review.

Once again, your participation in this summary is much appreciated. Thank you very much for your time.

Very Respectfully,

Monique Maldonado

Appendix G: Interview Transcripts

Participant 1

Researcher (R)

Participant (P)

Transcribed information will be below:

Appendix H: Interview Transcripts

Agency/Organization Name: _____

Contact Information: _____

_____

_____

Date: _____

Dear Monique Maldonado,

On behalf of DOD Public Affairs, I give you permission to utilize conference rooms within the Pentagon for your research study. As part of this study, I ask that you do not interview above the unclassified level to prevent disclosure of unauthorized information that could potentially cause significant damage to the United States and American assets.

I confirm that I am authorized to approve research in this setting.

Very Respectfully,

Representative
Signature Block

Appendix I: Dr. Simon's Survey/Interview Rubric

Survey/Interview Validation Rubric for Expert Panel - VREP©

By Marilyn K. Simon with input from Jacquelyn White

http://dissertationrecipes.com/

Criteria	Operational Definitions	Score **1=Not Acceptable** (major modifications needed) **2=Below Expectations** (some modifications needed) **3=Meets Expectations** (no modifications needed but could be improved with minor changes) **4=Exceeds Expectations** (no modifications needed)				Questions NOT meeting standard (List page and question number) and need to be revised. ***Please use the comments and suggestions section to recommend revisions.***
		1	2	3	4	
Clarity	• The questions are direct and specific. • Only one question is asked at a time. • The participants can understand what is being asked. • There are no *double-barreled* questions (two questions in one).					
Wordiness	• Questions are concise. • There are no unnecessary words					
Negative Wording	• Questions are asked using the affirmative (e.g., Instead of asking, "Which methods are					

	not used?", the researcher asks, "Which methods *are* used?")					
Overlapping Responses	• No response covers more than one choice. • All possibilities are considered. • There are no ambiguous questions.					
Balance	• The questions are unbiased and do not lead the participants to a response. The questions are asked using a neutral tone.					
Use of Jargon	• The terms used are understandable by the target population. • There are no clichés or hyperbole in the wording of the questions.					
Appropriateness of Responses Listed	• The choices listed allow participants to respond appropriately. • The responses apply to all situations or offer a way for those to respond with unique situations.					
Use of Technical Language	• The use of technical language is minimal and appropriate. • All acronyms are defined.					
Application to Praxis	• The questions asked relate to the daily practices or expertise of the potential participants.					
Relationship to Problem	• The questions are sufficient to resolve the					

	problem in the study • The questions are sufficient to answer the research questions. • The questions are sufficient to obtain the purpose of the study.					
Measure of Construct: A: ( )	• The survey adequately measures this construct.***[Include Operational Definition and concepts associated with construct]***					
Measure of Construct: B: ( )	• The survey adequately measures this construct. ****[Include Operational Definition and concepts associated with construct]***					
Measure of Construct: C: ( )	• The survey adequately measures this construct.*** [Include Operational Definition and concepts associated with construct]***					
Measure of Construct: D: ( )	• The survey adequately measures this construct.*** [Include Operational Definition and concepts associated with construct]***					

* The operational definition should include the domains and constructs that are being investigated. You need to assign meaning to a variable by specifying the activities and operations necessary to measure, categorize, or manipulate the variable For example, to measure the construct *successful aging* the following domains could be included: degree of physical disability (low number); prevalence of physical performance (high number), and degree of cognitive impairment (low number). If you were to measure creativity, this construct is generally recognized to consist of flexibility, originality, elaboration, and other concepts. Prior studies can be helpful in establishing the domains of a construct.

Comments and Suggestions

Types of Validity

VREP is designed to measure face validity, construct validity, and content validity. To establish criterion validity would require further research.

Face validity is concerned with how a measure or procedure appears. Does it seem like a reasonable way to gain the information the researchers are attempting to obtain? Does it seem well designed? Does it seem as though it will work reliably? Face validity is independent of established theories for support (Fink, 1995).
Construct validity seeks agreement between a theoretical concept and a specific measuring device or procedure. This requires operational definitions of all constructs being measured.
Content Validity is based on the extent to which a measurement reflects the specific intended domain of content (Carmines & Zeller, 1991, p.20). Experts in the field can determine if an instrument satisfies this requirement. Content validity requires the researcher to define the domains they are attempting to study. Construct and content validity should be demonstrated from a variety of perspectives.
Criterion related validity, also referred to as instrumental validity, is used to demonstrate the accuracy of a measure or procedure by comparing it with another measure or procedure which has been demonstrated to be valid. If after an extensive search of the literature, such an instrument is *not* found, then the instrument that meets the other measures of validity are used to provide criterion related validity for future instruments.
Operationalization is the process of defining a concept or construct that could have a variety of meanings to make the term measurable and distinguishable from similar concepts. Operationalizing enables the concept or construct to be expressed in terms of empirical observations. Operationalizing includes describing what is, and what is not, part of that concept or construct.

References

Carmines, E. G. & Zeller, R.A. (1991). *Reliability and validity assessment*. Newbury Park: Sage Publications.

Fink, A., ed. (1995). *How to measure survey reliability and validity v. 7*. Thousand Oaks, CA: Sage Publications.

Appendix J: Debriefing Form

Title of Research Study:
A Qualitative Study on F-35 Fighter Production Delays Affecting National Security Guidance

Statement of Appreciation:
I would like thank you for your time and cooperation through the interview process. Your experience and expertise is vital and what you have provided will be an asset to the success of this qualitative research case study:

Brief Synopsis of Research Study:
The purpose of this study is to explore the production delays of the F-35 Joint Strike Fighter (JSF) program and how it affects national security guidance and defense. Extensive research was completed for the literature review and face-to-face interviews were conducted as a data collection process tool to obtain vital data, which could be the key to study's problem on the fighter's position in national security. Research and interviews were completed to discover if constant production delays will affect the fighter's full execution, which is schedule 2037. Additionally, this study was established to explore whether immobilization of production within the fighter program breaks down national security guidance modernization and globalization.

Point of Contact:
If you have questions about this study, would like to know more information about the topic, or would like to receive a reproduction of this research study when it is finalized, please contact:
Researcher: Monique M. Maldonado
Email (School): monique.maldonado@waldenu.edu
Email (Work): maldonadom@tiffin.edu
Phone: 475-422-6355

Point of Contact about your rights in this experiment:
Walden University Institutional Review Board
Email: irb@waldenu.edu

Thank you again for your participation!
V/r
Monique M. Maldonado
Doctoral Candidate
Student ID: 00363643
PhD Public Policy & Administration Program
Walden University

Appendix K: Follow-Up Interview Email

Good Morning/Evening (Participant),

My name is Monique Maldonado and I like to ask you to participate in a follow-up interview. More information is needed based on the data analysis portion of the interview process and I would like to verify additional information with your consent.

If you agree to this study, you will be asked to:

a. Complete a 30 – 45 minute interview with the researcher in a conference room within the Pentagon
b. Provide consent to audio and video recording to ensure accuracy during the data analysis process
c. Provide consent to have audio recordings transcribed to ensure the interpretation of your statements are accurate

During the interview process, I will ask you a series of questions that relate to the F-35 JSF program based on your professional expertise. No precise hypotheses are being tested and this qualitative research case study is intended to gain understanding of how continued production delays break down strategic planning that are outlined in the Defense Strategic Planning and National Security Strategy.

After the interview, I will e-mail you an electronic version of the transcripts and ask that you review the information for accuracy. If you find any errors or the interview was transcribed inaccurately, I will make the appropriate changes. Revised copies of the transcriptions will be e-mailed to you in a summary of the results.

Your participation and professional expertise is definitely appreciated and extremely valuable to this research study. Additionally, your participation in this research will immensely assist in filling an information gap in the current literature involving Congress, the Department of the Air Force, the F-35 program, and national security. Your insight will provide a complete understanding of the F-35 program and how it is critical to the United States.

Your consideration to participate in this qualitative research study is greatly appreciated. If you have any questions or concerns, please do not hesitate to contact me at your earliest convenience. If you would like to participate in this study, please respond to this e-mail or call me at the information listed below.

Once again, thank you for your consideration and I am looking forward to your response!

Very Respectfully, Monique Maldonado

Appendix L: Follow-Up to Initial Response Email

Good Morning/Evening (Participant),

My name is Monique M. Maldonado and this is a follow-up to the initial email requesting your participation in a research study on (date).

If you would like to participate, I have attached the previous information below to give a brief synopsis about the research, your contribution as a participant, and myself as the researcher.

If you do not respond to this email within 24-72 hours, I will assume that you no longer wish to participate in this study and no further action is needed. This is a voluntary research study and you have the right to decline participation.

--Initial Email—

Good Morning/Evening (Participant),

My name is Monique Maldonado and I like to ask you to participate in a research study.

I am a Doctoral Candidate at Walden University. In order to fulfill the requirements to obtain a Ph.D. in Public Policy and Administration, I am conducting a qualitative research case study on the F-35 Joint Strike Fighter program and how production delays affect Defense Strategic Guidance and National Security Strategy. As a Doctoral Candidate, I am also an active duty Air Force service member with 12 years of service, who has a general knowledge of the fighter program. I became interested in this topic because of the incredible need for technological advancement air superiority and national security interest.

If you agree to this study, you will be asked to:

a. Complete a 30 – 45 minute interview with the researcher in a conference room within the Pentagon
b. Provide consent to audio and video recording to ensure accuracy during the data analysis process
c. Provide consent to have recordings transcribed to ensure the interpretation of your statements are accurate

During the interview process, I will ask you a series of questions that relate to the F-35 JSF program based on your professional expertise. No precise hypotheses are being tested and this qualitative research case study is intended to gain understanding of how continued production delays break down strategic planning that are outlined in the Defense Strategic Planning and National Security Strategy.

After the interview, I will e-mail you an electronic version of the transcripts and ask that you review the information for accuracy. If you find any errors or the interview was transcribed inaccurately, I will make the appropriate changes. Revised copies of the transcriptions will be e-mailed to you in a summary of the results.

Your participation and professional expertise is definitely appreciated and extremely valuable to this research study. Additionally, your participation in this research will immensely assist in filling an information gap in the current literature involving Congress, the Department of the Air Force, the F-35 program, and national security. Your insight will provide a complete understanding of the F-35 program and how it is critical to the United States.

Your consideration to participate in this qualitative research study is greatly appreciated. If you have any questions or concerns, please do not hesitate to contact me at your earliest convenience. If you would like to participate in this study, please respond to this e-mail or call me at the information listed below.

Once again, thank you for your consideration and I am looking forward to your response!

Very Respectfully,

Monique Maldonado

Appendix M: Follow-Up Email to Transcript Process

Good Morning/Evening (Participant),

Once again, thank you very much for your participation in this research study. I understand your time is valuable and your willingness to provide your professional expertise is much appreciated.

This is a follow-up to the initial email requesting your review of the electronic transcripts sent to you on (date) from the interview I conducted with you on (date).

If you would like to participate, I have attached the information below to give a brief synopsis of the review instructions.

If you do not respond within 24 to 72 hours, I will assume that you no longer wish to participate and no further action is required. This is a voluntary research study and you have the right to decline participation.

--Initial Email—

Good Morning/Evening (Participant),

Thank you so much for your participation in this research study. Your willingness to provide your professional expertise is much appreciated.

If you do not mind, please take a few moments to review the electronic transcript document attached. This is to ensure that was captured during the interview process is accurate and that anything you stated was not misinterpreted.

If you approve of the transcript, there is no further action is required. No response will be confirmation that the transcript is accurate and can be used in the research study. However, if you disagree with anything annotated in the transcript, please e-mail the statements in question, and I will make the appropriate changes. After changes have been made, I will send an updated summary and e-mail for your review.

Once again, your participation in this summary is much appreciated. Thank you very much for your time.

Very Respectfully,

Monique Maldonado

Appendix N: Confidentiality Agreement

Name of Signer:

During the course of my activity in collecting data for this research: "A Qualitative Study on F-35 Fighter Production Delays Affecting National Defense Guidance," I will have access to information, which is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement I acknowledge and agree that:

1. I will not disclose or discuss any confidential information with others, including friends or family.
2. I will not in any way divulge, copy, release, sell, loan, alter or destroy any confidential information except as properly authorized.
3. I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.
4. I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.
5. I agree that my obligations under this agreement will continue after termination of the job that I will perform.
6. I understand that violation of this agreement will have legal implications.
7. I will only access or use systems or devices I'm officially authorized to access and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Print Name _____ (researcher)

Signature _____

Date_____

Print Name _____ (data analysis consultant or transcriber)

Signature _____

Date _____

Appendix O: Permission to Use Instrument in Qualitative Research Study

I, **MARILYN K. SIMON**, give researcher, **MONIQUE M. MALDONADO**, permission to use the Survey/Interview Validation Rubric in her respective research study and dissertation with Walden University titled, "Possible Effects of the F-35 Fighter on National Defense Guidance." With my permission, the researcher can do the following:

- Use instrument as a template to establish her own interview protocol or modify rubric to fit the needs of the interview process
- Have instrument reproduced in the dissertation

The instrument is obtained legally because it is available to the public via website: http://dissertationrecipes.com/

Print Name _____ (Researcher)

Signature _____

Date _____

Print Name _____ (Owner of Instrument)

Signature _____

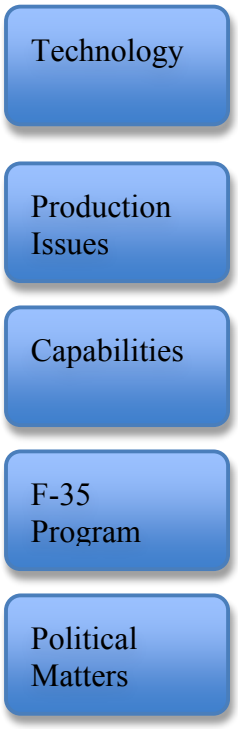
Date_____

Appendix P: Mapping of Research Questions to Coding Categories, Patterns, and Themes

Research Questions	Categories Established	Codes Derived from Data Analysis
RQ1: How do constant production delays within the F-35 JSF program directly affect national security?	Overall Strategic Perspective Budget F-35	Acquisition, **budget issues**, contracts, F-35 Program, industry, International Partners & security partners, **modernization**, **political matters**, scheduling mishaps, social change, software issues
S1: How are production delays within the F-35 program relevant to National Security Strategy (NSS)?	Overall Strategic Perspective Budget F-35	Future scenarios, informational gap, modernization, **national defense guidance**, **national security interests**, **political matters**, **modernization, technology**
S2: How are production delays within the F-35 program relevant to National Military Strategy (NMS)?	Overall Strategic Perspective Budget F-35	History of aircraft, initial operational capabilities, **national defense guidance**, **national security interests**, Navy, Marine Corps, Air Force, **modernization, technology**
RQ2: What is the future of legacy aircraft if delays such as the F-35 fighter continue to occur?	Overall Strategic Perspective Budget F-35	**Air dominance**, **capabilities**, **budget issues**, maintenance, 4th generation, initial operational capabilities, upgrades

***Bold denotes multiple codes in other categories**

Appendix Q: Initial Coding Paradigm


Technology
Production Issues
Capabilities
F-35 Program
Political Matters

Appendix R: List of Acronyms

AC	Acquisition Category
ACC	Air Combat Command
ADM	Acquisition Decision Memorandum
AESA	Active Electronically Scanned Array
AI	Air Interdiction
ALIS	Autonomic Logistics Information System
APB	Acquisition Program Baseline
APUC	Average Procurement Unit Cost
AR	Armed Reconnaissance
ASE	Air Support Escort
ASTOVL	Advanced Short Takeoff and Vertical Landing
AT&L	Acquisition, Technology, & Logistics
AWC	Air Warfare College
AWC	Air Warfare Command
BCA	Budget Control Act
BUR	Bottom-Up Review
CA	Counter Air
CAA	Consolidation Appropriations Act
CAPE	Cost Assessment and Program Evaluation
CAS	Close Air Support
CDR	Critical Design Review

CIO	Chief Information Officer
CJCS	Chairman of the Joint Chiefs of Staff
CL	Critical Listing
CNI	Communication Navigation and Identification system
CNO	Chief of Naval Operations
CRS	Congress Research Service
CTOL	Conventional Takeoff and Landing
CV	Carrier Variant
DAS	Distributed Aperture System
DAU	Defense Acquisition University
DEAD	Destruction of Enemy Air Defense
DEPSECDEF	Deputy Secretary of Defense
DOD	Department of Defense
DOT&E	Director of Operational Test & Evaluation
EOTS	Electro-Optical Targeting System
FAR	Federal Acquisition Regulation
FLIR	Forward Looking Infrared
FY	Fiscal Year
GE	General Electric
HASC	House Armed Services Committee
HMDS	Helmet Mounted Display System
IG	Inspector General

IOC	Initial Operational Capability
IOT&E	Initial Operational Test and Evaluation
IRB	Institutional Review Board
IRST	Infrared Search and Track
JAST	Joint Advanced Strike Technology
JPO	Joint Program Office
JSF	Joint Strike Fighter
LM	Lockheed Martin
MADL	Multifunction Advanced Data Link
MOU	Memorandum of Understanding
MRF	Multirole Fighter
NDAA	National Defense Acquisition Act
NDS	National Defense Strategy
NMS	National Military Strategy
NSS	National Security Strategy
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OSD	Office of the Secretary of Defense
O & S	Operating and Support costs
PAA	Primary Aerospace Vehicle Authorized
PAUC	Program Acquisition Unit Cost
PEO	Program Executive Officer

PM	Program Manager
POTUS	President of the United States
PSFD	Production, Sustainment, and Follow-On Development
RSC	Republican Study Committee
SAE	Service Acquisition Executive
SDD	System Development and Demonstration
SDO	Senior Defense Official
SEAD	Suppression and Enemy Air Defense
SECAF	Secretary of the Air Force
SECDEF	Secretary of Defense
SE	Support Equipment
SMO	Senior Military Official
STOVL	Short Takeoff Vertical Landing
TALF	Tactical Air and Land Forces
QDR	Quadrennial Defense Review
UCR	Unit Cost Report
USAF	United States Air Force
U/SECAF	Under Secretary of the Air Force
USMC	United Marine Corps
USN	United States Navy
US	United States