# U.S. Army Force Sustainment Systems Role in Countering China's Increased Gray Zone Activities and Increased Anti Access/Area Denial (A2/AD) Capabilities in the Pacific

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11 May 2021

**PUBLISHED BY**

**DAU**

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**Acknowledgements**

I would like to thank my mother, Claire Lind, who in the midst of a great life challenge gave me her patience and love while I did this research and the DAU Senior Service College Fellowship (SSCF). I would also like to thank my brother, Eric Lind, for his support, understanding, motivation, and care as we have navigated a tumultuous year. I recognize the Picatinny SSCF director, Mr. Keith Gooding, for the tremendous flexibility and consideration he afforded me to accomplish this research paper and the SSCF requirements. I extend my sincere gratitude to the Picatinny Cohort who make up the "Fellowship of the 7" for their flexibility and kindness. I would like to extend my appreciation to my Research Advisor, Dr. James Roche, for guiding me through the research process and this interesting area of knowledge.

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**Abstract**

China's Gray Zone activities and Anti-Access/Area Denial (A2/AD) capabilities have increased, creating current and future operating environments that are challenging for Army logistics/sustainment in the INDOPACOM Area of Operations. Given the vastness of the Indo-PACIFIC Area of Responsibility (AOR), sustainment of military forces is a challenge by itself. With China's increased A2/AD capability, delays to re-supply of units in the AOR can be expected in a conflict. Key is enabling units to be self-sustaining for an extended period of time. Force Sustainment Systems (FSS) are essential to maintaining the combat effectiveness of units. How well and efficiently they work can impact the how long and well military units can self-sustain or be sustained.

This paper used a qualitative historical case study approach to review existing research and literature and conduct research analysis. Those literature sources included studies, monographs, papers, articles, DOD/Joint/Army publications, and presentations.

The purpose of this research was to answer the central question: what can the U.S. Army can do to further develop, improve, procure and field Force Sustainment Systems that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities and increased A2/AD capability?

The study findings identified items that the U.S. Army can do to counter Chinese gray zone activities and respond to China's increased A2/AD capability. The following factors/risks are identified by the study as potentially impacting FSS. Increased dispersed/distributed operations and unit self-sufficiency and redundancy due to dispersal and lack of supply lines.

Having a forward presence and “inside the wire” focus/readiness. Consideration of clandestine requirements and a lack or air superiority.

The study recommends actions which include; conducting a gap analysis, continuing to conduct and support exercises involving FSS and investigating new technologies to improve FSS. Further areas of recommendation and future investigation are presented by the study to enable the U.S. Army to succeed in the INDOPACOM area of operation. They include increasing FSS quantities, FSS design and efficiency research, and exploring FSS support of caching techniques and clandestine prepositioning.

# Chapter 1 – Introduction

## Background

Over the past 5 to 10 years China has increased its Gray zone activities. Gray zone activities are efforts designed to stay below the level of military conflict while gaining something for the nation employing them. Some examples of China's gray zone activities include increased confrontations with Japanese Coast Guard in the areas surrounding the contested Senkaku islands, building of artificial islands in the South China Sea, and use of law enforcement and maritime militia in confrontational actions against fishing and coast guard vessels to deny access to resources.

China is investing in A2/AD capabilities to include: "…naval forces, cruise and ballistic missiles, and a formidable proficiency in cyber and space operations." (U.S. Army, 2019, p. 3) These capabilities are designed to prevent our projection of combat power into the Pacific. Gray zone activities serve to intimidate and gain influence over countries in the INDOPACOM area while increased Chinese A2/AD capabilities complicates our ability to project military power and deterrence into the area.

A critical aspect of the INDOPACOM AOR is the ability to support and sustain our land forces. FSS play a role in doing that. The Army Program Manager for FSS has a fact book explains their focus: "provide direct and indirect life cycle support to Soldiers in virtually any environment to include training, contingency and combat operations. The programs are organized into five different product lines: Field Feeding Equipment, Field Services Equipment,

Shelter Systems, Aerial Delivery Systems, and Force Provider. They provide a broad range of Soldier sustainment capability to ensure Soldiers have the proper living conditions, nutrition, supply, hygiene, and clean clothing, resulting in improved combat effectiveness." (PM Force Sustainment Systems, 2020, p. 4)

**Problem Statement**

China's Gray Zone activities and Anti-Access/Area Denial (A2/AD) capabilities have increased, creating current and future operating environments that are challenging for Army logistics/sustainment in the INDOPACOM Area of Operations. Given the vastness of the Indo-PACIFIC AOR, sustainment of military forces is a challenge by itself. With China's increased A2/AD capability, delays to re-supply of units in the AOR can be expected in a conflict. Key is enabling units to be self-sustaining for an extended period of time. FSS are essential to maintaining the combat effectiveness of units. How well and efficiently they work can impact the how long and well military units can self-sustain or be sustained. Additionally, concepts of dispersal, forward basing, and the use of alternate support bases could increase the need for more FSS.

**Purpose Statement**

The purpose of this qualitative study is to explore what the U.S. Army can do to further develop, improve, procure and field Force Sustainment Systems that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities

and increased A2/AD capability. Additionally, this study will look at what the U.S. Army can do in the future with FSS to support the Army Strategy in the INDOPACOM.

The audience of the study is Army Leadership.

**Significance of This Research**

"China has been the United States' most significant strategic competitor since the end of the Cold War." (Freier et al, 2020, p. 37) The U.S. span of influence in the Asia Pacific Region is threatened by alarming actions that China is taking and capabilities it is investing in. Sustainment architecture consists "of multiple routes, multiple modes, multiple nodes, and multiple suppliers that provide multiple options to the supported commander and presents multiple dilemmas to adversaries." (TRADOC, 2017, p. 10) China's gray zone activities, the Army's ability to deploy in the Asia Pacific Region, and sustainment architecture and needed investments in the Indo-Pacific are all Army priorities for strategic analysis (U.S. Army War College (USAWC), 2018, 2020). The capability and services provided by the Army's FSS's are essential in maintaining Army units combat effectiveness. Enlightening what has been done to develop, improve, procure and field these systems and what could be done further is important for Army operations in the INDOPACOM region. This research may assist Army leadership with prioritizing funding of certain FSS in order to support INDOPACOM strategy.

In April 2020 Sen Inhofe (R, Oklahoma) gave the following comments in response to the report the INDOPACOMs Commander provided to congress. "Under President Trump, we've made a lot of progress rebuilding readiness and investing in the modernization of our force, but

we still need to do more to deter our adversaries, especially China. The reality is that the military balance in the Indo-Pacific is getting worse. This assessment provides critical information for understanding how to reverse this trend and to protect American interests in this important region". "Clearly, many of those requirements are in the areas of posture and logistics. I am pleased that Admiral Davidson focused much of his assessment on these critical requirements. As I've said before, the National Defense Strategy is about more than just how many planes, ships and tanks we buy. It's also about making sure our forces can be in the right place, at the right time, with the right stuff. Posture and logistics may not draw as much attention as F-35s or hypersonic weapons, but they're just as important." (Inhofe, 2020 p. 1)

**Overview of Research Methodology**

This paper used the qualitative literature review method. I reviewed historical studies, articles, point papers, Army and Joint Publications, and strategy documents to gain insight and data. At a high level, my initial research informed me on what Gray zone activities and A2/AD capabilities are and China's employment of them. It also informed me on the scope of FSS's capability. More in depth research provided me information on DOD, Army, and INDOPACOM strategic initiatives and goals in relation to China's Gray zone activities and A2/AD capabilities. My research seeks to answer three main questions:

1. What can the U.S. Army do to counter China's Gray Zone Activities?
2. What can the U.S. Army do in response to China's increased A2/AD capability?
3. How might Force Sustainment Systems support answers to questions (1) and (2)?

a. Does the Army have enough Force Sustainment Systems if contracted resources are not available?
b. What is required of Forces Sustainment Systems in these environments?
c. What risks do Force Sustainment Systems have WRT these challenges?

**Objectives and Outcome**

I anticipated finding answers to question one and two in existing USG strategy documents, in studies and articles about proposed USG/US Military strategy moving forward, and articles about the current situation in the INDOPACOM AOR. I anticipated there would be less information available on the use of FSS and its capabilities and how that can enable U.S. Army operations to counter China's Gray zone activates and increased A2/AD capability. I anticipated my research would show that it is important continue to develop and field FSS to the Army to support its efforts in the INDOPACOM region.

Limitations

Research for this paper is constrained by the amount of time available in the DAU Senior Service College Fellowship curriculum. Additionally, if there is a dearth of relevant historical data, then the qualitative study approach can constrain research. I assumed that literature that I uncover that has been published within the past ten years is still relevant to the research topic

## Chapter 2 – Literature Review

A literature review was conducted on the topic of what the U.S. Army can do to further develop, improve, procure and field FSS that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities and increased A2/AD capability. The literature review also included what the U.S. Army can do in the future with FSS to support the Army Strategy in the INDOPACOM. The purpose of the review was to determine what relevant research had already been done in this topic area.

In preparation for the review a list of relevant search terms was created and used during the searches. Initially the literature review was focused on three areas; what can the U.S. Army do to counter China's Gray Zone Activities, what can the U.S. Army do in response to China's increased A2/AD capability? How might FSS help with this? In many of the documents reviewed, the areas of gray zone activities and increased A2/AD capability were addressed collectively and not necessarily separated as independent research. The literature review took this overlap into account and search terms and document analysis were adjusted. A major limitation to the literature review was the time available in the Senior Service College Fellowship curriculum.

The literature review was conducted primarily using two methods. The first was use of multiple search engines and the second was reviewing works cited of relevant studies that were found. The literature review boundaries included English language only and generally literature that was from within the last five years but not more than 10 years. The search engines used

included (but were not limited to): ABI/INFORM Proquest, Proquest Dissertations & Theses Global, EBSCOhost Academic Search Ultimate, Rand corporation website, U.S. Army War College Press, Defense Technical Information Center (DTIC) website and R&E Gateway, and Google.

The literature review has found studies that discuss the future roles of the U.S. Army for INDOPACOM and in the South China Sea along with the importance of U.S. Army land power capabilities. Also the review found studies and recommendations about gray zone competition/conflict, implications of Chinas strategy on the U.S. Army and high level theater logistics. Additionally, studies showed the importance of the increase in Chinese A2/AD and its associated risk. The following studies provide insight and examples of what was obtained in the literature review.

The first study is *An Army Transformed: USINDOPACOM Hyper competition and U.S. Army Theater Design* published by the U.S. Army War College Press. The genesis of this study was in 2018, "then-Secretary of the Army (SECARMY) Mark Esper asked U.S. Army War College researchers to examine how change in Army theater design in the Indo-Pacific region will enable full implementation of the objectives identified in the unclassified Summary of the 2018 National Defense Strategy (NDS) by 2028." (Freier et al, 2020, p. xi) The studies purpose includes answering a question: "For 2028 and beyond, what is the foundational US Army theater design that will best support NDS objectives across the anticipated range of military demands in the USINDOPACOM area of responsibility (AOR)?" (Freier et al, 2020, p. xiii) The foreword of the study identifies a critical finding " Physically, conceptually, and in terms of deployed and anticipated capabilities, the United States is out of position for multi-domain

competition and multi-domain conflict with the PRC over the medium to long term." (Freier et al, 2020, p. xi) The study also recommends the Army take on four roles of Grid, Enabler, Multi-Domain Warfighter, and Capability and Capacity Generator (Freier et al, 2020).

Two of the Army roles that include sustainment in their descriptions are enabler and grid. The figure below depicts the grid role of the Army and also shows the vastness of the INDOPACOM AOR in the Pacific Ocean. The study also offers findings that include recommendations for Theater Design Elements. For the element of forces and capabilities, the study recommends: "prioritize transformation and innovative employment of USINDOPACOM capabilities focused on mission command, protection, sustainment, intelligence (and information), and movement." (Freier et al, 2020, p. 70)

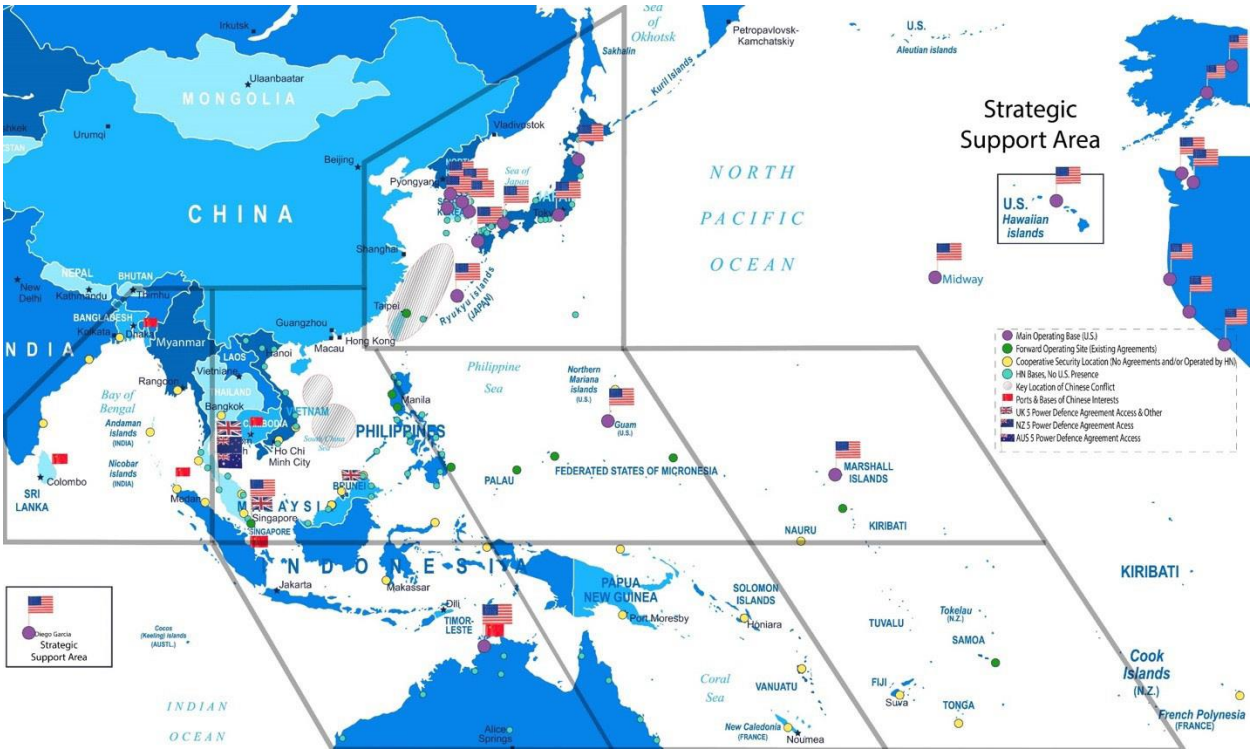



*Figure 1 The Grid Role*

The study identifies Chinese increased A2/AD capabilities and that "most forward-deployed US forces are within the PRC (Peoples Republic of China) anti-access/area-denial umbrella." (Freier et al, 2020, p. 52) The study also touches upon China's continued use of gray zone activities. "To date, China has been undeterred in its aggressive gray-zone maneuver against the United States and its partners in the region." (Freier et al, 2020, p. 46)

The study supports relevant themes for this paper's research. The first is that the Army has important future roles in INDOPACOM and with at least some of those roles, sustainment is an important aspect that warrants "innovative employment." (Freier et al, 2020, p. 46) The second is the impact and criticality of Chinas gray zone activities and increased A2/AD capabilities. The study does not provide details on how to achieve or implement better sustainment and does not mention FSS and their role at all.

The second study is a monograph titled *U.S. Landpower in the South China Sea* published by the U.S. Army War College Press. The documents overarching focus is countering "the misperceptions that U.S. landpower plays only a minor or supporting role in what is normally considered a predominately maritime- and air-centric theater." (Bouchat, 2017, p. vii) The document "explains the vital role of landpower to engage the forces of other countries, deter aggression, and fight if necessary in pursuit of broad U.S. national interests in the region." (Bouchat, 2017, p. vii) The paper concludes that "U.S. landpower in the South China Sea is an essential component to stabilizing this contested region during America's strategic rebalance to the Asia-Pacific region." (Bouchat, 2017, p. 93)

The study states that the U.S. Army has important capabilities, responsibilities, and experience that it brings to the table and can provide to the joint force. Specifically, "the U.S. Army provides indispensable support to other forces and agencies through its theater opening and sustaining abilities." (Bouchat, 2017, p. 94) It is the DOD lead for multiple logistics and sustainment functions. The study also touches upon Chinese increased A2/AD capability impacts and China's use of Gray zone activities/Coercive Gradualism. "In the South China Sea region, forward U.S. and friendly bases" (such as Antonio Bautista Air Base and Basa Air Base in the Philippines) "are vulnerable to preemptive air and missile strikes from China's burgeoning A2AD system, meant to disrupt concentrated in-place or reinforcing U.S. and partner logistics and combat forces on land and at sea." (Bouchat, 2017, p. 28) The monograph mentions the Army's important role of providing air and missile defense systems. "Deployed U.S. air and missile defenses, commanded by the 94th Army Air and Missile Defense Command, are a partial counter to Chinese coercive gradualism." (Bouchat, 2017, p. 28) The study provides an example of both gray zone activities and the use of A2/AD capability in the South China Sea: "China's coercion is most recently seen in the "coercive gradualism" or small "gray zone" advances of dredging reefs into artificial islands and militarizing them along with advanced A2AD capability and belligerent maritime confrontations." (Bouchat, 2017, p. 17) The monograph identifies, in general, the important Army role of deterrence. "Deterrence needs to exhibit the will to back combat capabilities, which is demonstrated through the forward presence of troops and prepositioning of equipment and supplies." (Bouchat, 2017, p. xii) The forward presence of troops put them under threat from China's increased A2/AD capability. Prepositioning of equipment could include FSS.

The monograph supports relevant themes for this paper's research. The first theme is the importance of sustainment and the role that the Army plays in providing sustainment and logistics to other services as part of a joint mission. The second is the impact of Chinese A2/AD capabilities on our forward deployed forces. The Army's air and missile defense systems have the ability to counter the A2/AD threat. The third is highlight of the reality and impact of China's gray zone activities. Lastly the study mentions the use of prepositioned equipment which could involve the increased procurement of FSS. The monograph does not provide details on better sustainment, does not mention FSS roles, and does not address FSS as part of prepositioned equipment.

The third study is titled *Outplayed, Regaining Strategic Initiative in the Gray Zone* published by the U.S. Army War College Press. The study was sponsored by the Army Capabilities Integration Center and in collaboration with the Joint Staff's Deputy Directorate for Global Operations (Strategic Multi-Layer Assessment Branch). The study "examines the emergence of gray zone competition and conflict as important pacers for U.S. defense strategy." (Freier et al, 2016, p. ix) The study suggests that the U.S. "will encounter persistent and unmitigated resistance…" which "….will often take the form of gray zone competition and conflict." (Freier et al, 2016, p. ix) In the foreword the study states that "the DoD should recognize that the gray zone will continue to confound the DOD until it (gray zone) is normalized and more fully accounted for in defense strategy and plans." (Freier et al, 2016, p. ix) The document gives a good definition of the gray zone: "the awkward and uncomfortable space between traditional conceptions of war and peace." (Freier et al, 2016, p. xiii) The study is not focused on INDOPACOM but the entire globe. It suggests its findings and

recommendations "will provide senior defense leadership with touchstones for deeper examination." (Freier et al, 2016, p. xiv) The study provides a way ahead: "normalizing and accounting for the DOD's burgeoning gray zone challenge relies on the socialization of two important concepts—adaptation and activism. The defense enterprise needs to adapt to how it sees its gray zone challenges; how it charters strategic action against them; and, finally, how it designs, prioritizes, and undertakes that strategic action. All of these require a robust and activist DoD response." (Freier et al, 2016, p. xv) *Outplayed* dedicates a chapter just for China and describes how they implement gray zone tactics and how the Chinese military is used. "To date, the PRC has practiced its brand of revisionist counter-U.S. resistance entirely in the gray zone. It employs different combinations of influence, intimidation, coercion, and veiled aggression to approach, probe, and, at times, violate perceived U.S./partner redlines while skillfully remaining below the threshold of outright military provocation." (Freier et al, 2016, p. 33) Its military forces are "extremely effective instruments of intimidation, coercion, and veiled aggression." (Freier, 2016, p. 37) The study talks about how China is increasing its A2AD capability and employing that as part of its gray zone activity. "China is building A2AD capabilities to picket its disputed territorial interests in the first island chain and the South China Sea; employing influence, intimidation, and coercion to achieve warlike ends and contest U.S. regional dominance." (Freier et al, 2016, p. 33)

The study also discusses the role of the Army (ground forces) can play in a grey zone environment, especially with modular forces that can be tailored to the mission. "All U.S. ground forces can tangibly contribute to contesting gray zone competition with forward-

deployed forces and surge expeditionary capability." The study also recommends forces be "more autonomous, self-sustaining, agile, and multi-functional." (Freier et al, 2016, p. 84)

*Outplayed* supports relevant themes for this paper's research. The first theme is the importance/impact of Chinas gray zone activities and the need for the U.S. to respond and adapt to that reality or risk ceding its position in INDOPACOM. The second theme is that there is a role for ground forces in countering this threat. The study refers to forward deployed and expeditionary forces as part of this role. The third supporting theme is the studies referral to forces needing to be self-sustaining. The study does not get into sustainment details or different ways of doing sustainment in INDOPACOM. It does not mention FSS and their role or improvements or increases in these systems.

The fourth study is titled "Understanding Coercive Gradualism" for the Quarterly Parameters the U.S. Army War College Press. The article discusses the strategy of coercive gradualism, Chinas employment of it through gray zone activities, and ways to deter it. The article highlights things China has done recently and their use of "cabbage theory". "The Chinese have a name for this approach—cabbage strategy: 'an area is slowly surrounded by individual 'leaves'—a fishing boat here, a coast-guard vessel there—until it's wrapped in layers, like a cabbage.' " (Pierce, 2015 Autumn, p. 55) The article states military deterrence is a way to counter coercive gradualism. The documents conclusion it states: "key to countering a strategy of coercive gradualism is preventing the initial aggressive move using all instruments of power." (Pierce, 2015 Autumn, p. 61)

This article has themes that support this papers research. The first theme is the example and importance of China's use of coercive gradualism and gray zone activities. The second theme is how military deterrence can be a counter to coercive gradualism. The article does not talk about A2/AD. It also does not talk about FSS and their role in military deterrence or in helping to counter gray zone activities.

The fifth study is a report from the Rand Corporation titled *China's Grand Strategy, Trends, Trajectories, and Long Term Competition.* The report was sponsored by the U.S. Army and part of a larger project to "help the U.S. Army understand the shifting relative capabilities of the U.S. and Chinese militaries over the next 35 years." (Scobell et al, 2020, p. iii) The report focused on "identifying and characterizing China's grand strategy, analyzing its component national strategies (diplomacy, economics, science and technology [S&T], and military affairs), and assessing how successful China might be at implementing these over the next three decades." (Scobell et al, 2020, p. ix) The report developed possible future scenarios for what China will be like in 2050 and then discussed those implications.

The report highlights a likely continued and increased threat to forward bases in INDOPACOM. It also discusses what the U.S. Army should do; "…optimize specific, key units and capabilities for available airlift and sealift to get soldiers to the fight quickly or to a hot spot swiftly before the fight breaks out." (Scobell et al, 2020, p. xii) The report goes on to describe the U.S. Army needing to have an "inside the wire" mentality because of the Chinese threat. In the future, crisis/conflict "…will require a combination of forward-based forces, light and mobile expeditionary forces, and interoperable allied forces." (Scobell et al, 2020, p. xii) It also

emphasizes that with increased risk the Army will need to be prepared "…to operate with much longer logistics tails." (Scobell et al, 2020, p. xii) The report also talks about capabilities that are needed, and investment in them, such as "expeditionary logistics, to include clandestine pre-positioning in theater." (Scobell et al, 2020, p. xiii) "…The long-term prominence of the China challenge will require increased investment in a range of capabilities for the Indo-Pacific…" (Scobell et al, 2020, p. xii)

In the report there are some supporting themes for this research paper. The first theme is increased prominence of China and its threat to U.S. forces. The second theme is there is a role for the U.S. Army and the Army needs to rethink how its forces are structured. Some emphasis is on light and mobile forces. The third theme is sustainment will continue to be challenging and there is a need for expeditionary logistics and preposition of equipment/supplies. The fourth theme is the need for increased investment in capabilities for the Indo-Pacific. The study does not mention FSS, does not discuss ways of doing sustainment differently, or discuss more investment towards sustainment capability.

The major themes found in this literature review support this research. The first major theme is about sustainment/logistics. The size and distances in INDOPACOM make sustainment difficult. Sustainment is not only important for the U.S. Army forces but also for Joint Forces in part by the support the Army provides. It is also important for units in the Army to be as self-sustaining as possible to account for the challenges of the INDOPACOM environment. The second theme is the reality, risk, and impact of Chinas increased A2/AD capabilities and gray zone activities. Additionally, it is important for the DOD to take this into account in their

strategy and planning. The third theme is that the U.S. Army role in INDOPACOM is an important one whether it is for presence, deterrence, missile defense, or supporting capabilities. The fourth major theme is related to the third theme. It is that the forward positioning of forces and prepositioning of equipment and supplies will likely continue to be an element of theater design. The fifth theme is the DOD and Army need to modify or increase its capability and force structure to match the threats mentioned in theme two. These themes provide a basis and strong reasoning for this research papers topic on FSS.

As a result of this literature review I have one recommendation for future researchers. It is to not focus on the use of business related literature search engines like ABI/INFORM Proquest or EBSCOhost Academic Search Ultimate. For the search terms I used I was not able to find many relevant studies through those search engines. I would recommend a researcher with limited time use these search engines only after reviewing other sources first.

The literature review clearly turned up gaps in existing literature specifically associated with the research paper. Those gaps include specific improvement suggestions/discussion to INDOPACOM sustainment activities or to sustainment units or force structure. There is also little available analysis of how FSS can support INDOPACOM in its counter to Chinese A2/AD and gray zone activities. Lastly there is no discussion of FSS role in prepositioned stock or how FSS could be improved to support INDOPACOMS needs. Gaps observed during this limited literature review support further research. Specifically it supports further research into what the U.S. Army can do to further develop, improve, procure and field FSS that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone

activities and increased A2/AD capability. Additionally, it supports research into what the U.S. Army can do in the future with FSS to support the Army Strategy in the INDOPACOM.

## Chapter 3 – Research Methodology

The purpose of this chapter is to describe the research methodology that was used for this research effort and analysis. The chapter outlines the research questions, the research design, the key processes and methods used to collect and analyze data, and addresses bias and error. This paper used a qualitative historical case study approach to review existing research and literature and conduct research analysis. The purpose of this research was to answer the central question: what can the U.S. Army can do to further develop, improve, procure and field FSS that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities and increased A2/AD capability?

### Research Questions

In addition to the central question, this study looked at what the U.S. Army can do in the future with FSS to support the Army Strategy in the INDOPACOM.

The research sought to answer three main questions:

1. What can the U.S. Army do to counter China's Gray Zone Activities?
2. What can the U.S. Army do in response to China's increased A2/AD capability?
3. How might Force Sustainment Systems support answers to questions (1) and (2)?
    a. Does the Army have enough Force Sustainment Systems if contracted resources are not available?
    b. What is required of Forces Sustainment Systems in these environments?
    c. What risks do Force Sustainment Systems have WRT these challenges?

**Research Design**

This study used a qualitative literature review method. The research was conducted in two main phases; phase one was a literature review and phase 2 was analysis of the research and themes obtained in phase 1. The first part of phase one was a literature review focused on studies with the intent of determining what relevant research already existed. The second part of the research for phase 1 further investigated existing studies and expanded that search into other relevant documents. Initial research was informative on what Gray zone activities and A2/AD capabilities are and China's employment of them. Further research provided information on DOD, Army, and INDOPACOM strategic initiatives, goals, and opinions in relation to China's Gray zone activities and A2/AD capabilities.

Research sources included historical studies, monographs, articles, reports, Army and joint publications, strategy documents, books, press releases, commentaries, and websites. A list of search terms was created and adjusted as relevant research documents helped inform more productive research terms. A sampling of those search terms, used in combination with each other are listed in the table below:

| Sampling of Search Terms | | | |
|---|---|---|---|
| China | gray zone, grey zone | U.S. Army, U.S. Army Pacific, Pacific Command, INDOPACOM | South China Sea |
| U.S. Army Pacific logistics | Force Sustainment Systems | U.S. Army Sustainment | Anti-Access Area Denial |

Table 1 Search Terms

Research was conducted primarily using two methods. The first was use of multiple search engines and the second was reviewing works cited of relevant studies/documents that were found. The research boundaries often included English language only and generally documents that were from within the last five years but not more than 10 years. The search engines primarily used included (but were not limited to): ABI/INFORM Proquest, Proquest Dissertations & Theses Global, EBSCOhost Academic Search Ultimate, Rand corporation website, U.S. Army War College Press, Defense Technical Information Center (DTIC) website and R&E Gateway, and Google. A spreadsheet was used to capture, categorize, and record the relevance of reviewed documents and sources. This spreadsheet was also used to record search terms used with search engines.

**Bias and Error**

There are two potential areas of bias in the research. The first potential bias is towards a particular military department or component of a services, for example an author or researcher trying to advocate for a particular weapons system or branch of a service such submarines or Army aviation. I attempted to mitigate the impact of this bias on this studies research and analysis through several steps. The first step was recognizing the potential for this bias existence and highlighting it when I observed it. Once observed I would eliminate that document/source or I would consider the points made. If I found the considered points/themes elsewhere in other documents, sufficiently justified, I would judiciously use them. The second area of potential bias was the selection of search terms. I believe I mitigated this bias by

selecting a majority of my search terms before conducting my research but also adjusting my search terms when additional themes or perspectives came to light that I had not considered previously. Although these bias could not be eliminated I believe their impact to be minimal.

## Chapter 4 - Findings

The purpose of this chapter is to present findings of this research effort and analyze, compare, and synthesize material from various sources. Those sources included studies, monographs, papers, articles, DOD/Joint/Army publications, and presentations. The findings help answer the question: *What can the U.S. Army do to further develop, improve, procure and field Force Sustainment Systems that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities and increased A2/AD capability*? Additionally, the findings help answer the main questions below:

1. What can the U.S. Army do to counter China's Gray Zone Activities?
2. What can the U.S. Army do in response to China's increased A2/AD capability?
3. How might Force Sustainment Systems support answers to questions (1) and (2)?
    a. Does the Army have enough Force Sustainment Systems if contracted resources are not available?
    b. What is required of Forces Sustainment Systems in these environments?
    c. What risks do Force Sustainment Systems have WRT these challenges

The findings are organized into five major areas of focus: sustainment/logistics, gray zone activities and A2/AD, Army roles, force posture and equipment preposition, and capability and force structure changes.

**Sustainment/Logistics**

The first major focus area of findings is in the area of sustainment and logistics. Findings are related to important aspects of sustainment, what FSS entails, INDOPACOM AOR attributes, Multi-Domain Battle (MDB) and A2/AD sustainment implications.

"Effective sustainment provides the JFC (Joint Force Commander) the means to enable freedom of action and endurance and to extend operational reach. Sustainment determines the depth to which the joint force can conduct decisive operations, allowing the JFC to seize, retain, and exploit the initiative. Joint logistics supports sustained readiness for joint forces." (Joint Chiefs of Staff, 2019, p. I-1) FSS enable portions of logistics services and/or field services. From *Joint Publication 4.0, Joint Logistics,* Joint Chiefs of Staff (2019) is an excerpt describing what Logistics Services is:

**"5. Logistics Services**

Logistics services comprise the support capabilities that collectively enable the US to rapidly provide global sustainment for our military forces. Logistics services include many scalable and disparate capabilities. Included in this area are food service, water and ice service, contingency base services, hygiene services, and mortuary affairs (MA).

a. **Food Service.** Includes all aspects of dining facility management, subsistence procurement and storage, food preparation, food sanitation protection (food defense and food safety), and delivery to supported personnel.
b. **Water and Ice Service.** Includes capability to purify, test, store, and distribute bulk packaged and frozen water in a deployed environment. Water and ice for human consumption must meet potable water standards.
c. **Contingency Base Services.** Provides the assets, programs, and services necessary to support CCMD operations. This includes capabilities to operate, manage, and transition, transfer, or close contingency locations for force application. Contingency locations provide shelter, billeting, utilities, common-user life support management, force protection, and facility management (i.e., mayoral capability) in a deployed environment. The base operating support (BOS) functions of the personnel, equipment, services, activities, operational energy, and resources required to sustain operations at an installation are managed by a base operating support-integrator (BOS-I). A GCC

may designate a Service component commander, subordinate unified commander, or JTF commander as the BOS-I at each contingency location.

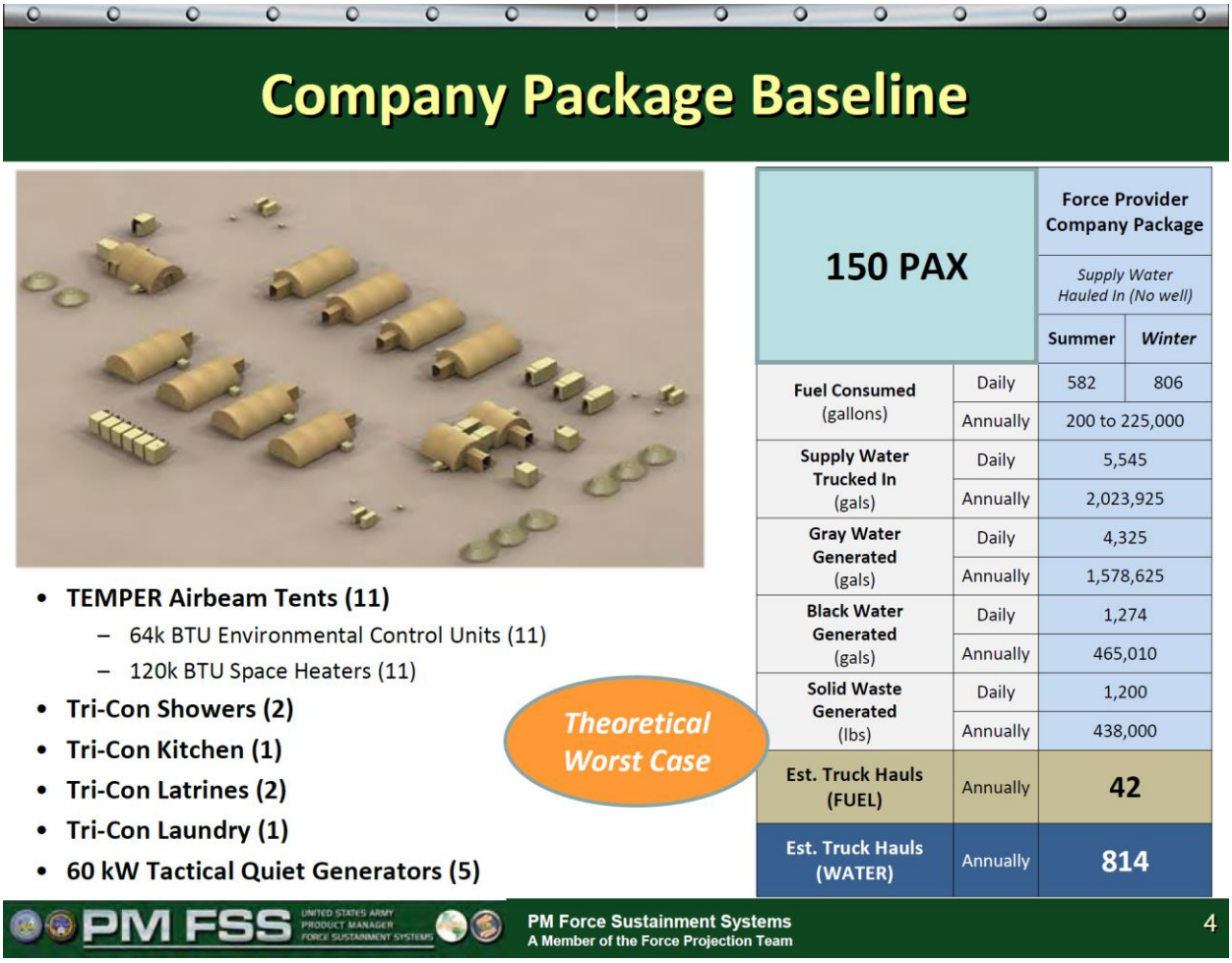
d. **Hygiene Services.** Include both personal hygiene and textile services. Personal services provide adequate sinks, showers, and toilets to meet needs of both men and women. Textile services provide cleaning, repair, and return of clothing items and individual equipment.
e. **MA.** The DOD Mortuary Affairs Program is a broadly based military program that provides for the care and disposition of deceased personnel and the handling of their personal effects (PE). The DOD Mortuary Affairs Program covers the return of human remains across a conflict continuum ranging from peace through war. The CCMDs and Services provide MA support across the range of military operations to:..."

The U.S. Army Publication, *ADP 4-0 Sustainment (2019, July)*, describes Field Services:

**"FIELD SERVICES**
1-30. ***Field services*** **includes aerial delivery, food service, shower and laundry, contingency fatality operations, and water purification. These services enhance unit effectiveness and mission success by providing for Soldier basic needs.** Field services maintain combat strength of the force by providing for its basic needs and promoting its health, welfare, morale, and endurance. Field services provide life support functions. …. A means of providing support is Force Provider, which can provide life support capabilities for Soldier sustainment during operations. It can also support humanitarian assistance, disaster relief and noncombatant evacuation operations…"

Force Provider is a base camp life support capability. Below is an excerpt of a presentation discussing potential efficiency and environmental solutions for a small operations base. (Munroe, 2010, slide 4) It illustrates the amount of fuel, water, etc. needed to operate. Conservation of operational energy and resources is an aspect of base camps and sustainment. *DoD directive, 3000.10, Contingency Basing Outside the United States* policy states "c. Using operational energy efficiently in accordance with the guidance stated in the *DoD Operational Energy Strategy*, *DoD Directive (DoDDs) 5134.15*, and *DoD Instruction 4140.25* (References (b), (c), and (d)), minimizing waste, and conserving water and other resources." (Department of Defense, 2018, p. 2). In the *U.S. Army Functional Concept for Sustainment,* Appendix B

"Required Capabilities", "future Army forces require the capability to produce and manage operational energy through the use of energy efficient, renewable, and intelligent power management technologies in the context of expeditionary and base camp operations to prolong endurance and sustain MDB." (TRADOC, 2017, February, p. 36)




| 150 PAX | | Force Provider Company Package | |
|---|---|---|---|
| | | *Supply Water Hauled In (No well)* | |
| | | Summer | *Winter* |
| Fuel Consumed (gallons) | Daily | 582 | 806 |
| | Annually | 200 to 225,000 | |
| Supply Water Trucked In (gals) | Daily | 5,545 | |
| | Annually | 2,023,925 | |
| Gray Water Generated (gals) | Daily | 4,325 | |
| | Annually | 1,578,625 | |
| Black Water Generated (gals) | Daily | 1,274 | |
| | Annually | 465,010 | |
| Solid Waste Generated (lbs) | Daily | 1,200 | |
| | Annually | 438,000 | |
| Est. Truck Hauls (FUEL) | Annually | 42 | |
| Est. Truck Hauls (WATER) | Annually | 814 | |

Figure 2 Force Provider (Munroe, 2010, slide 4)

The size and distances within INDOPACOM make sustainment challenging. From the INDOPACOM website it says "the USINDOPACOM AOR covers more of the globe of any of the other geographic combatant commands and shares borders with all of the other five

geographic combatant commands." (U.S. Indo-Pacific Command, 2021) The diagram below is also from the website and helps show the vastness of the AOR. (INDOPACOM website)

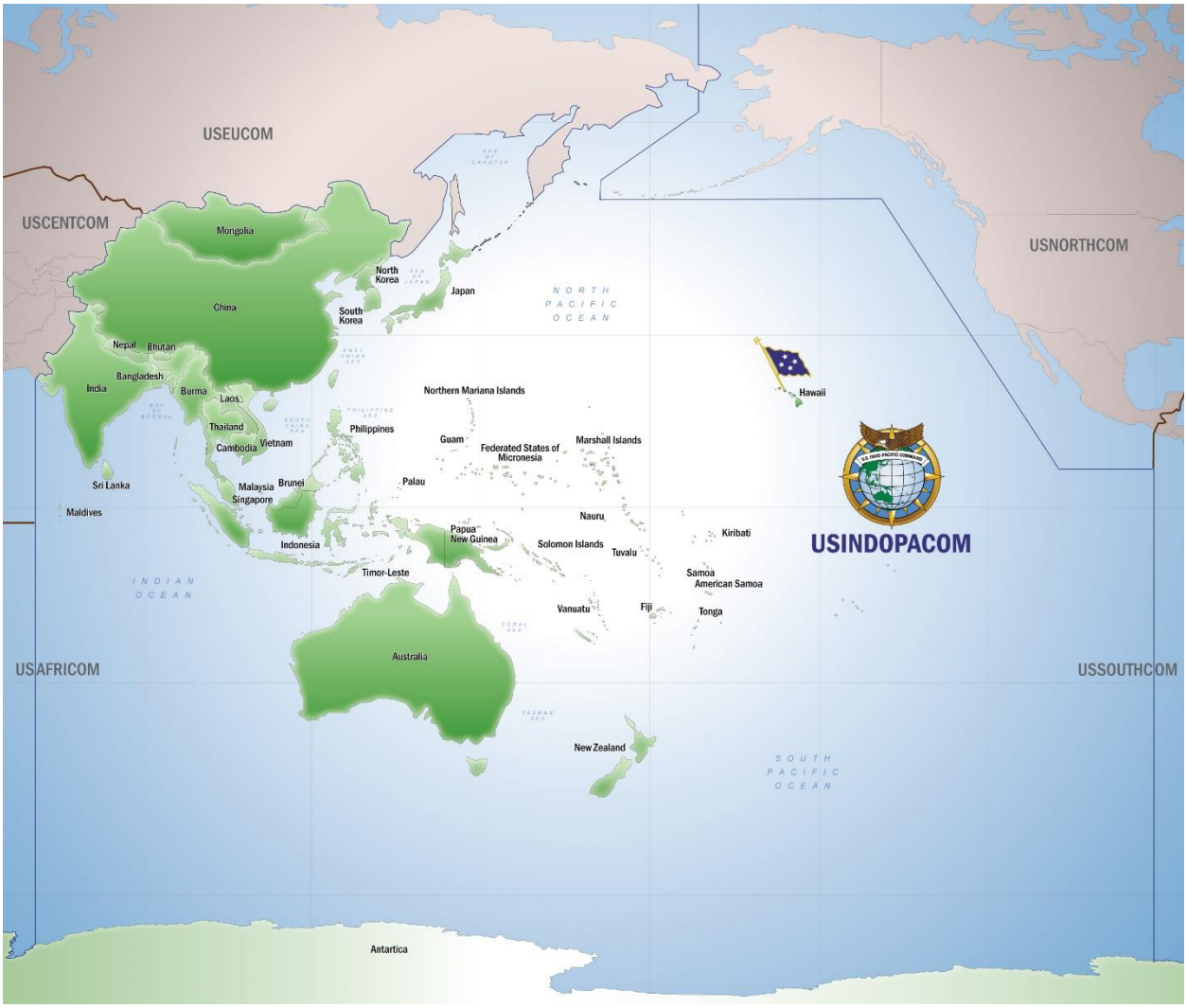



Figure 3 INDOPACOM AOR (U.S. Indo-Pacific Command, 2021)

The U.S. Army Training and Doctrine Command (TRADOC) publication: *Multi-Domain Battle: Evolution of Combined Arms for the 21st Century, 2025-2040*, lists sustainment supporting actions. Two of those include the ability to: "rapidly establish mobile, clandestine expeditionary logistics bases to provide sustainment to afloat and expeditionary operating forces" and "add and reconfigure prepositioned stocks (ashore and afloat) that are dispersed

for survivability and combat configured in unit sets for rapid employment with alignment to early entry requirements." (TRADOC, 2017, December) Both of these have relevance to an A2/AD environment and challenges that might present in the INDOPACOM AOR, especially the clandestine and dispersed aspects.

In their discussion of strategy the authors of the paper *Tightening the Chain: Implementing a Strategy of Maritime Pressure in the Western Pacific* discuss the sustaining forces environment and requirements. They describe an intense scenario; "Inside-Out Defense would require sustaining highly geographically distributed forces operating in austere environments, all while under attack." (Mahnken et al, 2019, p. 39). In the RAND corporation study *Chinas Grand Strategy, Trends, Trajectories, and Long-Term Competition* discuss implications of a future stronger China and describe the impact to logistics. "These conditions call for greater attention to improving joint force capabilities, to both maintain combat power at and project power to points of contention in the region, as well as preparing to operate with much longer logistics tails." (Scobell et al, 2020, p. xii). Given China's increased A2/AD capability, the article "Sustainment in an Anti-access/Area-Denial Environment" provides relevant thoughts on five strategies that Joint Force should implement, "suppression, active defense, dislocation, dispersion, and redundancy." (Bethel, 2016, p. 13) Two of those strategies have relevant impacts for FSS. The first is dispersion; as described in the article: a "…passive strategy to deal with the A2/AD threat is the dispersion of both units and materiel. This affects the sustainment enterprise in two ways." First "…combat commanders will seek to minimize risk to the force by distributing combat formations over a larger area." Second, "…materiel will need to be dispersed into smaller, more numerous groups to avoid catastrophic loss. Loss of

economy of scale caused by both of these strategies requires the earlier deployment of a larger number of EAB (echelons above brigade) sustainment units." (Bethel, 2016, p. 15) The second strategy is redundancy; "…to cope with the A2/AD threat, the sustainment enterprise must build greater redundancy into its operations. Against a determined, capable A2/AD adversary there will inevitably be losses and delays." (Bethel, 2016, p. 15) The article gives an example impact that brigade combat teams (BCTs), in an A2/AD environment, may need to survive for longer periods without resupply and the amount of materiel carried may need to be increased (Bethel, 2016).

Multiple sources consider, with China's increased capabilities, that the INDOPACOM requires an MDB operations focus. The article "Sustainment Innovation for Multi-Domain Battle" discusses BCT's being more self-sufficient for longer. "A key element of the MDB concept is that of resilient formations featuring BCTs capable of operating semi-independently for up to a week without continuous resupply. Currently the brigade support battalion (BSB) holds 2 ½ days of supply. In the new MDB environment, BCTs will be required to operate more independently and with fewer logistics constraints. In order to achieve the goal of seven days of supply, the Army must either triple the BSB's capacity or change the way sustainers provide support." (Hurley et al, 2018, p. 5)

An overview of key findings:

- Force Provider systems have requirements to conserve resources/energy.
- INDOPACOM has great distances and in the current or future conflict/contingency environment forces will be dispersed/distributed and in austere environments

- Prepositioned stocks should be dispersed and possibly clandestine
- Materiel needs to be dispersed into smaller amounts in more locations
- Units need to self-sustain for longer
- Higher amount of sustainment units needed to conduct operations

**Gray Zone Activities and A2/AD**

The second major focus area of findings is in the area of gray zone activities and A2/AD. Findings include definitions, Chinese actions, and impacts.

The *2019 Army modernization strategy* talks about a renewed great power competition. It states "China is also rapidly modernizing its armed forces, and is projected to surpass Russia in the mid to-long-term as our most capable threat." (U.S. Army, 2019, p. 3). China is increasingly using gray zone activities to achieve its goals and is improving its A2/AD capabilities. The Army War College report *A Whole-of-Government Approach to Gray Zone Warfare* provides some definitions and explanations of gray zone warfare that are valuable. "Gray zone warfare, also known as irregular warfare, political warfare, hybrid warfare, asymmetric warfare, and unconventional warfare, is increasingly becoming the norm." (Troeder, 2019, p. 1) "The term "gray zone" was coined by the U.S. Army's Special Operations Command "to describe activities, actions, or conflict in the space between peace and war. Commander of U.S. Central Command, General Joseph L. Votel further describes that space between peace and war as "characterized by intense political, economic, informational, and military competition more fervent in nature than normal steady-state diplomacy, yet short of conventional war." The types of campaigns waged within the gray zone are numerous—all are

considered elements of soft power and are differentiated as instruments of national power (diplomatic, information, military, and economic) and tools of national security policy (finance, intelligence, and law enforcement)." (Troeder, 2019, p. 2)

The *2019 DOD INDO-PACIFIC Strategy Report*, in talking about China as a revisionist power, provides some examples of Chinese gray zone activities. "China has continued to militarize the South China Sea by placing anti-ship cruise missiles and long-range surface-to-air missiles on the disputed Spratly Islands and employing paramilitary forces in maritime disputes vis-à-vis other claimants. In the air, the People's Liberation Army (PLA) has increased patrols around and near Taiwan using bomber, fighter, and surveillance aircraft to signal Taiwan. China additionally employs non-military tools coercively, including economic tools, during periods of political tensions with countries that China accuses of harming its national interests." (Department of Defense, 2019 p. 8) The map below (figure 4) of the South China Sea gives a good starting perspective of the potential challenges faced in that area.

The *A Whole-of-Government Approach to Gray Zone Warfare* report also provides some additional insight into China's gray zone activities. "Examples of China's gray zone tactics are its "One Belt, One Road" initiative as well as its "artificial island construction and militarization of facilities on features in international waters," especially in the South China Sea. Both strategies expand China's control in the Asian region and threaten national security, trade, and economic growth, particularly for those who require navigation through the South China Sea. The three primary issues regarding China's initiatives in the South China Sea—which are not necessarily consistent with international law—are multiple claims to land masses, multiple claims to

exclusive economic zones, and restrictions of varying activities enforced by claimants within their exclusive economic zones." (Troeder, 2019, p. 2)


Figure 4 South China Sea with Occupied Island Features (Steindl, 2017, p. 33)

In the Army War College report *Outplayed, Regaining Strategic Initiative in the Gray Zone*, the authors provide additional information on how China employs gray zone activities and how their military can also be part of those activities. "To avoid open conflict, China pursues its objectives almost entirely in the gray zone. One such prominent gray zone approach is its reliance on military and paramilitary intimidation and the non-violent use of military force." (Freier et al, 2016 p. 37) The *2019 DOD INDO-PACIFIC Strategy Report* discusses China's military modernization and coercive actions. The report again touches upon gray zone activity as well as increased A2/AD capabilities. "China is engaged in a campaign of low-level coercion to assert control of disputed spaces in the region, particularly in the maritime domain. China is using a steady progression of small, incremental steps in the "gray zone" between peaceful relations and overt hostilities to secure its aims, while remaining below the threshold of armed conflict. Such activities can involve the coordination of multiple tools, including: political warfare, disinformation, use of A2/AD networks, subversion, and economic leverage." (Department of Defense, 2019 p. 8) The report highlights the risk that Chinas new A2/AD capabilities "…could be used to prevent countries from operating in areas near China's periphery, including the maritime and air domains that are open to use by all countries." (Department of Defense, 2019 p. 8)

The *2019 Army Modernization Strategy*, in describing Multi-Domain Operations (MDO), identifies what adversaries are trying to do with A2/AD capability. "Near-peer competitors such as China and Russia seek to achieve their aims by using multiple layers of stand-off across all domains – land, sea, air, space, and cyberspace – to separate U.S. forces and our allies in time, geography, and function. They hope to deny our ability to project combat power, thereby

creating de facto spheres of influence. Our competitors will do this through a combination of long-, mid-, and short-range weapons systems, conventional forces, integrated air defenses, electronic warfare and jamming, cyber-attacks, and denial of space-based capabilities, such as reconnaissance, navigation, and communications, as well as an array of political and informational tools." (U.S. Army, 2019, p. 5)

Considering China's improved A2/AD and their gray zone tactics there are increased risks and impacts to the U.S. in the INDOPACOM area. In the defense one article "The US is Out of Position in the Indo-Pacific Region", the authors discuss their research done through the Army War College. They claim the Chinese already have the strategic initiative and "Beijing will continue to limit U.S. freedom of action" until the U.S. can make changes. "… China will continue to manipulate U.S. and partner risk calculations through innovative combinations of gray zone capabilities and methods." (Freier et al, 2020, July) "Beijing's effective gray zone resistance" and their " and gray zone maneuver" is crowding "the United States out of its perceived sphere of influence." (Freier et al, 2020, July) Alarmingly, "step by forceful step, China is laying the groundwork for a new order in the region that recognizes Beijing's unquestioned primacy, and for an international system whose norms and institutions reflect China's interests and preferences. "China is biding its time," one report recently concluded, "slowly eroding American credibility in the region…" (Mazarr, 2015, p. 1)

China's gray zone action "return on investment" is an incentive for them to continue. According to the authors of the research report *Outplayed* Chinese gray zone activities "…..have enabled China to contest and sometimes dominate competitive spaces and thereby achieve warlike aims without resorting to warlike violence." (Freier et al, 2016, p. 33) As mentioned

above, China uses military and paramilitary forces in its gray zone activities. Their use "can effectively deter rivals attempting to counter gray zone activity. By hinting or implying that armed escalation may be its next course of action, China effectively boxes in less powerful or more risk averse opponents." (Freier et al, 2016, p. 37) "If the United States fails to compete effectively in the gray zone, it hazards ceding power, initiative, and influence in the Asia-Pacific region, putting vital national security interests in jeopardy." (Freier et al, 2016, p. 40)

China's increased capabilities and activities have increased the U.S. military risk. In the article "INDOPACOM through 2030" it emphasizes this risk, "China's aggressive military transformation and its deliberate gray-zone maneuvering will progressively increase US risk and limit realistic future US military options." (Freier et al, 2020, May, p. 30). Specifically, in the future "…the U.S. military should anticipate increased risk to already threatened forward-based forces in Japan, South Korea, and the Philippines and a loss of the ability to operate routinely in the air and sea space above and in the Western Pacific." (Scobell et al, 2020, p. xii) *Joint Publication 4.0 on Joint Logistics*, encourages logistics planners to take into account adversaries threats and reduce risks to logistics. "The challenge for future joint logistics is to adequately support globally integrated operations given the combination of five ongoing trends." (Joint Chiefs of Staff, 2019, p. I-1) One of those is "The proliferation of advanced anti-access/area denial capabilities by adversaries that would degrade logistics capabilities and capacities." (Joint Chiefs of Staff, 2019, p. I-2) An overview of key findings:

- Chinas A2/AD capabilities have increased
    - Significant threat and risk to U.S. military to include logistics
- China uses gray zone activities extensively to achieve its goals

- Threatens Indo-Pacific security
- Potential negative impact to U.S. influence and standing

**Army Roles**

The third major focus area for findings is U.S. Army roles and this entails the importance of the Army and potential roles. The Army's role in INDOPACOM is strategically important despite the geographic makeup of the AOR. The monograph *U.S. Landpower in the South China Sea* "counters the misperceptions that U.S. landpower plays only a minor or supporting role in what is normally considered a predominately maritime- and air-centric theater." (Bouchat, 2017, p. vii) Some of the roles the Army can "play in" include deterrence, engagement, specialized capabilities, and all the while offering less potential escalation than other potential military services. The monograph "explains the vital role of landpower to engage the forces of other countries, deter aggression, and fight if necessary in pursuit of broad U.S. national interests in the region." (Bouchat, 2017, p. vii) Additionally, the study states that landpower can have a supporting and stabilizing role. "U.S. landpower in the South China Sea is an essential component to stabilizing this contested region." (Bouchat, 2017, p. xi) The authors highlight the importance of landpower in the simple act of deterrence. With landpower comes deterrence and with deterrence come commitment. "U.S. ground forces are the linchpins in the DoD's gray zone response. Operations and operational effects on and from land or projected ashore onto land from the sea provide a persistent demonstration of U.S. commitment." (Freier et al, 2016, p. 84) Commitment is critical for our INDOPACOM partners to see from the U.S.

Another aspect of the U.S. Army's critical role in INDOPACOM is the unique and valuable capabilities it brings to the fight. *U.S. Landpower in the South China Sea* identifies those capabilities as sustainment, theater opening, and missile defense (Bouchat, 2017). "One proven function of landpower, as assigned by DoD to the U.S. Army, is its ability to defend against air and missile attacks using land-based radar and missile systems integrated under the joint force air component commander. In the South China Sea region, forward U.S. and friendly bases" (such as Antonio Bautista Air Base and Basa Air Base in the Philippines) "are vulnerable to preemptive air and missile strikes from China's burgeoning A2AD system, meant to disrupt concentrated in-place or reinforcing U.S. and partner logistics and combat forces on land and at sea. For Southeast Asian countries, Chinese A2AD systems also have the potential for political coercion and to contest access to the South China Sea. Deployed U.S. air and missile defenses, commanded by the 94th Army Air and Missile Defense Command, are a partial counter to Chinese coercive gradualism." (Bouchat, 2017, p. 28)

What can the U.S. Army do in INDOPACOM? The study *An Army Transformed: USINDOPACOM Hyper competition and U.S. Army Theater Design*, published by the U.S. Army War College Press, had the task of suggesting what the U.S. Army theater design should be in INDOPACOM. The "…study recommends that the Army adopt and adapt to four transformational roles in the USINDOPACOM AOR: the Army as *the grid*, the Army as *the enabler*, the Army as *the multi-domain warfighter*, and the Army as *the capability and capacity generator.*" (Freier et al, 2020, p. xv) The two most relevant roles for FSS are the grid and the enabler.

Key aspects of the grid are multiple and distributed locations/forces, many of them austere. With additional locations more FSS are naturally needed. “The grid sees the Army establish a distributed, resilient, and mutually reinforcing theater network of expeditionary base clusters, hubs, and nodes as the foundation for regional Joint operations. The core purpose of the grid is expanding the competitive space; creating options for Joint Force commanders; and, ultimately, enabling effective Joint, multi-domain maneuver.” (Freier et al, 2020, p. xv) “In practice, the grid is a division of the USINDOPACOM Theater into operationally relevant subdivisions. Each subdivision includes a combination of one or more hubs and multiple nodes. A hub is a point of entry and onward movement, a robust operating and sustainment location, and/or a regional mission command site. Nodes are widely distributed expeditionary or austere operating sites from which a variety of Joint Force and Army functions are performed.” (Freier et al, 2020, p. 61)

Key aspects of the enabler role is the specific focus on sustainment, a focus on small units that are distributed, and how those units may be isolated and have to act without constant communication/guidance from higher level units. “The enabler calls for Joint-focused Army transformation specific to USINDOPACOM in the areas of mission command, sustainment, protection, movement, and intelligence (and information) to animate the grid. This transformation would require persistent, small-unit, multifunctional Army presence prepared to light up clusters, hubs, and nodes and accept follow-on forces to meet Joint operational demands. Army forces would need to organize tasks based on mission into composite, multifunctional formations that operate in a distributed fashion well below brigade level, and

often in ways that challenge even the most liberal interpretations of mission command." (Freier et al, 2020, p. xv)

The article in the Army Sustainment magazine titled "Sustainment Innovation for Multi-Domain Battle" proposes a sustainment concept (spider web sustainment), for the Army, that has similarities to the grid and enabler roles mentioned above. The concept is associated with MDB, however many see MDB as being a necessary focus for INDOPACOM. "Spider web sustainment is a complex web of logistics modes, nodes, routes, and suppliers that employ both old and new methods. It is also an acronym that stands for self-sufficient units, precision logistics, interoperability with partners, distribution, expeditionary sustainment, regional resources, widely dispersed, enabled mission command with enterprise resource planning, and brigade-focused." (Hurley et al, 2018, p. 6). Relevant aspects of this concept for FSS (in INDOPACOM) are self-sufficient units that are widely dispersed.

An overview of key findings:

- Army/landpower role is important
    - For deterrence
    - For stability
    - Shows commitment
- Army capabilities are essential for the joint force (sustainment, theater opening, and missile defense)
- Potential new roles/concept (grid, enabler, spider web sustainment)

**Force Posture and Equipment Preposition**

The fourth major focus area of findings is in the area of Force Posture and Equipment Preposition. Findings include discussion on forward presence, dispersal, prepositioned equipment, deterrence, and caching.

In a Defense News Article from April 2020, titled "Inside US Indo-Pacific Command's $20 billion wish list to deter China- and why Congress may approve it", it describes a congressionally mandated report submitted by the U.S. Indo-Pacific Commander, Admiral Phil Davidson. The report ("wish list") details "what the combatant command needs to fulfill the National Defense Strategy and maintain an edge over China." (Mehta, 2020) It could be the "…basis for a new Pacific-focused pot of money to deter Chinese military action in the region." (Mehta, 2020) To answer the question of what the U.S. needs to do, Admiral Davidson wrote, "This requires fielding an integrated Joint Force with precision-strike networks, particularly land-based anti-ship and anti-air capabilities along the First Island Chain; integrated air missile defense in the Second Island Chain; and an enhanced force posture that provides for dispersal, the ability to preserve regional stability, and if needed sustain combat operations." (Mehta, 2020) In writing about force design and posture, Admiral Davidson said "forward-based, rotational joint forces are the most credible way to demonstrate U.S. commitment and resolve to potential adversaries, while simultaneously assuring allies and partners." (Mehta, 2020) The article states "in the unclassified summary, details are scarce, but funding primarily focuses on dispersal and pre-positioning facilities." (Mehta, 2020) The report and the article touches upon several key areas of interest; forward presence (forward based), dispersal, pre-position, first and second island chains, and commitment. At a strategic level, showing U.S. commitment is critical for our

relationship with our partners in the INDOPACOM. The map below identifies where the island chains are considered.


Figure 5 Introduction to East Asia's Maritime Geography (Steindl, 2017, p. 9)

In the *2019 DOD INDO-Pacific strategy* report it "affirms the enduring U.S. commitment to stability and prosperity in the region through the pursuit of preparedness, partnerships, and the promotion of a networked region." (Department of Defense, 2019, p. 4) In discussing preparedness the report states "achieving peace through strength and employing effective deterrence requires a Joint Force that is prepared to win any conflict from its onset" and the DOD "…will ensure our combat-credible forces are forward-postured in the region." (Department of Defense, 2019, p. 5) The report also touches open the importance of pre-positioning of equipment. "In order to overcome the tyranny of distance, posture that supports and enables inter- and intra-theater logistics must be flexible and resilient, and the pre-positioning of equipment is critical." (Department of Defense, 2019, p. 20) The report emphasizes the importance of U.S. commitment to the region and having a good deterrence. The monograph *U.S. Landpower in the South China Sea* also addresses the importance of deterrence, forward presence, and prepositioning. One "of the strategic roles of U.S. landpower, to deter and prevent war, is also crucial to stability in Southeast Asia. Deterrence needs to exhibit the will to back combat capabilities, which is demonstrated through the forward presence of troops and prepositioning of equipment and supplies." (Bouchat, 2017, p. 95)

The TRADOC publication: *Multi-Domain Battle: Evolution of Combined Arms for the 21st Century, 2025-2040* discusses how to deter and defeat increasingly capable peers in MDB, the importance of force posture, unit dispersion, and semi-independent forces with organic sustainment to address absent supply lines. "Appropriate force posture requires the calibration of forward presence." (TRADOC, 2017, December p. 23) "Multi-Domain Battle demands

formations able to conduct semi-independent, dispersed….operations" and "maneuver and fight for periods without continuous supply lines…" (TRADOC, 2017, December p. 24) With respect to defeating ground forces, the publication states: "Semi-independent maneuver requires joint sustainment forces to pre-position, generate, procure, or transport essential supplies and services to formations organized to maneuver in austere conditions. Stores and facilities are dispersed, camouflaged, redundant, and/or mobile……" (TRADOC, 2017, December p. 43)

In the paper, *Tightening the Chain, Implementing a Strategy of Maritime Pressure in the Western Pacific*, the authors present a strategy and how land forces might use dispersion and prepositioned equipment. The paper also highlights the need to think of sustainment in different ways. "Land-based strike forces deployed along the First Island Chain would anchor the defense against a Chinese attack. Upon warning, the forces would move to pre-selected, dispersed positions after potentially linking up with pre-positioned equipment." (Mahnken et al, 2019, p. 4) "Current U.S. sustainment methods are focused on optimizing efficiency while operating in permissive environments. As such, new sustainment concepts and approaches are needed for the highly contested battlefields of the future. Ground forces arrayed along the archipelagos of the First Island Chain could sustain themselves for some time, particularly if they leveraged pre-positioned stocks of munitions and supplies." (Mahnken et al, 2019, p. 39)

The article "The Road to Predictive Logistics: Perspectives from the 8th Theater Sustainment Command (TSC)" describes how the 8th TSC took a look at aspects of INDOPACOM sustainment. The configuration and importance of prepositioned stocks is discussed in the article. "As fighting and winning our nation's wars is the end and predictive logistics is a way,

then the means to achieve this objective entails five tenets explored at 8th TSC that can better posture the U.S. for successful deterrence. They are access, pre-set agreements, agile sustainment, dynamic forward posturing, and leveraging technology." (Hamilton, 2019) A tenet that has some relevance for FSS is dynamic forward posturing. It can be described as "…where power projection provides logistic support to joint and combined forces and will initially rely on immediately available operating stocks and pre-positioned war reserve stocks. Specific to the Indo-Pacific region, the distance between the U.S. and the region, or from the strategic support area to the joint security area, creates sustainment challenges." (Hamilton, 2019) The article further states: "Warfighting resources stored in smaller, more "forward," configurations realize the potential to improve readiness. General Gustave Perna, Commander of U.S. Army Materiel Command stated in his Army Sustainment article in 2017 "Providing Materiel Readiness in a Joint Battlefield" that "force projection...entails Army pre-positioned stocks that are configured to strengthen national defense and build capacity." (Hamilton, 2019)

The Rand corporation report *China's Grand Strategy* writes that implications of a more capable future China include that "the U.S. Army, as part of the joint force, will need to be able to respond immediately to crises or contingencies at various points of contention. To be "inside the wire" at the outset of a crisis or conflict will require a combination of forward-based forces, light and mobile expeditionary forces, and interoperable allied forces." (Scobell et al, 2020, p. xii) The report also states a key to gaining a competitive advantage in a contingency is "expeditionary logistics, to include clandestine pre-positioning in theater." (Scobell et al, 2020, p. xiii) This report reinforces previously mentioned important aspects of forward-basing and pre-positioning.

The author of a paper, titled *Sustainment Considerations for the Multi-Domain Battle*, from the School of Advanced Military Studies at the US Army Command and General Staff College presents a technique that is similar to clandestine pre-positioning. “In Multi-Domain Battle, especially in an environment where the United States does not have the advantage of air superiority, small elements of US forces can expect to conduct dispersed operations. Where these dispersed units are isolated and operating deep into enemy territory, effective resupply operations become highly degraded and put an increased risk on sustainment units and those supported units…The lack of air superiority may limit predictable and accurate aerial delivery resupply operations. One technique that could reduce these risks to both sustainment and combat forces is caching.” (Maples, 2018, p. 31) This technique could involve concealing a “cache” of materiel in an isolated location. “Adjusting the concept of caching slightly may also enable larger forces to extend their operational reach and maintain tempo longer than would otherwise be possible with traditional logistics operations.” (Maples, 2018, p. 32) The author of this paper introduces the suggested use of an FSS for sustainment. “One potential way to sustain dispersed operations either directly or through caches is to increase the innovative use of aerial delivery. The Joint Precision Airdrop System (JPADS), already in use, allows for Global Positioning System (GPS) guided parachutes to deliver supplies to a direct point of need with extreme accuracy.” (Maples, 2018, p. 32)

An overview of key findings:

- Commitment to partners and effective deterrence is important
- Forward presence/posture and dispersal of forces is key

- Preposition of equipment and materiel is critical
- Caching is a potential sustainment technique

**Capability and Force Structure Changes**

The fifth major focus area of findings is in the area of Capability and Force Structure Changes. Findings include discussion on sustainment force structure and capability changes, testing, and gap analysis.

From the article titled "The US is Out of Position in the Indo-Pacific Region" about a recent Army study/report offers some assessment of INDOPACOM. "Several months after the January 2018 release of the National Defense Strategy, our group of U.S. Army War College researchers began to look at the role of the U.S. Army in INDOPACOM, drawing upon our earlier study of this hypercompetitive environment. Our research suggests that the Joint Force needs fundamental changes — in strategy and operational concepts, forces and capabilities, footprints and presence, authorities and agreements, and theater command and control —". (Freier et al, 2020, July) "…The United States is out of position with deployed and anticipated capabilities. The military is not yet equipped for the large-scale, widely distributed all-domain operations that U.S. senior leaders believe are essential to deterring or defeating China. In particular, power projection and access, Joint command and control, sustainment, protection, and intra-theater maneuver and movement are all challenged by the twin tyrannies of distance and an increasingly capable Chinese military." (Freier et al, 2020, July)

The *2019 Army Modernization Strategy* envisions multi-domain formations that will be built and adjusted, in an informed manner, over time. "The MDO capable force will combine

tailorable formations of networked manned and unmanned platforms, fires, electronic warfare, cyber, intelligence, surveillance, reconnaissance, engineers, sustainment, communications, and protection capabilities at all echelons, from squad to theater. The Army will build, employ, and refine the capabilities in the MDO force packages over time, based on continuous assessments of the strategic environment. This development will be driven by continuous operational testing and analysis – such as ongoing experiments with Multi-Domain Task Forces in both the European and Indo-Pacific theaters, regular war gaming and experimentation, and rapid and iterative capability assessments with units deployed and in the field. The Army will use the lessons learned from this experimentation to refine the design of future multi-domain formations." (U.S. Army, 2019, p. 5) Key aspects from the strategy are tailorable formations at lower levels and refinement through testing and experimentation.

The authors of the report *an Army Transformed: USINDOPACOM Hyper competition* and US Army Theater Design provide recommendations on theater design elements. One recommendation has to do with the element of Forces and Capabilities and is relevant for sustainment. "Prioritize transformation and innovative employment of USINDOPACOM capabilities focused on mission command, protection, sustainment, intelligence (and information), and movement." (Freier et al, 2020, p. 70) In the report "Outplayed", the authors make recommendations for ground forces in responding to gray zone activities. "The gray zone may require much different and sometimes much smaller modular combinations of unique military capabilities. These organizations may have to be more autonomous, self-sustaining, agile, and multi-functional than current structures imply." (Freier, 2016, p. 85) "This study found that Army forces would be essential future gray zone contenders. However, they will

need greater flexibility in organizational approaches to do so." (Freier, 2016, p. 85) "…all U.S. ground forces—but Army forces in particular—should ruthlessly pursue new levels of modularity, autonomy, and self-sufficiency at increasingly lower echelons to make them effective tools for precision competition in gray zone environments." (Freier, 2016, p. 85)

In the *Tightening the Chain* strategy paper, it discusses some needed changes for sustainment of forces that are dispersed in INDOPACOM, suggested force structure, and sustainment material management. "Hardening and geographically dispersing forces could help mitigate the threat from Chinese area-denial systems. However, geographically distributed operations would create significant challenges for a U.S. logistics system designed to maximize efficiency while functioning in permissive environments. As such, distributed operations would require, at a minimum, new sustainment concepts and significant changes to sustainment capabilities and force structure." (Mahnken et al, 2019, p. 25) The paper describes a notional multi-domain ground unit. The sustainment element would be a "forward support company capable of sustaining distributed forces in an austere environment." (Mahnken et al, 2019, p. 29) "Given the likely difficulty of resupplying inside forces, particularly early in a conflict, they would need sufficient stocks of munitions and sustainment material to fight without resupply for an extended period of time." (Mahnken et al, 2019, p. 29) Key points of the paper are use of dispersion, new sustainment concepts and force structure to deal with distributed operations, and the need to be self-sufficient for extended periods of time.

In the Army Sustainment article, "Sustainment Innovation for Multi-Domain Battle", the concept of spider web sustainment was presented but the authors also emphasize further development. "The spider web sustainment concept will provide the framework for future

sustainment operations, but materiel development and investment will enable sustainers to operate in a mobile, redundant, and dispersed manner while retaining access to supplies and equipment." (Hurley et al, 2018, p. 7)

There are sustainment challenges when dealing with a multi-domain battlefield that has friendly units dispersed and an A2/AD environment. The author of monograph *Sustainment Considerations for the Multi-domain Battle* suggests the current U.S. Army sustainment capability is inadequate to deal with this and needs to be further developed. "Capabilities development starts with identifying capability gaps (the incongruence between the capabilities we have today and what capabilities we believe we would need in the future)…" (Maples, 2018, p. 3). "Gap analysis calls for an understanding of the current state and the desired end state, and then the formulation of an operational approach that contains the solutions necessary to achieve the desired end state." (Maples, 2018, p. 3)

Sometimes current capability needs further materiel development and investment is needed to adjust to a new environment or requirements. The monograph *Sustainment Considerations for the Multi-domain Battle* provides a good example of an effort to do that on a FSS. In an A2/AD environment GPS cannot always be assured. "…many of the GPS-guided solutions present the enemy with potential cyber targets. One counter to a GPS-denied environment is visually aided technology. The US Army Natick Soldier Research, Development, and Engineering Center is developing sensors that will allow JPADS to use visual cues to navigate instead of GPS." (Maples, 2018, p. 35)

A 2013 article, "PM Force Sustainment Systems looks ahead, supports pacific strategy" describes some of the actions the FSS program office has taken in the past to work with

INDOPACOM. PM FSS has shown a commitment to work with INDOPACOM by trying to ensure "…the warfighter has the right systems from PM FSS that work well and reliably in the Pacific environment." (Reinert, 2013) This has involved "…seeking to bring its energy-efficient systems to (INDOPACOM) exercises." (Reinert, 2013) An example of testing/experimentation of FSS equipment through participation in exercises is the Tempest Wind exercise. PM FSS supported this exercise "on Guam by setting up a 150-person rigid-wall camp to test various systems." (Reinert, 2013) The article also mentions capability gap analysis. INDOPACOM is "able to do that gap analysis…as they identify those gaps and needs, they're looking to do these technology-development ideas to fill those gaps." (Reinert, 2013)

An overview of key findings:

- Changes suggested for sustainment force structure and capabilities
    - Testing and experimentation to improve
- New sustainment concepts needed
- Units need to be more self-sufficient (more materiel and more sustainment assets/units)
- Use of capability gap analysis
- Investment is needed in development of sustainment capability/equipment

## Chapter 5 – Conclusions and Recommendations

The central research question for this qualitative historical case study was: What can the U.S. Army can do to further develop, improve, procure and field FSS that may help the U.S. Army succeed in the INDOPACOM area of operation despite aggressive Chinese Gray Zone activities and increased A2/AD capability? In Chapter 4, the research findings were organized into five major areas of focus; sustainment/logistics, gray zone activities and A2/AD, Army roles, force posture and equipment preposition, and capability and force structure changes. The findings help answer the main questions below and are the basis for the conclusions, recommendations, and study limitation sections of this chapter. The main questions were:

1. What can the U.S. Army do to counter China's Gray Zone Activities?
2. What can the U.S. Army do in response to China's increased A2/AD capability?
3. How might Force Sustainment Systems support answers to questions (1) and (2)?
    a. Does the Army have enough Force Sustainment Systems if contracted resources are not available?
    b. What is required of Forces Sustainment Systems in these environments?
    c. What risks do Force Sustainment Systems have WRT these challenges?

This qualitative historical case study identified items that the U.S. Army can do to counter Chinese gray zone activities and respond to China's increased A2/AD capability. Additionally, multiple factors/risks are identified that could impact FSS. Actions and recommended further research are presented for FSS to continue to enable the U.S. Army to succeed in the INDOPACOM area of operation.

**Conclusions**

Sustainment is a significant factor in the success of Army and joint operations and FSS are an essential component of sustainment. Based on the review of multiple studies, monographs, papers, articles, DOD/Joint/Army publications, and presentations which formed the findings in chapter 4, the conclusions below are made. In general and for both China's gray zone activities and in response to China's increased A2/AD capabilities the following should be done. The Army needs to organize, coordinate, and operate as part of the joint force in INDOPACOM. The Army brings capabilities to the joint force that are critical and is dependent on what the joint force does to support Army operations. The Army needs to consider a force structure that involves tailorable/modular formations in order to meet the gray zone challenge and operate in an A2/AD environment. Continued development and investment is needed in capabilities, systems, force structure, and exercises.

1. What can the U.S. Army do to counter China's Gray Zone Activities?

   The Army can improve its force and equipment posture to entail a more forward presence in the INDOPACOM AOR. The Army can also increase its coordination with regional allies. The effect of this will be to deter Chinese gray zone activities and show U.S. commitment to Asia-pacific region partners and the security of the area. This will help ensure freedom of action for ourselves and our allies and have a stabilizing effect.

2. What can the U.S. Army do in response to China's increased A2/AD capability?

   The Army should continue to recognize the vastness of the INDOPACOM AOR and its impact on operations, coordination, and logistics. In an A2/AD environment, the

Army can disperse and distribute its forces/assets for protection. The Army can increase the self-sufficiency of all its units and plan for redundancy as the result of potential loss or degradation of supply lines and units. The Army/DOD can improve its prepositioned material and equipment by increased forward basing, and dispersing it, and also making it more clandestine. The Army can increase and improve its missile defense assets in the INDOPACOM, this will also benefit the joint force. The Army should review its theater overall sustainment capability with respect to the potential new roles of "grid" and "enabler" mentioned in chapter 4. The Army should also consider the spider web sustainment concept (also discussed in chapter 4).

From the findings, there are several INDOPACOM situational/scenario factors/risks that can impact FSS and could impact how they are designed, procured, employed, etc. They are:

- Dispersed/distributed operations
- Units need to be more self-sufficient and redundant due to dispersal and lack of supply lines
- Forward Presence, "inside the wire" focus/readiness, Clandestine consideration
- Lack of Air Superiority

**Recommendations**

3. How might Force Sustainment Systems support answers to questions (1) and (2)?

There are several recommended actions that can be taken to help ensure FSS are supportive and continue to be supportive to INDOPACOM in the future. The first is

conducting a gap analysis similar to that described in the monograph *Sustainment Considerations for the Multi-Domain Battle* (Maples, 2018). This could be done by various organizations but key players would be PM FSS, U.S. Army Pacific command requirements personnel, and the 8th Theater Sustainment Command. The goal of this analysis would be to better understand what is needed now and in the future for capability and to identify gaps. With gaps further identified, plans could be developed as to how to prioritize and fill those gaps. The second action that can be taken is to continue to conduct and support exercises that involve FSS. An example of this from the article "PM Force Sustainment Systems looks ahead, supports Pacific strategy", and previously mentioned in Chapter four. PM FSS set"… up a 150-person rigid-wall camp to test various systems." (Reinert, 2013) (Rigid wall systems are an element of the PM FSS Force Provider portfolio.) This allows for valuable data from operational testing of equipment to be used to improve FSS or how they are utilized. Additionally, other avenues for feedback from soldiers and units could be investigated and utilized for ideas. A third action that can be taken is to investigate new technologies that could improve FSS systems to best fit with the needs of INDOPACOM.

Another broad recommendation is to increase the amount of FSS. This is an option that would require further investigation. Units being dispersed into smaller formations and requiring more and longer self-sufficiency means there needs to be an increased amount of FSS to best support the soldiers. For example a unit that was supported by FSS at the battalion level, with field feeding and shower facilities, may now need to be supported at the company level due to dispersion. Additionally, the need for redundancy may also increase the amount of FSS needed

to take into account losses that might occur. Quantity increases are relevant for equipment that units organically have and deploy with and also for prepositioned equipment/stocks. Prepositioned stocks also may also be dispersed and have the need for redundancy to account for losses especially if they are forward based.

The U.S. military may not have air superiority in the event of a conflict in INDOPACOM as a result of increased Chinese A2/AD capabilities. Another low cost FSS product may need to have its quantities increased. That is the camouflage netting. Even if the U.S. is able to maintain air superiority over large areas in the INDOPACOM region, supply lines may still be challenged due to a lack of airfields for cargo delivery. In this case an increase in the devices that make aerial re-supply capable may need to be increased (i.e. parachutes, parachute release systems, JPADS). This would support increased aerial re-supply to dispersed units.

Another recommendation is to conduct research and analysis into improving design and efficiency aspects of FSS to better deal with the INDOPACOM specific situational/scenario factors/risks. For example, an area of design improvement could be modularity which would support FSS systems being in smaller configurations for dispersed units but able to be configured for larger, more tailored forces necessary for the MDB. More examples of situational/scenario factors are: Noise reduction could be another design improvement to help units in a dispersed tactical environment. Smaller/lighter systems are an aspect of design that could help with transportability. Increased self-sufficiency may increase the amount of materiel that a ground unit needs to transport. Reduced manpower requirements could help with setup/teardown and operations. Dispersed units may be manpower constrained and may need to move more frequently. As a result of contested airspace, another area for research is the

performance design aspects of FSS aerial resupply components (i.e. parachutes, parachute release systems, JPADS), specifically, increased air speed, higher altitudes or in the case of JPADS, longer distances. This could aid in giving more options/flexibility to aerial re-supply operations.

Efficiency of resources is essential in an environment where supply lines are constrained. Further research into how FSS can use less water, less fuel, less electricity is important for the INDPACOM environment. In the article "Sustainment Innovation for the Multi-Domain Battle", it states that reducing demand on resources is important for the MDB. "The military must look to (or lead) industry in developing new and innovative science and technology to reduce BCT consumption." (Hurley et al, 2018, p. 5). Use of renewable resources like solar or wind may also be options.

Caching was discussed briefly in Chapter 4 and was described in the monograph *Sustainment considerations for the Multi-Domain Battle* as potential solution/technique for sustainment (Maples, 2018). In the report, *Chinas Grand Strategy,* it mentions clandestine pre-positioning (Scobell et al, 2020). Further research should be done to see how FSS could support caching techniques, clandestine pre-positioning, or a combination of both.

**Limitations of the study**

Time in the curriculum for the Defense Acquisition University Senior Service College Fellowship program was a major limiting factor. This paper used a qualitative historical case study approach to review existing research and literature and conduct research analysis. This

was also a limiting factor. With more time, interviews of personnel with subject matter expertise may have improved the study findings and recommendations.

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## Glossary of Acronyms and Terms

A2/AD – Anti Access/Area Denial

AOR – Area of Responsibility

BCT – Brigade Combat Team

DOD – Department of Defense

DTIC – Defense Technical Information Center

EAB – Echelons Above Brigade

FSS – Force Sustainment Systems

GPS – Global Positioning System

JFC _ Joint Force Commander

JPADS – Joint Precision Airdrop System

MDB - Multi-Domain Battle

MDO – Multi-Domain Operations

NDS – National Defense Strategy

PLA _ China's People's Liberation Army

TRADOC – U.S. Army Training and Doctrine Command

TSC – Theater Sustainment Command

USAWC – U.S. Army War College