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EXPEDITIONARY LOGISTICS: HOW THE MARINE CORPS SUPPORTS ITS EXPEDITIONARY OPERATIONS

by

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June 2015

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This thesis reviews the state of expeditionary logistics within the U.S. Marine Corps. Expeditionary logistics is further defined within this thesis as the support given to an expeditionary operation. This study further categorizes expeditionary logistics according to the phase of the operation in which they occur. This insight gives greater understanding into when and where different assets and strategies are utilized in order to support Marines deployed abroad, and why the methods employed are used.

A hypothetical yet realistic case study based on a Marine unit deployed in support of a humanitarian aid disaster relief mission was developed to assist with understanding the conduct of expeditionary logistics within the Marine Corps. This case study provides insight with regard to the methods employed to sustain a force abroad. The case study also provides scale and timing to aid in the general flow of supplying an expeditionary operation.

This thesis provides recommendations where improvements can be made in the Marine Corps' process of conducting expeditionary operations. Further study opportunities are identified to provide guidance for further research on the conduct of Marine Corps Expeditionary Logistics.

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EXPEDITIONARY LOGISTICS: HOW THE MARINE CORPS SUPPORTS ITS EXPEDITIONARY OPERATIONS

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LIST OF ACRONYMS AND ABBREVIATIONS

AAR	After Action Report
ACE	Aviation Combat Element
AEF	American Expeditionary Force
APEX	Adaptive Planning and Execution System
APOE	Aerial Port of Embarkation
ARG	Amphibious Ready Group
ASR	Aviation Support Request
ATO	Air Tasking Order
C2	Command and Control
CASEVAC	Casualty Evacuation
CAX	Combined Arms Exercise
CLC2S	Common Logistics Command and Control System
CSS	Combat Service and Support
DASC	Direct Air Support Center
EAF	Expeditionary Air Field
ESG	Expeditionary Strike Group
FSCC	Fire Support Coordination Center
GCSS-MC	Global Combat Support System–Marine Corps
GCE	Ground Combat Element
JOPES	Joint Operational Planning and Execution System
LCE	Logistics Combat Element
MAGTF	Marine Air Ground Task Force
MCCLL	Marine Corps Center for Lessons Learned
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MPF	Maritime Prepositioning Force
NGO	Non-Governmental Organizations
NEO	Noncombatant Evacuation Operations
OMFTS	Operational Maneuver from the Sea

POL	Petroleum, Oil and Lubricants
SASO	Security and Stabilization Operations
SPMAGTF	Special Purpose Marine Air Ground Task Force
TBMCS	Theater Battle Management Core System
TCPT	Transportation Capacity Planning Tool
TPFDD	Time-Phased Force Deployment Data
TRAP	Tactical Recovery of Aircraft and Personnel
TTP	Tactics, Techniques and Procedures
USDA	United States Department of Agriculture

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I. INTRODUCTION

A. OVERVIEW

The U.S. Marine Corps is known as the United States Expeditionary Force in Readiness (Gates, Lecture Series, 2011). The U.S. Marine Corps provides an unparalleled forward deployed force that assists the United States leadership in projecting power around the world. The force is both scalable and responsive to the environments encountered, and relies heavily on the doctrinal structure of the U.S. Marine Corps. With forces continually deployed around the earth, the U.S. Marine Corps is often the first force to arrive in any new area of operation and is responsible for supporting itself logistically in the early stages of any operation.

The scalable nature of the U.S. Marine Corps forward deployed efforts is facilitated through its deployable structure. The Marine Corps can deploy a Special Purpose Marine Air Ground Task Force (SPMAGTF) to counter any small occurrence that requires a small force structured to complete the mission anywhere in the world (United States Marine Corps, 1998, pp 76–77). For a large-scale response, the U.S. Marine Corps can deploy an entire Marine Expeditionary Force. This force brings with it a Marine Division, a Marine Air Wing and a Marine Logistic Group. This scalable approach to expeditionary operations gives the leadership of the United States great breadth and depth of capability in handling situations as they arise around the world (United States Marine Corps, 1998, pp 76–77).

Embedded within this scaled response from the Marine Corps is an inherent capability to be self-supporting on foreign shores. With the assistance of its sister service, the U.S. Navy, the Marines have, and continue to develop, methods to facilitate operations from the sea and follow-on operations ashore. A number of different types of Marine units require support overseas. From the basic infantryman to aviation squadrons, the needs of these units are broad and extremely complex to support within the United States, let alone overseas. This ability to support forces when deployed abroad has been

labeled expeditionary logistics and is a key strength and capability the U.S. Marine Corps must possess to obtain future successful operations.

Unfortunately, the unpredictable nature and wide range of foreign operations required preclude an all-encompassing framework for completion of these expeditionary operations. The very nature of unforeseen foreign operations suggests that no "one size fits all" approach to supporting troops abroad will ensure success. All foreign operations will differ in their size and scope, necessitating differing levels of material support. Additionally, the same variables define the level of Combat Service Support that is required to deliver those resources around the area of operations once supplied to a foreign location. Finally, friction ensues when distributing these resources to the operational units. While getting supplies to a foreign theater is strenuous, distributing them in an optimal manner is nearly impossible.

The Marine Corps, through its history, has experienced logistical difficulties during many operations. From supply shortages on Guadalcanal (Simmons, 1998, p. 61) to food shortages during Operation Iraqi Freedom (OIF), expeditionary logistical support has played a large role during many operations. These shortfalls have also taught the Marine Corps to implement various channels of supply during operations abroad leveraging all available resources and assets to ensure operational success. Recent conflicts have highlighted the need to concentrate heavily on force protection and ensure protection of logistical supply lines (United States Marine Corps, 1998, p. 35). This emphasis will be paramount going forward and future operations must include viable plans to protect these critical vulnerabilities. Unfortunately, many of these insights into logistical support abroad lie outside of doctrine and few manuals have been written discussing how the Marine Corps performs expeditionary logistics. Additionally, few sources have written articles discussing logistical support to capture recent lessons learned and merge them with doctrine to improve the methodology in the future. Alees' article *Seabasing—Modern Expeditionary Warfare* is a good example of one of the few available articles on this topic (2004). This lack of research is the primary reason why the current research is being undertaken.

Much of this thesis will build upon the methodology developed in a previous Masters of Business Administration (MBA) project titled, “Assessment of Logistical Support for Expeditionary Units” prepared by Kundra, Brown, and Donaldson (2014). Kundra et al. provided a reference to further develop the theories and principles of naval expeditionary logistics as they apply to the United States Marine Corps (2014).

The Marine Corps has realized following the end of Operation Iraqi Freedom (OIF) and the drawdown beginning in Operation Enduring Freedom (OEF), that focus must be placed back on naval expeditionary operations. Many of the logistical tools used during the most recent conflicts may not be available for use in future expeditionary operations, and training must be undertaken to restore the expeditionary methods and capabilities that are claimed by the existing doctrine. Maximizing the capabilities of the logistical support structure, within the Marine Corps, for any future operation must be a key undertaking with the intent to improve operational capabilities. The improvement of logistical capabilities must be a primary goal going forward. As the requirements of our expeditionary forces change, the method and makeup of the support to those operations must change as well. Flexibility within the logistical force structure is a key component of operational success. This thesis addresses the United States Marine Corps’ expeditionary logistics efforts, the doctrine behind those efforts, and the means through which those efforts are accomplished.

The U. S. Marine Corps is unique in its force structure: it relies on the other military branches to provide support in areas in which it does not maintain capabilities (United States Marine Corps, 1997, pp 64–83). The Marine Corps relies upon the Navy for transportation of many of its troops, vehicles and supplies around the globe (United States Marine Corps, 1997, pp 64–67). The Marine Corps also relies heavily on the Army for logistical support when engaged in larger scale land operations (Joint Staff, 2014 p. II-8). The Air Force also lends rapid deployment capabilities as well as rapid logistical support for many large and low density part requirements (Joint Staff, 2013, pp. III-51–III-61). Initially, when the Marines deploy abroad they maintain complete logistical autonomy for a set period following their assault ashore (United States Marine Corps, 2011, pp. 2–23–2–29). After that period is complete, many other methods of

resupply can be leveraged from the inherent capabilities of the other services (United States Marine Corps, 2011, pp. 2–23–2–29). This outside support from the other services is used to ensure the flow of logistical materials. The U.S. Marine Corps operating structure is designed as to act as a logistical facilitator focusing its effort on the combat service support side of Logistics while shying away from the embedded logistical train that the Army and Navy already provide. A good example of this is the medical support the U.S. Navy provides to the Marine Corps (Joint Staff, 2013, pp. V-32–V-36). Since the U.S. Navy already maintains the logistical function of medical support aboard ship there is no reason for the Marine Corps to have its own medical function. The Navy provides the medical support that the Marine Corps requires by embedding its network within Marine Corps units.

Prior to going ashore, the primary means of resupply must be established, whether it be by land sea or air. Additionally, agreements between the different services must be reached on how to support that resupply. It is important, when facilitating logistics across multiple branches of the U.S. Armed Forces that attention be given to the follow on requirements of the deployed forces. Additionally, this attention must possess both primary and contingency plans due to the unpredictable nature of expeditionary operations. These contingency plans must be well versed across the entire deployed force to ensure that the capabilities are known to everyone to ensure there successful and optimal use.

Training is a key component to successful completion of expeditionary operations and subsequently expeditionary operations. While the bulk of the U.S. Marine Corps logistics specialists are trained in their individual specialties, this alone does not prepare the logisticians to do their jobs satisfactorily. Attention is given throughout the U.S. Marine Corps deployment cycle to integrate logistical training and ensure that the individual subject matter experts can develop the capabilities needed to accomplish the stated goals. The Marine Corps completes this task through a number of different exercises. When a Marine Expeditionary Unit goes through its work up cycle, it completes a number of different exercises to integrate not only with the Marine Corps logistical facilitators but also with their Navy counterparts. This ensures a cohesive

capability across the entire Amphibious Ready Group (ARG) or Expeditionary Strike Group (ESG). This training increases teamwork and leads to improvements in the logistical support capabilities inherent to these deployable units. Since the ARG or ESG is a shared command with both a Navy and Marine commander, a decision must be made early in every operation of the supporting and supported position of each service in order to ensure mission success.

U.S. Marine Corps units can also deploy individually to foreign lands. When units deploy in this manner a pre-deployment training package is normally conducted to prepare the unit for their deployment. These pre-deployment training exercises are normally conducted at MCAGCC Twentynine Palms, California. These exercises are titled with various names that center around the Combined Arms Exercise (CAX) label. These CAX training periods require integration of all branches of the Marine Corps and demand that they work together to accomplish assigned missions. This mission focus lends itself to improving all aspects of these units and as a result requires great strides be made with regard to logistical support integration.

Unit-based training exercises are normally tailored for the unit to be trained in the environment to which it ultimately will deploy. This environment-based training prepares the deploying units for many of the environmental difficulties they will face while deployed and facilitates realistic expectations of logistical capabilities. This environment-based training prepares logistical forces for the conditions they will face while deployed, and greatly improves mission performance.

B. PURPOSE

This professional report lays out the approach that the U.S. Marine Corps currently takes with regard to expeditionary logistics. The U.S. Marine Corps is unique in that it is at the forefront of expeditionary operation yet little has been written on how it logistically supports these operations. This report intends to capture many of the methods that U.S. Marine Corps utilizes to support its forces abroad. This methodology then can be used to develop a framework for understanding the unique characteristics that are required to conduct expeditionary logistics. This framework will be useful in developing

future expeditionary operations and better prepare the war fighter for the logistical difficulties to be faced on the battlefield. Ultimately, this research will provide tools to these warfighters, ensuring their capability to overcome adverse situations, and provide guidance when this adversity may be insurmountable.

The primary purpose of this research is to answer the question of how the U.S. Marine Corps conducts expeditionary logistics. This research question is extremely broad, and as a result difficult to answer. To further refine the purpose of this thesis, research is governed by the following list of secondary questions:

1. How does the Marine Corps supply basic life support resources to its expeditionary forces?

2. How does the Marine Corps supply mission essential materials to its expeditionary forces once deployed?

3. How does the Marine Corps incorporate contingency operations into its expeditionary logistics planning?

4. How can the Marine Corps improve its expeditionary logistical efforts?

5. What tools utilized during recent operations proved most useful to facilitate expeditionary operation?

Research for this thesis started with a review of Joint, U.S. Marine Corps, Navy, Army and Air Force publications (Bates, 2004, pp. 30–35; Faulkner, 2014). Several previous theses touched on this subject and provided insight into the methodology of the other military services with regard to expeditionary operations (Kundra, Brown, & Donaldson, 2014). An exhaustive search of professional and trade journals provided little additional information of value with regard to the U.S. Marine Corps and expeditionary logistics methodology. Since the expeditionary methodology is inherent in the nature of U.S. Marine Corps operations, little doctrinal writing has occurred in the previous decade with respect to the topic. A specific goal of this research is to fill a void of information that exists on how the U.S. Marine Corps performs expeditionary operations and begin the process of writing the materials to train the Marine logisticians of the future.

The ultimate purpose of this thesis is to gain a better understanding of naval expeditionary logistics. Additionally, analysis will be conducted of the methods currently

employed by the Marine Corps. From this analysis, recommendations for improvements to current practices outlining a way forward for future operations will be presented. Finally, additional research requirements will be highlighted for future targeted research to address. These recommendations for further research will provide a framework for follow on research to complete this study of Marine Corps expeditionary logistics.

C. SCOPE

The U.S. Marine Corps conducts many expeditionary operations. These expeditionary operations require a wide array of logistical support. The large number and many types of these expeditionary operations preclude the study and inclusion of them all within this research thesis. The primary focus within this study will be on the Marine Expeditionary Unit (MEU). The MEU was chosen as the focus of research to create a starting point for the training of larger units. The MEU is the primary training platform within the U.S. Marine Corps for expeditionary operations. As the most heavily trained unit size, this unit is well suited for research on this topic.

Within the MEU, two units will be the primary focus of research regarding expeditionary logistical operations. The first is the Logistics Combat Element (LCE), the primary provider of logistical support to ground forces during expeditionary operations. The second is the Aviation Combat Element (ACE), which provides a wide spectrum of logistical support and is a primary means of conducting contingency operations.

The USMC conducts expeditionary operations using two differing methods. Traditional expeditionary operations occur when troops are rapidly deployed through any means available and fall in on gear supplied through air transport or the use of Maritime Prepositioning Force (MPF) ships. The second type of expeditionary operation is a naval expeditionary operation. This is the traditional form of expeditionary operation used by the MEU. While the MEU is capable of conducting any method of expeditionary operation, its marriage to an amphibious ready group dictates the use of naval expeditionary operation in most cases. Since the MEU primarily conducts naval expeditionary operation, the scope of this research will be limited to that method as well.

D. SUMMARY

This chapter provided a broad overview of the purpose and scope of this research thesis. This thesis provides a basic understanding of expeditionary logistics and the methods the U.S. Marine Corps uses to accomplish expeditionary operations. The scope of this research was limited based on the breadth of information available on the topic. Ultimately the scope of this research will center on a MEU undertaking an expeditionary operation in a hypothetical case study to represent how expeditionary logistics are undertaken. Considerations were given to the methodologies under which this research was completed and a broad overview was given to aid readers in their understanding of the topic.

II. BACKGROUND

A. HISTORY

The United States Marine Corps has a long history of conducting expeditionary operations beginning with the American Expeditionary Force (AEF) during World War I (Simmons, 1998, pp. 50–75). In the years following World War I, the U.S. Marine Corps continued refining its expeditionary capabilities through conduct of many small wars referred to as the banana wars (Simmons, 1998, pp. 56–59). These wars resulted in the U.S. Marine Corps' small wars manual, a publication that is still relevant to this day (United States Marine Corps, 1940). This manual lays down many of the difficulties experienced during expeditionary operations and discusses many of the logistical problems that can impede an expeditionary operation (Asprey, 1996).

The U.S. Marine Corps began World War II as the recognized experts in amphibious operations and were given the task of clearing many of the islands held by the Japanese throughout the war. This amphibious island-hopping campaign across the Pacific Ocean culminated in the seizure of the island of Okinawa (Simmons, 1998, pp. 68–71). This was the largest amphibious assault undertaken during World War II (Simmons, 1998, p. 68). The island seizures conducted by the U.S. Marine Corps during this war were the true beginning of the modern expeditionary operation. These operations developed and dictated the methods used to conduct amphibious operations for the remainder of the century. Many of the lessons learned during these operations are relevant and are still in use today (Simmons, 1998, pp. 59–70).

After World War II, the U.S. Marine Corps conducted many expeditionary operations, including protecting the Pusan Perimeter during the Korean conflict and conducting the amphibious assault at Inchon ((Hoffman, 2002, pp. 420–429). Marines then deployed to the Nation of Vietnam for the next big conflict. Both Korea and Vietnam greatly changed the way the U.S. Marine Corps undertook expeditionary operations as this was the point where the helicopter was first fielded (Hoffman, 2002,

pp. 428–429). This revolution of transportation greatly facilitated expeditionary operations and changed forever the methods of which they are undertaken.

Today, the U.S. Marine Corps continues to conduct expeditionary operations regularly, as such continues to improve the methods used to logistically support these operations. Recent changes have occurred resulting in a movement away from the methodology of beachhead seizure and the forced movement of supplies to shore. Changes in warfare have necessitated a shift to a new concept of amphibious operation called Operational Maneuver from the Sea (OMFTS) (Venoit, 1999). OMFTS is a method of moving the amphibious Ready Group (ARG) further out to sea in a safer location and conducting logistical support through seabasing of those assets (Naval Studies Board, 1999).

B. ORGANIZATION

The operational structure of the Fleet Marine Force is task organized as a Marine Air Ground Task Forces (MAGTF). These forces can be employed as naval expeditionary forces, independently as expeditionary forces or as part of a larger joint or coalition force. These units are task organized with the stated intent of serving as a naval expeditionary force; however, they maintain the capability to perform sustained missions ashore. The U.S. Marine Corps structure has three individual levels of deployable MAGTF. These units are the Marine Expeditionary Force (MEF), The Marine Expeditionary Brigade (MEB) and the Marine Expeditionary Unit (MEU). All of these units are organized under the same structure with a command element, an Aviation Combat Element (ACE), a Ground Combat Element (GCE) and a Logistics Combat Element (LCE) (U.S. Marine Corps, 2000a). Refer to Figure 1.

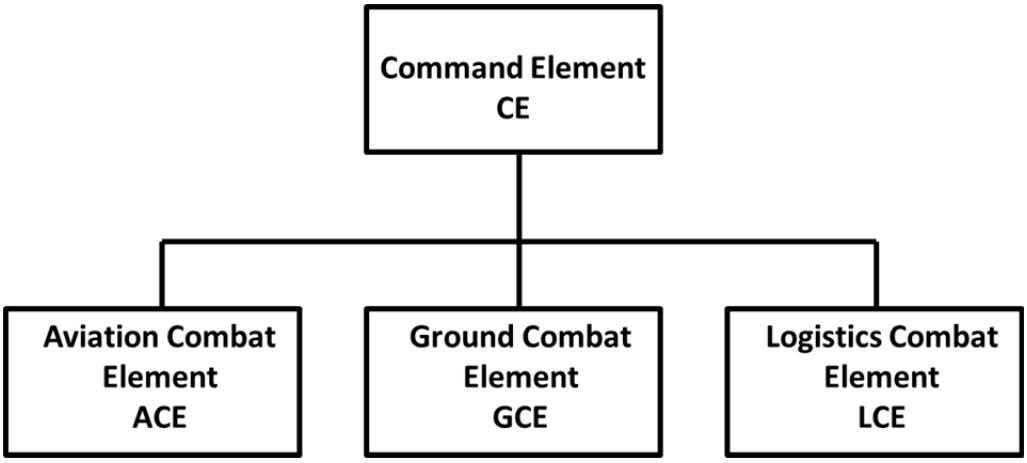

Figure 1. Marine Corps Air Ground Task Force Organization (after MCRP 5–12D, 2000a)

The largest of the Marine Air Ground Task Forces is the Marine Expeditionary Force. There are currently three standing Marine Expeditionary Forces in the U.S. Marine Corps (United States Marine Corps, 2000a, pp. 1–1 – 1–6). I MEF is based out of Camp Pendleton, California. II MEF is based out of Camp Lejeune, North Carolina. III MEF is based out of Okinawa, Japan. The size and actual components of a MEF can vary greatly based on locations and requirements. The MEF normally deploys by its individual echelons with a planned sustainment period of 60 days. The structure of a deploying MEF can also be varied to best facilitate the mission that it serves. Figure 2 provides a doctrinal example from MCRP 5–12D "Organization of the Marine Corps." The MEF is capable of being deployed by sea through the Navy or through air provided through Air Force Support. When deployed by air, a marriage of personnel with Maritime Prepositioning Ships' equipment is necessary to provide the unit with appropriate assets (U.S. Marine Corps, 2000a, pp. 2–3). Refer to Figure 2.

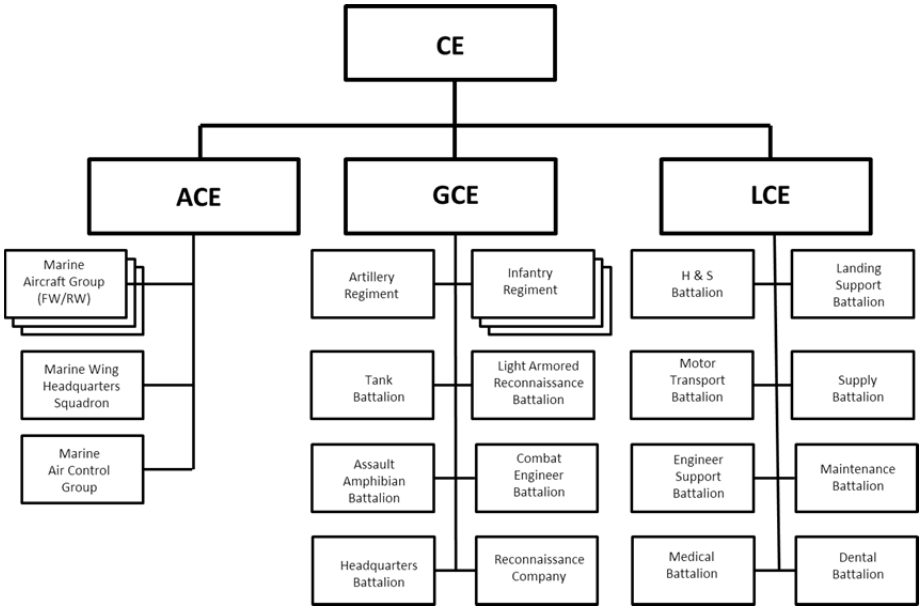

Figure 2. Marine Expeditionary Force Organization (after MCRP 5–12D, 2000a)

The Marine Expeditionary Brigade (MEB) stands as the medium-sized MAGTF. Within each of the Marine Expeditionary Force Headquarters are the components of a single MEB headquarters. The MEB is based on the same structure as the MEF; however, it is far smaller. The MEB encompasses a single marine aircraft group acting as the ACE, a single infantry regiment acting as the GCE and a single logistics combat regiment acting as the LCE. Just as the MEF units are task organized with the required elements to complete the mission, elements can be added or subtracted from the structure.

The Marine Expeditionary Unit (MEU) is the smallest of the officially organized Marine Air Ground Task Forces. Currently, seven marine expeditionary units reside within the U.S. Marine Corps force structure. Three MEUs reside in Camp Lejeune, NC, Three reside at Camp Pendleton, CA, and one is continuously deployed to Okinawa, Japan. The Marine Expeditionary Unit is the U.S. Marine Corps' most common rapid response force. There are always two MEUs deployed at any given time around the world. One MEU each from the east and the west coast is always deployed. A third MEU, based in Okinawa, Japan, is either embarked or ready to deploy at a moment's notice. All three MEUs are deployed as a components of an Amphibious Ready Group sailing the ocean to provide the United States national command authority, the capability

of projecting power anywhere in the world rapidly. This power can be used for any mission ranging from crisis response to full combat operations.

The MEU cycle includes a six-month training workup, which includes all subordinate units to train for future missions. This workup period is followed by an approximately six-month deployment period spent embarked aboard naval shipping. The MEU is the primary means by which the Marine Corps has conducted expeditionary operations. The makeup and scale of the MEU is similar to that of both the MEF and the MEB; however, the MEU is far smaller. Refer to Figure 3. The MEU is made up of a MEU command element commanded by a Colonel. His command includes an ACE centered on a Marine Medium Tilt rotor Squadron, a GCE centered on an infantry battalion and an LCE center around a combat logistics battalion (U.S. Marine Corps, 2000a, pp. 2–5).

The MEU work up training cycle is the primary means through which the Marine Corps trains for expeditionary operations. The training consists of an operations focused rapid reaction planning process. This training process continues from Expeditionary Strike Group Integration through to its completion of the MEU's certification exercise. During this training the Marine units train to complete operations and as such must logistically support themselves during the evolution. This training has proven to improve the expeditionary capabilities of Marine Corps units. The MEU trains to the capability of sustaining itself for fifteen days once an operation is undertaken (U.S. Marine Corps, 2000a, pp. 2–5).

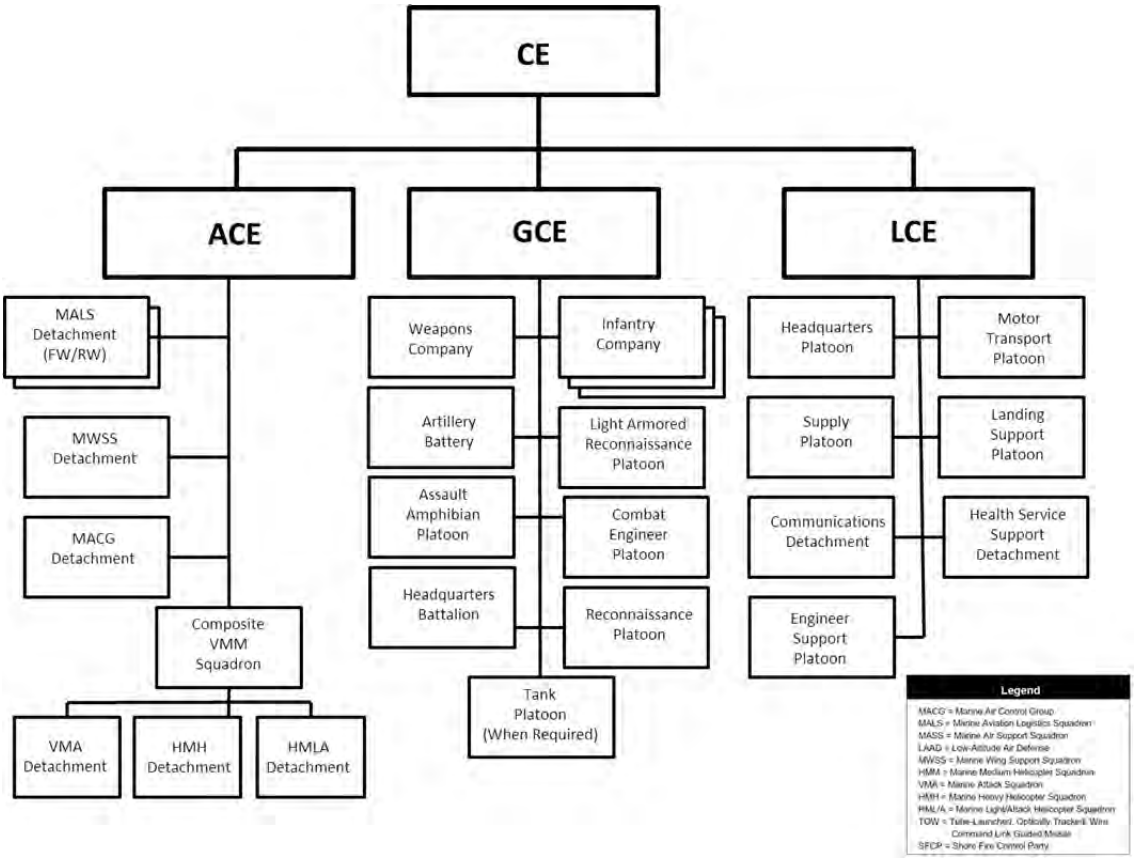

Figure 3. Marine Expeditionary Unit Organization (after MCRP 5–12D, 2000a)

The final U.S. Marine Corps MAGTF is the Special Marine Air Ground Task Force (SPMAGTF). The SPMAGTF is a force catered to a particular mission and can be any size (U.S. Marine Corps, 2000a, pp. 2–5). These special units normally are the same size as a MEU or smaller. These units are normally formed to meet a rapid response mission, and are formed from elements of a MEF. These units can be deployed in any manner including both military and commercial means to meet the assigned mission.

The final means through which the U.S. Marine Corps deploys its forces is by the individual unit command. This is normally accomplished at the battalion or squadron command level. This method of deployment often is used when conducting military operations other than war, such as in response to a crisis brought about by a natural disaster or to conduct combined training with a foreign nation. These individually deployed units are then scalable and can either complete their mission or eventually turn into a SPMAGTF if necessary. This style of unit deployment often is employed when

deploying Marine aviation units. This occurs as a result of the aviation unit's inherent capability to self-deploy rapidly.

C. EXPEDITIONARY LOGISTICS

This section begins by refining the definition of expeditionary logistics as interpreted by the U.S. Marine Corps. Further, additional information and ideas are presented to provide better understanding.

A number of definitions exist for expeditionary logistics; however, the definition is normally tailored to the agency that defined it. This report uses a top-down approach to define expeditionary logistics for the purpose of this research. The U.S. Marine Corps takes an operational approach to logistics; therefore, we must first define the force which conducts an expeditionary force.

- MCDP 3 defines an expedition as or "a military operation conducted by an armed force to accomplish a specific objective in a foreign country" (p. 31).

- Joint Publication 3–0 defines an expeditionary force as "An armed force organized to accomplish a specific objective in a foreign country" (GL-9).

- Joint Publication 1–02 defines a naval operation as "1. A naval action (or the performance of a naval mission) that may be strategic, operational, tactical, logistic, or training. 2. The process of carrying on or training for naval combat in order to gain the objectives of any battle or campaign."

With an understanding that any force deployed to a foreign shore can be considered an expeditionary force, the broad interpretation of the definition is obvious as well. Once these operations are undertaken through a naval operation they are considered naval. Further integration determines that an expeditionary operation conducted from the sea is a naval expeditionary operation.

- Joint Publication 4–0 defines logistics as "Planning and executing the movement and support of forces" (GL-7).

- MCDP 4–0 adds that "Logistics provides the resources of combat power, positions those resources on the battlefield, and sustains them throughout the execution of operations" (p. 3).

- The Naval Studies Board states that “naval expeditionary logistics is about moving naval forces and sustaining their operations in a broad array of environments” (Naval Research Council, 1999, p. 15).

From these definitions, we conclude that logistics is considered the support of forces, and that includes delivery of that support to the operational forces. Emphasis must be placed on supporting the operational forces, not those activities that support non-operational personnel. With an understanding of both expeditionary operations and logistics the combination of these terms is simple; however, many nuances exist during this combination. The U.S. Marine Corps interprets expeditionary logistics as all the support required to support an expeditionary operation. Whether that is direct support to the troops abroad or support to the naval ships supporting them, all of these actions are required to achieve mission success. Examples of the types of items discussed above are displayed in Figure 4 taken from JP 4–0 Joint Logistics.

Core Logistics Functions

Core Functions	Functional Capabilities
Deployment and Distribution	• Move the force • Sustain the force
Supply	• Manage supplies and equipment • Inventory management • Manage global supplier networks • Assess global requirements, resources, capabilities, and risks
Maintenance	• Depot maintenance operations • Field maintenance operations
Logistics Services	• Food service • Water and ice service • Contingency base services • Base and installations support • Hygiene services
Operational Contract Support	• Contract support integration • Contractor management
Engineering	• General engineering • Combat engineering • Geospatial engineering
Health Services	• Health service delivery • Force health protection • Health system support

Figure 4. Core Logistics Functions (from JP 4–0 Joint Logistics, 2013)

Logistics are normally broken down into 10 categories of supply. These categories are a method of providing structure to supplies as they are delivered. For instance, Class III refers to Petroleum Oil and Lubricants (POL). This means that if one receives a shipment of class III supplies those supplies are most likely petroleum-based products (Gas, Oil, Grease, etc.). Figures 5 and 6 illustrate all ten classes of supply as defined by JP 4–0 Joint Logistics (2013).

Classes, Subclasses of Supply, and Common-User Logistics Suitability

Class	Symbols	Subclass	Common-User Logistics (CUL) Capability
I. Subsistence: Food		A - Nonperishable dehydrated subsistence that requires organized dining facilities C - Combat rations includes meals, ready to eat (MREs) that require no organized dining facility; used in combat and in-flight environments. Includes gratuitous health and welfare items R - Refrigerated subsistence S - Non-refrigerated subsistence (less other subclasses) W- Water	Fully suited to CUL
II. General Support Items: Clothing, individual equipment, tentage, organizational tool sets and tool kits, hand tools, material, administrative, and housekeeping supplies		A - Air B - Ground support material E - General supplies F - Clothing and textiles G - Electronics M - Weapons T - Industrial supplies (e.g., bearings, block and tackle, cable, chain, wire, rope, screws, bolts, studs, steel rods, plates, and bars)	Limited CUL suitability
III. Petroleum, Oils, Lubricants (POL): Petroleum (including packaged items), fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and compressed gasses, coolants, deicing, and antifreeze compounds, plus components and additives of such products, including coal		A - Air W- Ground (surface) P - Packaged POL	Excellent CUL candidate (with some limitations)
IV. Construction/Barrier: Materials that support fortification, obstacle and barrier construction, and construction material for base development and general engineering		A - Construction B - Barrier materials	Fully suited for CUL
V. Ammunition: Ammunition of all types (including chemical, radiological, and special weapons), bombs, explosives, mines, fuses, detonators, pyrotechnics, missiles, rockets, propellants, and other associated items		A - Air W - Ground	Limited, primarily to small arms, selected larger munitions

Figure 5. Class of Logistical Supply I (from JP 4–0 Joint Logistics, 2013)

Classes, Subclasses of Supply, and Common-User Logistics Suitability (Cont'd)

Class	Symbols	Subclass	Common-User Logistics (CUL) Capability
VI. Personal Demand Items: Nonmilitary sales items		A - Personal demand items not packaged as ration supplement sundry packs (RSSP) M- Personal and official letter and packaged mail. Does not include items in other classes such as spare parts P - RSSP	Fully suited for CUL
VII. Major End-Items: A final combination of end-products ready for intended use; e.g., launchers, tanks, racks, adapters, pylons, mobile machine shops, and administrative and tracked vehicles		A - Air B - Ground support material (includes power generators, fire-fighting, and mapping equipment) D - Administrative and general purpose vehicles (commercial vehicles used in administrative motor pools) G - Electronics J - Tanks, racks, adapters, and pylons (US Air Force only) K - Tactical and special purpose vehicles (includes trucks, truck-tractors, trailers, semi-trailers, etc.) L - Missiles M - Weapons N - Special weapons X - Aircraft engines	Not suitable for CUL
VIII. Medical Material/ Medical Repair		A - Medical material (including repair parts special to medical items) B - Blood and fluids	Fully suited for CUL
IX. Repair Parts (less medical special repair parts): All repair parts and components, including kits, assemblies, material power generators sub-assemblies (repairable and nonrepairable) required for all equipment; dry batteries		A - Air B - Ground support material, power generators, and bridging, fire-fighting, and mapping equipment D - Administrative vehicles (vehicles used in radio administrative motor pools) G - Electronics K - Tactical vehicles (including trucks, truck-tractors, trailers, semi-trailers, etc.) L - Missiles M- Weapons N - Special weapons T - Industrial supplies (e.g., bearings, block and tackle, cable, chain, wire, rope, screws, bolts, studs, steel rods, plates, and bars) X - Aircraft engines	Not suitable for CUL except for common items; requires special coordination to ensure proper support
X. (code as zero '0'): Material to support military programs, not included in classes I through IX		None	Fully suited for CUL

Figure 6. Classes of Logistical Supply II (from JP 4–0 Joint Logistics, 2013)

The Navy interprets naval expeditionary operations as an extremely broad and difficult topic. The Navy interprets expeditionary logistics as movement and support of operations. While expeditionary operations and expeditionary logistics sound exactly the same, they are not. The naval operation relies on the effective movement of supply and this success is determined through metrics set to interpret mission success. The focus of operations from the Marine Corps perspective is one of mission accomplishment, no other metrics are required. Successful expeditionary logistics are fundamental to that success and are essential for the expeditionary operation even to occur.

The U.S. Marine Corps participates in two forms of expeditionary logistics. The first form is naval expeditionary logistics, which implies that the expeditionary operation is supported by naval shipping. As such, much of the supporting naval structure is in place to facilitate and support the operational forces ashore. The second form is a more traditional expeditionary operation where the MAGTF has deployed to a foreign country without naval shipping. Movement to the operation can be accomplished through a variety of methods including military asset deployment or a commercial alternative. Without the naval support structure the chain of supply shift to different providers. During these types of operations agreements must be put in place to determine who is providing what support to ensure that expeditionary logistics are both possible and are completed.

Expeditionary logistics fundamentally are regular logistics in support of an operation in a foreign country. As such, expeditionary logistics can be split into three different levels of support. MCDP 4 states that "levels of logistics correspond directly to the strategic, operational, and tactical levels of war" (United States Marine Corps, 1997, p. 48). Expeditionary Logistics, summarily, has the same three levels of strategic, operational and tactical. Strategic level expeditionary logistics would encompass the United States ability to support our operating forces on a foreign shore to complete the execution of our national military strategy (United States Marine Corps, 1997, p. 49). Operational expeditionary logistics encompasses many of the same problems and difficulties surrounding strategic expeditionary logistics however the focus lays on a specific theater of operations at the operational level not a grand military strategy (United States Marine Corps, 1997, p. 50). Tactical expeditionary logistics is primarily concerned with the support of combat operations (United States Marine Corps, 1997, p. 51). This support of combat operations in a foreign country deals with the primary concerns of combat commanders at all levels the "feeding, fueling, arming and maintenance of troops and equipment" (United States Marine Corps, 1997, p. 51). When discussing expeditionary logistics within the United States Marine Corps the focus tends to revolve around Combat Service and Support (CSS). Combat service plays a role in all three levels

of expeditionary logistics. Figure 7 is a graphic representation of the three levels of logistics including many of the missions completed at the different levels.

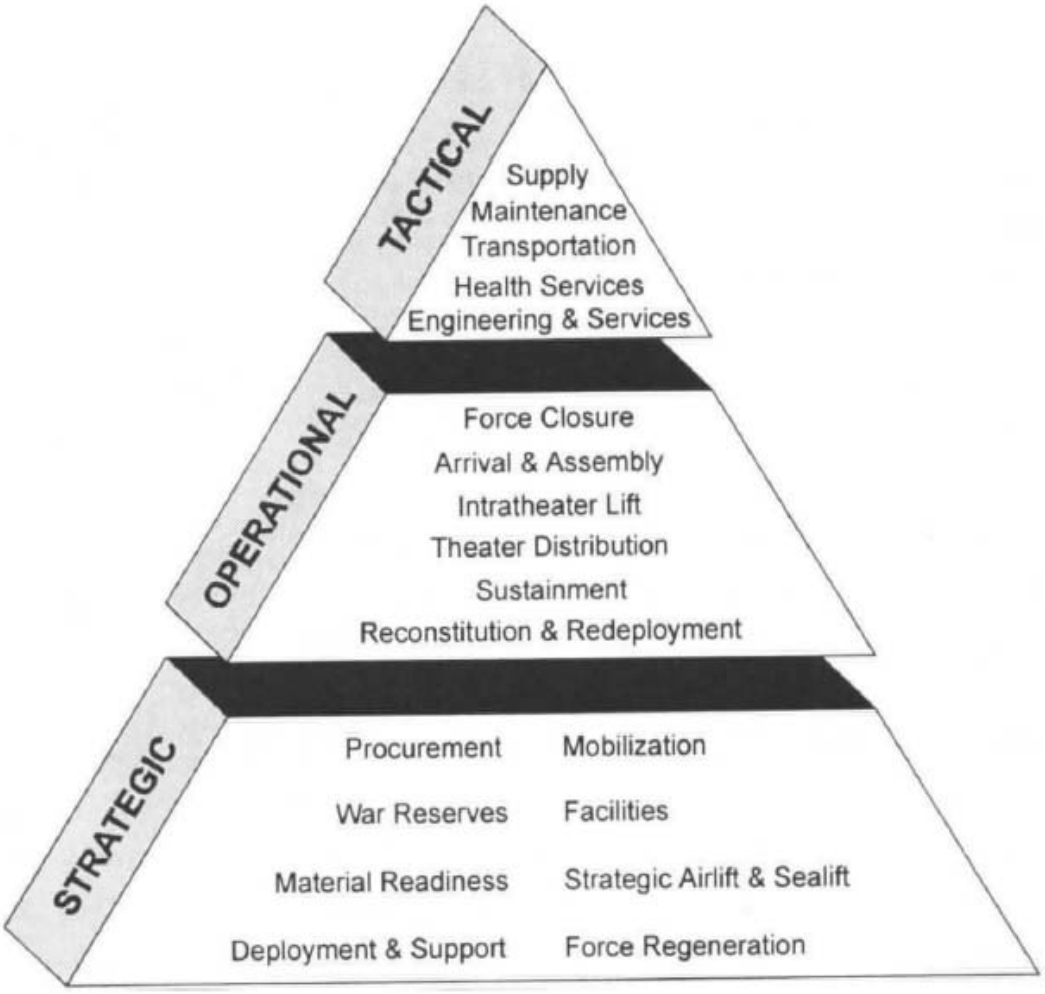

Figure 7. The Levels of Logistic Support. (from MCDP 4, 1997)

D. LOGISTICAL COMMAND AND CONTROL SYSTEMS

The U.S. Marine Corps currently employs many Command and Control (C2) systems to aid in the facilitation of its logistical support efforts. The development and fielding of these systems has accelerated in recent years along with advancements in digital communications. Global Combat Support Systems–Marine Corps (GCSS-MC) has been implemented force wide and it increases "a commander's ability to see the resources that are at his disposal" (Faulkner, 2014, para. 4). Another system employed is Common

Logistics Command and Control System (CLC2S). This system facilitates a unit's ability to monitor unit logistical statistics and requirements to "allow for more efficient push logistic" and it also "creates a simple and effective way for units to request tactical logistical support" (Cain, 2014, para. 1). While many of these modern communication systems have improved logistical tracking and facilitated expeditionary logistics, these systems have not gone without problems. A key component of all new logistical systems is cloud computing. The problem with Cloud-based computing systems is their inability to operate stand alone when communications spectrum is not available for their use. Simple maintenance on the communication architecture can limit the effectiveness of many expeditionary logistic efforts.

Ground and air support of expeditionary logistics are handled differently on a systems use basis. While request systems are used to provide pull logistics end items in both cases, when aviation is used there is an added step to request the aviation support. This aviation support is completed in many ways, but normally centers around the completion of an Aviation Support Request (ASR). These ASR's are compiled through the command hierarchy for approval. Once a request is approved, an asset is matched with the requirement for servicing. This request process is completed through an aviation support system known as Theater Battle Management Core System (TBMCS). This computer-based system is heavily reliant on data bandwidth, which limits the point at which the ASR input is completed, whether it is at the battalion, regimental, or divisional level. Email or voice telecommunications are tools often used to mitigate data bandwidth restrictions. When data is limited, ASRs are often delivered to higher headquarters through email or voice means in order to service the assault support requests.

Medical evacuation is normally completed with aviation assets when available. These evacuations also require an ASR; however, immediate medical needs are supported through the use of a 9-Line CASEVAC request. This request eliminates the 120-hour ASR requirement for inclusion of the movement within the Air Tasking Order (ATO). When 9-Line evacuations are used they are primarily delivered via voice or chat messaging to the Direct Air Support Center (DASC), which is doctrinally collocated with the GCE's senior Fire Support Coordination Center (FSCC) (MCWP 3–25.5, 2001a,

p. 4–1). This collocation facilitates this voice and data transfer of information between ground and air units, which greatly speeds logistical support. Traditional medical support is also provided by aviation support but the less immediate nature of normal doctor appointments determines that the normal ATO cycle will be followed for any ASR that is not immediate in nature.

Overall Command and control of military forces has transitioned at the operational level of war. The process involved in movement of forces is no longer managed through Joint Operational Planning and Execution System (JOPES). This process is now done through Adaptive Planning and Execution System (APEX). The APEX system is best described by the joint staff as follows:

> The Adaptive Planning and Execution (APEX) system facilitates iterative dialogue and collaborative planning between the multiple echelons of command to ensure that the military instrument of national power is employed in accordance with national priorities, and that the plan is continuously reviewed and updated as required and adapted according to changes in strategic guidance, resources, or the operational environment. Joint operation planning also identifies capabilities outside Department of Defense (DOD) required for achieving the strategic objectives to reach the end state by providing a forum that facilitates the interorganizational coordination that enables unified action. (JP 5–0, 2011, p I-1)

E. TYPES OF EXPEDITIONARY OPERATIONS

There are numerous different types of expeditionary operations. These operations are not always combat-oriented operations. Numerous other forms of expeditionary operations exist, and each type of expeditionary operation has a differing requirement for expeditionary operation. For many types of expeditionary operations the requirements for expeditionary logistics are dictated by the size and scope of the operation undertaken. For short-duration expeditionary operations, such as a Humanitarian Assistance Disaster Relief (HADR) mission, Noncombatant Evacuation Operation (NEO) or a Tactical Recovery of Aircraft and Personnel (TRAP) mission, there is a greater need for aviation support to distribute both people and supplies than would be the case for a longer duration combat or Security and Stabilization Operation (SASO). These differing missions have differing requirements; as such, they need support that is tailored to meet

the requirements of the mission. While there are an unlimited number of possible expeditionary operations that could be undertaken, the HADR, NEO, SASO, TRAP and combat operation are missions commonly undertaken by the U.S. Marine Corps. These missions all require the use of expeditionary logistics methods, but the methods used to apply expeditionary logistics are different based on the mission requirements. A further explanation of these event-based missions provides insight into their size scope and duration.

- HADR missions are of a short duration. These missions normally only last one to two months. These humanitarian missions normally occur in response to an event or disaster that causes a country to lose control over its people. Rapid dissemination of critical commodities is required to stabilize the situation (Joint Staff, 2013, p. V-2). The main mission of a Marine Unit is to stabilize the situation and then provide the assistance required to restore order and a sense of normalcy.

- NEO missions are extremely short in duration normally lasting less than a week. The primary goal of this mission set is to extract United States Citizens from a country as it destabilizes for any number of reasons. Often times this extraction centers around the extraction of an embassy and ambassador. These missions are normally directed by the Department of State (Joint Staff, 2011a, p. 187).

- SASO missions are longer in duration. These missions can take place for months or even years. The primary goal of this mission set is to provide security to a populace allowing them to develop a working government of their own. The length of these missions is highly defendant on the government that was in place prior to the undertaking of the SASO.

- TRAP Mission is extremely short in duration. From defining the need for the mission to locating and recovering the person or asset to recover normally is completed in under a week. This mission is very short notice and commences immediately when the requirement is defined. This mission is also completed abruptly when the aircraft or person is recovered (Joint Staff, 2011b, p. 258).

These missions are not all encompassing of the capabilities that the U.S. Marine Corps provides. These mission sets are provided with the intention of supplying an idea of what the U.S. Marine Corps is capable of providing in the realm of expeditionary operations.

F. SUMMARY

This chapter provided a condensed history of the U.S. Marine Corps and its conduct of expeditionary operations. Beginning with the starting point of World War I, the Marine Corps has taken a path through its history, which defined its expeditionary and logistical capabilities. A review of the current U.S. Marine Corps fighting organization detailed the force structure available through each element. This structure provides the framework through which the U.S. Marine Corps conducts operations. Additionally, the definition of both expeditionary operations and logistics provided a firm starting point for interpretation of this thesis. Many interpretations of the term expeditionary exist and none of the U.S. forces interpret that term the same. While the term expeditionary is broad by its joint definition, the methodology that the different services undertake as a result of that broadness is not. A review of the different systems that are currently in use to support both expeditionary operations and logistics was conducted, and the chapter concluded with a review of several of the expeditionary operations that the U.S. Marine Corps conducts.

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III. LITERATURE REVIEW

A prior research study was conducted by Kundra, Brown, and Donaldson (2014) that dealt with the topic of expeditionary logistics. The focus of this thesis is not to duplicate those previous efforts, but rather to take their methodologies and build upon their findings to better develop an understanding of expeditionary logistics. There has been little research done with regard to the United States Marine Corps. Relevant information was collected that pertains to the topic of this thesis. The following paragraphs will summarize that information. Additionally, any analysis that pertains to this thesis will be highlighted.

None of the documents reviewed for the preparation of this thesis specifically addressed the topic for this thesis, that is, how the Marine Corps executes expeditionary logistics. Additionally, there appears to be no primary definition within the U.S. Marine Corps doctrine as to how expeditionary logistics are accomplished. Rather, there are many supporting documents that provide a basis of understanding and offer suggestions on how to conduct this type of operation (United States Marine Corps, 1997; United States Marine Corps, 1998; United States Marine Corps, 2000b).

This research was undertaken in the shadow of a group that established the ground work for this research (Kundra, Brown, & Donaldson, 2014). While the analysis and content of the research will differ, the framework and methodology of the case study undertaken will not. The case study methodology uses a hypothetical situation developed from real after action reports to interpret how a service undertakes expeditionary operation. This case methodology was developed by Kundra, Brown, and Donaldson (2014) for their study of expeditionary logistics within the Navy titled *Assessment of logistical support for expeditionary units*. Their MBA project focused on two types of expeditionary units within the naval services.

The Naval Research Council conducted a committee on naval expeditionary research in 1999. Many of the themes from their report are included within the scope of this research. This report provides the backbone of new naval methodologies such as

seabasing and OMFTS. Their research highlighted that a shift toward OMFTS would require a shift in emphasis from ground-based logistical support to a greater reliance on air transport (National Research Council, 1999, p. 3). This study also highlighted the concept of seabasing and stated that "basing of many supporting functions at sea will dramatically reduce the demand for logistical support ashore but will require that many of the logistical functions usually performed on land be performed at sea" (National Research Council, 1999, p. 3). This research study also does an excellent job of highlighting the hybrid models of expeditionary supply that must be employed. Through requirements-based analysis this study shows the capabilities and opportunities available through OMFTS and seabasing as well as the difficulties and problems that it causes.

Comparisons with the Army's methods for conducting expeditionary operations are drawn throughout this report. Many of these comparisons are drawn from a Rand Corporation report titled *Speed and Power: Toward an Expeditionary Army* written by Peltz, Halliday and Bower (2003). This report also provides background on the expeditionary support that the Marine Corps can draw from the army during expeditionary operations.

Further information on OMFTS was drawn from Peter Venoit's research paper title "Expeditionary Logistics from the Sea" (1999). This research paper provides an outline of the concept of OMFTS. This report also introduces the concept of a single channel of supply operations.

Differences in how aerospace forces are supported were drawn from *Supporting Expeditionary Aerospace Forces* by Tripp, Galway, Killingswoth, Peltz, Ramey and Drew (2006). This book highlights the methods that the U.S. Air Force uses to support expeditionary aerospace forces.

Many of the doctrinal and reference publications of the Marine Corps and the Joint Staff were used heavily to develop the organization structure of these operations. These same resources were vital in defining terms and in delineating responsibilities across a joint force. Many of the thoughts and instruction on the implementation of logistical theory originate in these publications. As the following listed references are

the bases for many training courses throughout the Marine Corps, many of the subjects discussed within this thesis originate within the publications; however, their implementation and understanding has been refined through other means. A list of these resources follows:

- Joint Publication 1–02 Department of Defense Dictionary of Military and Associated Terms (2001)
- Joint Publication 3–0 Joint Operations (2011)
- Joint Publication 4–0 Joint Logistics (2013)
- Joint Publication 5–0 Operational Planning (2011)
- MCDP 3 Expeditionary Operations (1998)
- MCDP 4 Logistics (1997)
- MCRP 5–12D Organization of Marine Corps Forces (2000a)
- MCWP 3–25.5 Direct Air Support Center Handbook (2001a)
- MCWP 4–11 Tactical-Level Logistics (2000b)
- MCWP 4–11.8 Services in an Expeditionary Environment (2001b)

Much information regarding Time-Phased Force Deployment Data (TPFDD) was drawn from *To TPFDD or not to TPFDD: Is the TPFDD Outdated for expeditionary U.S. Military Ops* by Brian Newberry (2005). This paper provides insight into the workings of Joint Operational Planning and Execution System (JOPES) and how units are deployed to expeditionary environments at the strategic level. The TPFDD, in the past, has been a primary method to deploy large numbers of U.S. forces and equipment. This method assigns unit numbers whereby the unit can be assigned to deploy in a rapid manner. This method of deployment has fallen out of favor in recent conflicts, however the structure built for command and control is still very relevant to modern expeditionary operations.

Additional information regarding TPFDD and JOPES was gleaned from *JOPES and Joint Force Deployments* by James Bates (2004). This article provides a sound basis describing how units are deployed using current systems at the strategic level, and also

provides insights into unit level deployment types that apply at the operational level of war.

Very little literature exists regarding the current state of logistical command and control software. While software is often a moving target with regard to the current systems of record, Cain, Burleigh and Holdridge provide some insight in their article *Logistics C2 Systems in an Expeditionary Environment* (2014) what systems are currently being employed to conduct expeditionary logistics. This article also highlights a DOD shift toward Cloud computing to support logistics, while stating the issues and difficulties that this shift in control has caused.

IV. METHODOLOGY

The basis of this thesis lies within its primary research question; how does the United States Marine Corps conduct expeditionary logistics? This question is far too broad in nature to construct a case study that would provide insight into this topic. Therefore, this research question has been further refined to encompass the following secondary questions.

The basis of the secondary research questions is how the U.S. Marine Corps accomplishes expeditionary logistics through many means. For this research, concentration was placed on the delivery of life support resources, mission essential materials and contingency operations. Additional efforts were put forward to identify improvements that could be made and tools that proved useful in operations.

These research questions will be the primary basis used for the construction of a hypothetical case study. This case study will be used to answer the primary research question of how the United States Marine Corps performs expeditionary logistics. Research on this topic was completed through the conduct of interviews with U.S. Marine Logistics Officers. Since logistics officers are the primary facilitator of logistics planning and support within the Marine Corps, their understanding and past experience is the primary basis for the understanding of the primary research question.

All interviewees ranged in rank from Captain to Major (O3-O4) and all interviewees had experience conducting both expeditionary operations and logistics. The majority of the interviewed officers had combat experience in either Operation Iraqi Freedom (OIF) or Operation Enduring Freedom (OEF).

All information gained from the interviews of personnel was analyzed to gain knowledge on Tactics, Techniques and Procedures (TTPs). After Action Reports (AARs) from recently deployed Marine Corps units were acquired from the Marine Corps Center for Lessons Learned (MCCLL). These AARs were reviewed for the purpose of gaining understanding on the conduct of expeditionary logistics. These AARs were selected based on recent combat operations and only AARs that heavily involved expeditionary

logistics were used. Common trends and other information was gained through both interviews and the AAR review. The two sources of information where then compared to highlight common trends, requirements and other TTPs used to conduct expeditionary logistics.

From the research, a hypothetical case study was developed with the goal of demonstrating the methodology and many of the TTPs and systems utilized by the U.S. Marine Corps to facilitate expeditionary logistics. The primary methodology used to develop and define this case study was derived from *Case Study Research Design and Methods* by Robert Yin. Yin's research methods and methodology for case development was heavily used throughout construction of this case study.

Robert Yins case study methodology is laid out in multiple feedback loops. Each step in the iterative feedback loop is used to share with others and advance the case study design. Figure 8 provides a graphic representation of Yin's case study methodology that will be used in this research thesis to develop comprehensive Marine Corps expeditionary logistics case study.

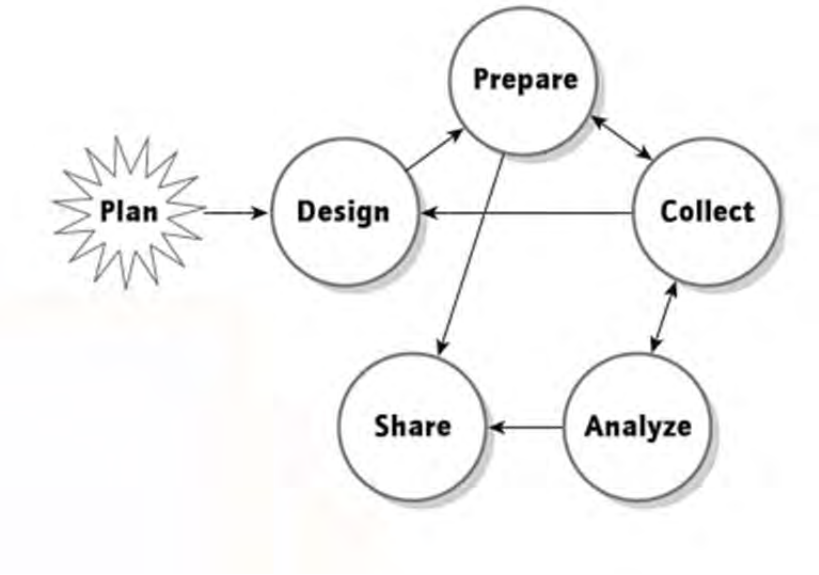

Figure 8. Case Study Methodology (Yin, 2009, p. 1)

A. PLAN

A rough construct of the methodology used by the Marine Corps to conduct expeditionary logistics was devised through conduct of a literature review on the topic. From this literature review a rough model of the procedures used was developed. This model facilitated the design of the case study. The case study methodology was chosen at this point because of its focus on contemporary events and its ability to answer how and why questions without control of behavioral events. Since this thesis concentrates on how the Marine Corps conduct expeditionary logistics case study methodology is the appropriate method for the conduct of this research.

B. DESIGN

The design of this case study was based initially on research conducted on AARs compiled by the MCCLL. From the information gathered by research of AARs, questions were developed for in depth personal interviews. After all interviews and AAR analysis is conducted theories regarding the conduct of expeditionary logistics are formed. From the information gathered, a single case study that is hypothetical in nature will be developed to explain the research questions. Quality of the case study will be maintained through the use of multiple forms of research. The conduct of the interviews will use set questions to ensure that responses are not skewed by the interview facilitator. Once all interviews are completed additional specific questions may be asked of the interviewees to leverage specific experiences and further advance understanding of the topic. The following figure displays graphically how Yin's (2009) case study method is used to develop both theory and counter theory without the need for sample or experimentation.

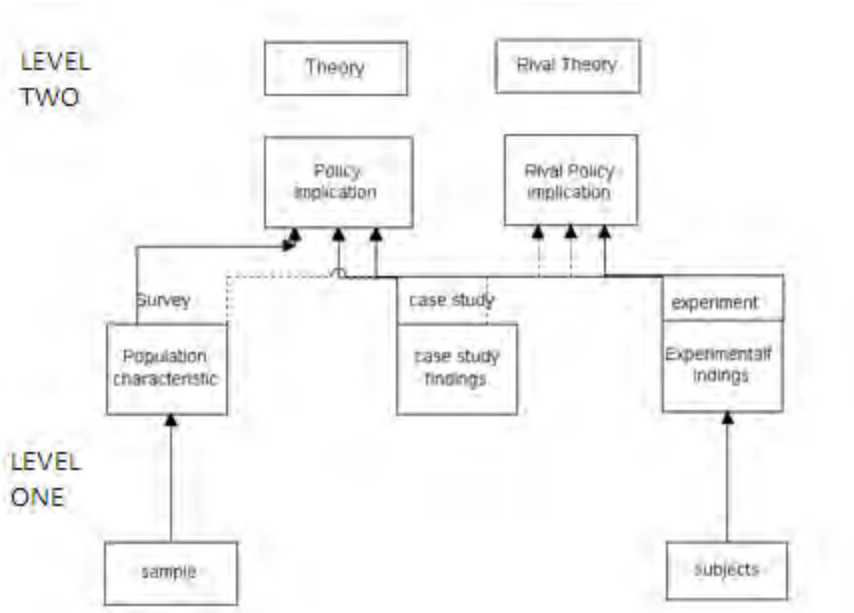

Figure 9. Yin's Inference Model (Yin, 2009, p. 39)

C. PREPARE

Collaborative Institutional Training Initiative (CITI) Investigator and Key Research Personnel Training were completed to safeguard respondents. An initial review of all available materials and literature was completed to prepare interviewers for the conduct of interviews. A question bank was built for the conduct of the interviews. A pilot interview was conducted to highlight deficiencies and improve interviewer reliability and validity. Emphasis was placed on performing interviews with the following skills:

- Interviewer acts as a good listener.
- Interviewer maintains a strong foundation of understanding with regards to expeditionary logistics.
- Interviewer is adaptive and flexible during the conduct of the interview.
- Interviewer remains unbiased in conduct of the interview focusing on fact based responses through open-ended questions..

D. COLLECT

Data collection followed with the design protocols developed for this case study. All data from AARs was taken directly from the MCCLL. These AARs are broken down into functional areas of responsibility with most data taken from the operational and logistical section. Common trends and occurrences where highlighted through this research. When no common trend was evident, the methodology that was used was treated as noise since only one instance of an occurrence was evidenced. During the interview phase these common trends were investigated further to gain understanding with regard to understanding the methods used to accomplish expeditionary logistics.

E. ANALYZE

During the analyze phase of this research, qualitative data was reviewed to gain understanding of methodologies used to support Marines in expeditionary operations. Through common trend analysis TTPs were highlighted as the most likely to occur in most situations. Likewise, many other TTPs were also evident as to additional methodologies that were available for use to support expeditionary operations. Reasons for the different methods were established by re-interviewing some interviewees providing additional information and understanding why different methodologies are used.

F. SHARE

This case study was developed with the primary goal of answering a specific research goal for the Office of Naval Research (ONR). As the primary audience, the research is designed to present answers to their primary questions. Additionally, the research is presented in a manner to enhance the common understanding of the average service member as to how the Marine Corps conducts expeditionary logistics. The research is compiled and used to develop a hypothetical case study that follows a Marine Corps unit that is deployed into a combat situation abroad. The Case study presents the options available to the Marine unit’s commander and then revolves around the choices and methods used to support the Marines abroad.

G. CASE STUDY DESCRIPTION

A hypothetical case study was developed based on experiences of the interviewees represented within this methodology. A hypothetical case study is a way of linking all of the relevant injectors that would dictate logistical requirements within a hypothetically designed scenario. This scenario will involve movement ashore from amphibious shipping and beginning operation in a hypothetical country. The scenario will demonstrate best practice with regard to expeditionary logistics giving an overview of the methods that are employed with in the U.S. Marine Corps to support troops abroad.

H. SUMMARY

This chapter outlined the methodology used to develop the research method and the case study that resulted from this thesis. The chapter addressed the methods available for research and addresses the reasoning why the case methodology was selected. Based on the method of research secondary research question were developed. The methods used to develop the case study where broken down along the lines developed by Robert Yin. The methodology of the research was then reviewed in a step-by-step basis as it was conducted.

V. CASE STUDY

This case study centers on the hypothetical deployment of forces from U.S. naval shipping for logistical support in a humanitarian disaster. The scenario used was developed to better understand the logistical facilitators that are used when situations similar to this one occur around the world. This case study, while hypothetical is realistic in its procedures and actions. The case study was developed from personal knowledge, after action reports and interview inputs. These inputs were combined within the case study methodology to gain insight and understanding on the workings of an expeditionary operation and the manner in which it is supplied. This case study provides many examples of how and why the U.S. Marine Corps uses its logistical assets and the strengths and weaknesses of its expeditionary logistics operations.

A. BACKGROUND

The landlocked hypothetical country of Shamistan is located in sub-Saharan Africa. This country is experiencing a severe humanitarian disaster. After years of civil war and internal strife, a recent drought has caused the country's government to practically collapse and the country has denigrated to a feudal existence based on age old families and tribes. The United States has pledged its support to the people of Shamistan, and the U.S. Department of State has attempted to supply the local populace with much needed supplies. Unfortunately, the destabilized population has caused a deteriorating security environment and the State Department officials were forced to leave the country under threat to their lives. Unable to provide aid to the populace, the State Department has requested security forces to reenter the country and provide logistical support in the distribution of resources to the populace.

B. WARNING ORDER

The 22nd MEU was embarked aboard ARG shipping steaming in the Arabian Gulf when they received a warning order to provide HADR support to the people of Shamistan. The 22nd MEU is commanded by a Colonel and is based out of Camp Lejeune, NC. Under the requirements of higher command the 22nd MEU was tasked to

provide security forces to secure an Aerial Point of Embarkation (APOE) and provide infrastructure support to assist the State Department efforts to distribute humanitarian aid to the people of Shamistan. Additional forces have been designated for deployment to Shamistan upon activation of the APOE. Strategic assets were directed to support this task by the AFRICOM commander and they were to be used to bring in both supplies and vehicles to facilitate the mission.

C. COURSE OF ACTION

The initial phase of movement into Shamistan is a 150-mile movement across open desert to this land-locked nation. The poor infrastructure of the country made road movements difficult and the roads in this country have been deemed unsuitable for heavier vehicles without major improvements. Specifically, the MEU's organic vehicles were too heavy for the bridges on the Main Supply Route (MSR) that reached to the interior of Shamistan. For this reason, the MEU commander deemed the quickest and safest method to complete the assigned task was to deploy his HELO Company to shore in order to seize and secure an airfield through an air assault. This airfield would then become an APOE to facilitate flights of additional troops and equipment to support the mission. This rapid movement of troops ashore by air necessitates the use of seabasing to logistically support the troops once moved ashore. As no "iron mountain" of supplies was built on a beachhead, the organic MEU aviation assets were tasked to provide logistical support from ship to shore in support of the company based ashore. Once security was established at the new airbase, strategic Air Force assets flew in heavy equipment in order to improve the airbase to meet the mission's requirements. Meanwhile, bridging assets were utilized to improve the main MSR from the shore from the combat engineer detachment.

D. INITIAL PHASE

The initial movement of the air assault ashore commenced with few difficulties. Aircraft failures delayed the movement of one platoon of troops by several hours. The addition of another wave of troop movements ashore delayed the follow-on movement of supplies from the sea-based ship to shore. The only organic aviation assets within the

MEU that could move assets ashore were the MV-22 Osprey aircraft (Kang, Doerr & Ameyugo, 2002, pp. 905–910). With six aircraft available for the first wave of the movement ashore, the original plan called for two waves of MV-22s moving personnel to seize the airfield. Unfortunately, several aircraft became unserviceable and a third wave of MV-22 Aircraft was required to get the entire company of 145 troops ashore. With the additional wave the spare seats were used to get a Marine Mobile Team (MMT) ashore to control the airfield and begin controlling aircraft as they came in. The lack of a ground-based supply route necessitated the use of aircraft to move both personnel and supplies simultaneously. Supplies and heavy equipment were moved to the airbase primarily by the CH-53E Super Stallion helicopter. The CH-53E is the only organic heavy lift helicopter within the MEU ACE. This simultaneous movement of forces and supplies quickly depleted any spare aviation assets that were planned into the operation. Several Marines experienced minor injuries during the seizure of the inland airfield that necessitated their MEDEVAC. These MEDEVACs also required the use of air assets, further stretching the already taxed capabilities of the MEU ACE. Additionally the priority nature of the MEDEVACs caused delays in the deck cycle of launching aircraft from the amphibious ships as priority was given to the landing injured personnel. After a surge of air craft usage on D-Day for the operation, readiness rates for the ACE aircraft had fallen to 60%, further delaying the movement of sea-based supplies ashore.

Once the airfield was secured within the borders of Shamistan, the supply shortfall was mitigated through the movement of supplies into theater by C-130 and C-17 aircraft lifts. These flights continued on the unimproved airfield building stocks of supplies for both the Marines securing the airfield and the State Department personnel to distribute aid to the local populace. On average a C-17 or C-130 aircraft was landing at the airfield every half hour during daylight hours. Unfortunately the airfield had yet to be improved with lighting at this point to facilitate night operations. Figure 10 shows a C-17 landing on an unimproved runway.

Figure 10. C-17 Landing on an Unimproved Runway
(from The Boeing Company, n.d.)

As the aid stockpiles grew, it became apparent that it was difficult to distribute the aid efficiently without large-scale vehicle assets. While the rapid nature of the aviation assault greatly increased the speed with which the actions ashore were accomplished. The lack of hardened MSRs to support large-scale movement of supplies make both shipment of supplies to Shamistan very difficult and the distribution of supplies within the outlying country impossible. After the initial week of operations, the sea-based supply shipping also required a Replenishment At Sea (RAS) to restock the supplies that were delivered ashore. This RAS required the use of the MEUs aircraft to externally lift pallets from the resupply ship to the seabasing platform. This further reduced the available assault support aircraft available from the ACE to support the logistical efforts ashore. Nearing the end of the initial phase of operations it was evident that surface means of supply transport were required as soon as possible to mitigate shortfalls. The ability to transport supplies via air provided the most flexible and rapid method to conduct this operation, however the difficulties balancing a limited and expensive asset with a very large and expanding

requirement meant that large-scale movements of both support equipment and supplies could be more efficiently conducted through surface means. With that reasoning maximum effort was placed on improving the MSR for heavy vehicle transport and large-scale bridging assets were flown into Africa to support the transport of supplies ashore. After approximately three weeks of continuous operations the situation ashore had stabilized dramatically and the Marines ashore had established routines that transition into a more complex transportation model. It was at this point that the 22nd MEU commander felt that the MEU had entered into a new phase of the operation.

E. SUSTAINED PHASE OF OPERATIONS

The sustained phase of this operation required several things to occur before it could begin. First force protection surrounding the APOE and a port facility. The rapid buildup of forces and supplies accomplished during the initial phases of the operation occurred through the most expeditious means available to the commander with little regard to cost or efficiency. This was accomplished to provide humanitarian assistance to Shamistan as rapidly as possible. Now that security has been established, the rapid requirement expressed during the initial phase of the operation no longer existed. During the sustainment phase of the operation improved productivity and reduced costs provided greater utility to the people of Shamistan as supplies flowed into their country providing relief from the famine and humanitarian crisis. Once the MSRs were improved to allow for the 22nd MEU's vehicle to provide the overland trucking, those assets began moving vast quantities of supplies. Additionally, the use of a port facility allowed the MEU to move supplies directly from civilian shipping straight to shore. That eliminated the requirement to move the supplies to a seabased staging area and greatly decreased the handling required of the supplies prior to shipment inland. This rapid influx of supplies further increased the need for combat service support assets available from the MEU. The AFRICOM Commander decided at this point that the scale and scope of this operation had grown and the need for additional assets required the increase in size of the MAGTF deployed in support to that of a Marine Expeditionary Brigade (MEB) (-). The MEB (-) was a far larger force than the original MEU. Commanded by a Brigadier General the MEB (-) was deployed from the East Coast of the United States. To accomplish this

increase in size of the HADR force required the strategic transport of a Battalion of troops from the United States. The 1st Battalion 2nd Marines had been designated by the TPPFD to meet this operation and as such were rapidly deployed via Air Force heavy lift assets to the secured airfield. Ten C-17 cargo aircraft loads were used to bring in the additional battalion of troops to Shamistan. With these additions, the company ashore based at the airbase had grown in size to approximately 2,000 personnel. Since the equipment they required to meet their mission was extremely heavy and difficult to deploy via air, the MEB commander used vehicles that were stored aboard MPF shipping. The use of this strategic asset greatly reduced the time required to deploy this additional battalion and also reduced the expense of deploying vehicles to Africa through strategic air.

The movement of MPF ship to port was conducted shutting down the port facility for several days as the vehicles for the new battalion were offloaded. As vehicles were offloaded, some of the MPF vehicles were not in a usable state requiring minor maintenance to make them serviceable. The readiness rate as the vehicles departed the roll on roll off MPF ship was approximately 90%, however, the unserviceable vehicles slowed the debarkation efforts. The roll-on-roll-off ships from the MPF squadron were used as they provided the quickest and most efficient method of delivering vehicles to theater. The rapid process of offloading this type of MPF ship limited the port facilities ability to unload humanitarian aid simultaneously during this phase. The MPF offload required all available space at the port to pre-stage unloaded vehicles for the battalion of troops arriving from the United States to pick up. Once all of the vehicle inspections were completed and the vehicles were offloaded from the MPF ship the ground transport capability of the MEB was significantly increased. Figure 11 shows a roll-on-roll-off MPF ship docked in Africa offloading rolling stock for exercise African Lion.

Figure 11. MPF Offload (from www.africom.mil)

The mission of the MEB evolved over time from transportation of supplies to distribution of supplies. Numerous contracts were signed, both with local national trucking companies and other contract support companies to move the supplies from the secured port forward to the country of Shamistan. Large supply areas were identified so that the trucking companies were able to move the supplies forward and drop at a central location. The U.S. Marine Corps continued to accomplish the mission of distribution of supplies, however, the reduced workload from decreasing transportation requirements with contractors allowed for expanded distribution capabilities. This transfer of duties was accomplished to allow the MEB to undertake an expanding role in the distribution of supplies to the local populace. During the initial phases of this operation the security environment prevented outside civilian trucking companies from moving supplies, so the Marine Corps had to undertake that duty. Now that force protection was in place, the duty of mass transport of supplies was undertaken through contracted support at much lower cost in both assets and personnel. U.S. Marine Corps assets were then able to branch out

from the MSRs of Shamistan, and distribute the humanitarian aid further out where it was needed most. As the HADR efforts pushed further into the difficult to reach areas of the countryside, further humanitarian aid requirements were identified, and aircraft were used to provide contingency-based support for the different problems encountered. Local nationals were given MEDEVACs back to the airbase for treatment of illness, and supplies were delivered via vehicle transports were required. Military vehicles often broke on the unimproved roads of the country and spare parts were flown in to theater by Air Force C-17 aircraft while the MEUs organic aircraft distributed these parts to the point of breakdown in order to facilitate the repair of vehicle breakdowns.

While the distribution of assets continued to occur it became increasingly hard to identify the movement of parts and supplies to the varying units. Originally when the situation was fluid, this movement occurred via voice communications. Now that the situation had matured and the separate sub units of the MEB (-) were in place, the forces began to use the designated programs to coordinate and track the movements of assets. Scheduling of convoys was accomplished with Transportation Capacity Planning Tool (TCPT), part ordering was accomplished through Global Combat Support System-Marine Corps (GCSS-MC) and supply requests were placed to higher echelons through Common Logistics Command and Control System (CLC2S). The use of these systems greatly increased the ability to track assets; however, the minimal bandwidth available for the use of these systems made the distributed nature of this operation difficult to accomplish. This resulted in many people working together to accomplish the most basic of tasks. Many times personnel would call back to higher headquarters and place orders for parts and supplies. These orders were not able to be entered into these systems at the distributed operations centers due to lack of bandwidth. The Marines adapted to this system shortfall by continuing to call other headquarters until a unit was found that had network capability. This shortcoming identified a major issue that occurs when multiple data systems are used with a restricted data spectrum available.

Throughout this stage of operations, the permanent base mentality of the situation was pervasive and the iron mountain of supplies and spare parts began to build at the now fully operational Expeditionary Air Field (EAF). Figure 12 shows a picture of the EAF

constructed as a proof of concept at MCAGCC Twentynine Palms, CA. This EAF began to mature at this point in the operation, and further personnel were used to facilitate the acceptance of supplies that were flown into theater by strategic U.S. Air Force lift. Air Force C-17 aircraft were now landing at all hours of the day and two to three aircraft were usually at the airbase at any given time. Once parts and supplies arrived in theater, they were categorized by the class of supply they were and forwarded to the correct supply point for distribution as required. While the distribution of Class 1 (Subsistence supplies) and Class 3 (POL) supplies continued through push methods without restriction, the movements of most other classes transitioned to an on request or pull methodology at this point. This transition prevented the buildup of parts and materials at decentralized bases that did not require them.

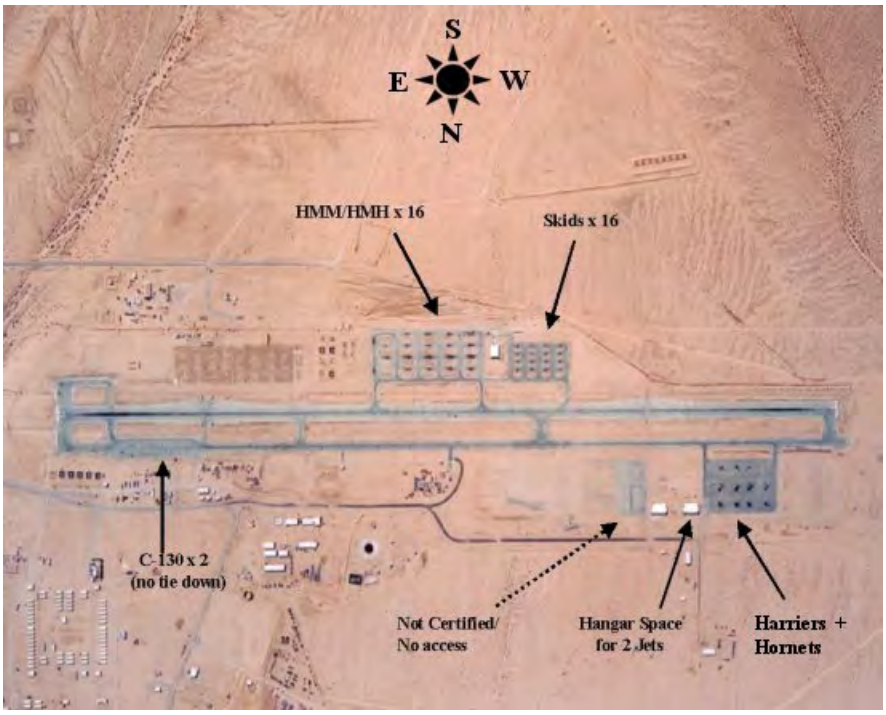

Figure 12. Expeditionary Air Field (from www.harrierpilot.com)

During the conduct of the initial phases of this operation water was delivered via bottles due to their ease of transport and distribution. During the sustained phase it was realized that the equipment and personnel were available within the organic MEB to

produce their own water. While the distribution of this water with water bull trailers was more difficult, it was also far less expensive. Additionally, the use of water production near the point of use eliminated the need to truck pallets of water inland from the port facility, freeing up further transportation capacity. After six months of continuing operations the AFRICOM commander determined that the tasks outlined within his original orders were met and the time had come to extract the U.S. Forces from the country of Shamistan.

F. RETROGRADE

Upon completion of the tasks outlined by the AFRICOM Commander, the process of removing all personnel and materials from the theater began. However, this task proved more difficult than anticipated. The retrograde of the now 2,500 troops from all branches of the U.S. Forces from Shamistan proved very difficult indeed. This often occurs during missions like this as the retrograde of forces is difficult, but often overlooked because the main goals of the mission have already been accomplished. The same aircraft and ships that were extremely expensive for the insertion of forces must now be used again to extract forces and supplies. These assets are in high demand and are very expensive. Therefore, great care must be exercised to maximize their utility.

The original plan for retrograde of forces included the extraction of all facilities and materials used within the operation. This included much of the construction equipment used to build and operate the EAF. This required more strategic air resources to extract than were used to insert the force. This occurred because additional equipment was delivered by civilian shipping means. The MEB (-) Commander made the decision to analyze what equipment the locals would need to maintain order within the country. A prioritized list of assets was developed determining what assets should be extracted and what assets should be handed over to the local populace. The MEB commander realized that the departure of the U.S. Marine forces would have compounding effects on the local populace. These effects included the reduction in a distribution network that the Marines had established and the lack of force protection assets that secured the main supply routes within the country.

During preparations for the extraction of the Marines from the theater, planning was conducted with the U.S. State Department analyzing what would be required to fill the void left behind that the U.S. Marines had been providing with respect to logistical support. Coordination was then conducted with Nongovernmental Organizations (NGOs) to ensure any shortfalls that would occur with the Marines departure were filled. Additionally, requirements were identified and equipment that would not fit within the MPF shipping were analyzed for transfer of assets and gifting through State Department foreign aid packages to the country of Shamistan. This move greatly reduced transportation and service costs of equipment that would not be regularly needed in the future, but required an immediate large expenditure exceeding equipment procurement cost to transport back to the United States. This surrender of equipment to the local populace facilitated their future logistical movement requirements and aided in negating the void left from the Marine departure.

The EAF that was built on the seized airfield was the last point where retrograde of forces consolidated to. This airfield was maintained to facilitate movements and assist the logistical planning that was required for the retrograde of forces following a major operation. The ability to fly personal and equipment around became paramount within the retrograde plan as it was executed. The EAF also assisted with the turnover of facilities to U.S. Department of State personnel.

Extraction of wheeled vehicle assets consolidated back to the port facility for wash down and agricultural inspection following United States Department of Agriculture (USDA) guidance. Following this several day evolution the vehicles were reloaded aboard the MPF roll on roll off ship. The original MEU's vehicles were likewise washed and inspected and embarked aboard the ARG shipping.

A remain behind detachment remained at the EAF to close down all remaining contracts and ensure that all environmental issues where handled prior to the complete departure of U.S. Forces. Once all loose ends were tied up, the rear detachment handed over all remaining facilities that existed on the EAF to the local government and departed the EAF via aviation assets.

G. AFTER ACTION

Following the completion of the mission, many best practice, mistakes and learning points were identified by all of the players involved with the operation. Efforts were made to facilitate an internal “hot wash” of all phases of the operation to highlight these identified learning points and write them down for future reference. From all of the internal analysis of operations, an After Action Report (AAR) was compiled for transmittal to MCCLL. MCCLL then retains that report under controlled access for future reference by operational staffs that require insight on future problems that are similar.

H. CONCLUSION

This case study displayed many methods employed by the U.S. Marine Corps to facilitate expeditionary operations. The fluid nature of these types of operations dictates that no two scenarios are ever the same, and there is no perfect solution on how to properly conduct an expeditionary operation. While the case presented has identified many solutions to different problems that occur during expeditionary operations, it must be said that other solutions and methods do exist and are used when prudent.

VI. ANALYSIS, RECOMMENDATIONS, AND CONCLUSIONS

This chapter analyzes and draws conclusions based on situations that were illustrated within the presented Case Study. This chapter will also address the research questions where able, and recommend further research to be conducted when required. Recommendations will be presented where the thesis author believes that efficiencies can be improved and where the overall conduct of expeditionary operations can benefit.

There are numerous limitations to the research conducted for this thesis. While all of the interviewees had experience conducting expeditionary logistics, all of their experience lay in the sustained and retrograde phases of the Iraq and Afghanistan wars. While all of this data is relevant, it does not provide a good representation of how expeditionary logistics are conducted in the initial and sustained/intermediate phases of a conflict. Historical data was drawn on to improve this lack of data; however, the initial phases of these conflicts happened over ten years ago and so many factors have changed since then that some methods used may have changed significantly.

An additional limitation of this research is the lack of financial data available. While supplies did change hands under all phases of operations, the methodology of their dispersal precludes the ability to put accurate numbers on units' actual usage in dollar terms. This issue will be addressed further in both analysis and recommendations section of this chapter.

A. ANALYSIS

The analysis of expeditionary logistics as a research question is difficult. The broad nature of this question must be further refined to lend understanding to any analysis that is completed. The research completed during this study led to a broad understanding that expeditionary logistics is operationally dependent. In other words, the methods used to support a NEO or TRAP mission will differ greatly from the methods used to support combat operations. Additionally, the different classes of supply also differ in the methods used to disperse them abroad. During the course of this research it was discovered that

the methods used to logistically support operations could be split into three distinct categories: the initial phase, the sustainment phase, and the retrograde forces. While all of these phases are not present in all types of operations that require expeditionary operation, this breakdown provides a working model for identifying logistical requirements and to develop a working logistical support plan prior to undertaking an expeditionary operation.

During the analysis of interviews it was clear that these phases of operation also had differing goals. The primary logistical goal of both the initial and retrograde phase of an expeditionary operation is effectiveness. The immediate requirements associated with these phases of an operation dictate that rapid distribution of needed supplies outweighs the costs involved in doing so. While the sustained phase of operations places higher efficiency as a primary goal of operations. The steady state of operations that occurs during this phase of an operation lends itself to improved efficiencies as process improvements occur over a protracted period.

1. Initial Phase of an Operation

This phase of an operation begins with the phasing ashore from either an air asset or amphibious shipping. During this phase of an operation the fluid nature of the operation requires that the Marines that undertake the operation go ashore with the capability to self-support themselves until a logistical supply line can be formed. After an initial movement ashore secures an area, it is at this point that an “iron mountain” of supplies can be formed to push supplies out to the units already ashore. Another method of accomplishing this was brought out during the interviews. Seabasing can be used during this initial phase of an operation to directly support ground troops that are already ashore. This method of expeditionary logistics requires the use of air assets to transport supplies directly from a seabase to the consuming unit. A key benefit that arises from this seabasing methodology is the lack of force protection personnel that would normally be used to secure a beachhead were the supplies would be pre-staged ashore prior to their distribution. The main shortfall of this seabasing methodology is the requirement for air assets to provide the only possible method to distribute supplies. This method requires a

dedication of aviation assets to accomplish the supply mission as well as provide the only means to undertake contingency operation such as Casualty Evacuation (CASEVAC) or an emergency extraction. This reliance on aviation means that the risks involved in conducting this type of mission are far greater than the more traditional method of supporting the initial phase of an amphibious operation. It was found during this research that both methods of expeditionary support have merit, but a mission-based analysis must be undertaken to assure that the risks associated with the method used meet the requirements of the supported unit to ensure mission success.

During the initial phases of an operation there is a large reliance on strategic assets to provide both airlift and sealift to support an expeditionary operation. At this point in an operation the marriage of MPF ship's vehicles would occur with troops that would be flown in via strategic air assets in order to converge with the vehicles.

Supplies are broken down by classes of supply for rapid dispersal to the units supported during the initial phase of an operation. These classes of supply are laid out in Table 1. These different classes of supply aid both the delivering units as well as the receiving unit to rapidly organize large amounts of materials during the dynamic movements that characterize the initial phase of an operation. Table 1 indicates that the push method of supply is the primary means by which supplies are initially distributed during an operation. This ensures that no shortfalls occur during this critical stage at the beginning of an operation. The only exception to this rule would be major end items. At this phase of an operation replacement equipment is not normally available until all off-loads ashore are complete. A transition to request based replacement of major end items occurs once a lodgment has been established ashore and a means of requesting replacement equipment exists.

Table 1. Initial Phase of an Operation

Beginning Phase of Operations		
Class	**Description**	**Method of Logistics Used**
I	Subsistence	Push / Initial Allotment
II	General Support Items	Push / Initial Allotment
III	POL	Push / Initial Allotment
IV	Construction Materials	Push / Initial Allotment
V	Ammunition	Push / Initial Allotment
VI	Personal Demand Items	Push / Initial Allotment
VII	Major End-Items	Not Available During Initial Phase
VIII	Medical Material	Push / Initial Allotment
IX	Repair Parts	Pull / Preauthorized Allotment

2. Sustainment Phase of Operations

Once the initial phase of an operation has concluded and large-scale movements have been completed, the sustainment phase of an operation begins. During this phase of an operation the primary means of supply transitions away from the methods discussed during the initial phases above. Methods of disbursing supplies become a more conventional undertaking due to the securing of logistical supply lines and are less fluid in nature during the steady state of operations phase. At this point in an operation the push of supplies forward to troops begins to wane and pull or request systems are often put into action to reduce overstocking of items. These request-based systems of supply also allow for the analysis of usage. Table 2 shows how the generalized support of the different classes of supply has shifted from the initial phases. This analysis provides the end-user the capability to quantify the usage rates for the various classes of supply. The end-user then has the ability to request the necessary amounts to limit losses that occur due to spoilage, theft, overuse and abandonment.

Table 2. Sustained Phase of Operations

Sustained Phase of Operations		
Class	**Description**	**Method of Logistics Used**
I	Subsistence	Pull / Maintained at Set Levels
II	General Support Items	Pull
III	POL	Pull / Maintained at Set Levels
IV	Construction Materials	Push to Meet Requirements
V	Ammunition	Pull / Maintained at Set Levels
VI	Personal Demand Items	Pull
VII	Major End-Items	Pull Through Requisition Process
VIII	Medical Material	Pull
IX	Repair Parts	Pull

It was found that aviation assets were used less as a primary method of supply during this stage, and more conventional methods such as logistical convoys were often used to supply outlying units. Aviation units, however, remain the primary method of servicing unit's contingency operations requirements such as CASEVAC and emergency resupply. This shift in the use of air assets hints at their limits with respect to logistical supply. Ground transportation allows for far greater capacity to supply distributed units at less cost in both resources and personnel. POL is the best example of ground transportation capabilities. Aviation assets are ill equipped to transport POL in the required quantities to conduct operation; however, trucking of POL is considered a cost-effective method in operational theaters. Additionally, during this phase of operations a shift to contracted support for distribution of some assets often occurs.

During the majority of the research interviews some form of life support service was outsourced to contractors. These contracts supplied life support services and basic subsistence items. This was also a common practice for the distribution of Class III POL where it was possible. The large POL requirements of deployed units can be more efficiently serviced by contracted tanker support than through the use of our assets during this stage of operations. The sustained phase of operations can continue for an indefinite

duration dictated by the operational requirements. Once a mission is completed a retrograde phase begins, which is addressed in the next section.

3. Retrograde Phase of Operations

The final phase of an operation that was identified was the drawdown of forces or retrograde phase. During this phase of operations there is a hesitancy to provide any logistical support unless essential. While the shipment of life and combat support resources remains common (Class I, III, V), it becomes less likely that replacement of vehicles will occur as an example. During this phase the drawdown dictates to units that all stockpiles of supplies should be used when possible. The large cost of shipping further dictates that cannibalization of parts should occur to minimize additional logistical shipments of parts. Abandonment of certain items must be considered at this phase of operation where the cost of shipping an item is greater than the remaining life-cycle cost of that item. It is during the final phases of an operation that large-scale usage of strategic transportation assets begins again. The use of strategic air and sea lift is high cost and their capacity must be maximized. The limited nature of these assets requires that detailed load planning occurs prior to retrograding equipment from an operational theater. The detailed planning of these retrograde movements is the primary driver behind the reluctance to supply major end items as large movements of vehicles or supplies can hinder a retrograde plan. Those movements affect the reloading of strategic assets, such as, military airlift or MPF shipping and can greatly delay operations.

There is a general reluctance during this phase of operation to supply units unless absolutely necessary. This reluctance stems from the increased costs incurred from shipping items multiple times in a short period. As Table 3 indicates, all classes of supply are on request only basis at this phase of operations, and no new major end items would be delivered unless absolutely mission critical.

Table 3. Retrograde Phase of Operations

Drawdrown of Operations		
Class	**Description**	**Method of Logistics Used**
I	Subsistence	Pull / Expedenditure of Stock
II	General Support Items	Pull / Expedenditure of Stock
III	POL	Pull / Expedenditure of Stock
IV	Construction Materials	Not Required
V	Ammunition	Pull / Expedenditure of Stock
VI	Personal Demand Items	Pull / Expedenditure of Stock
VII	Major End-Items	N/A unless required for support
VIII	Medical Material	Pull / Expedenditure of Stock
IX	Repair Parts	Pull / Preauthorized Allotment

4. Expeditionary Logistics Training

After the analysis of the phases, a finding from this research involved the methods that Marine Corps employs to train its logisticians. There is no expeditionary logistics training during the initial logistics Military Occupational Specialty (MOS) School. The interview process indicated that over half of the interviewed personnel had no specialized expeditionary logistics training. Interviewees that had received specialized training indicated that it was not sufficient for the purpose of training them to conduct expeditionary logistics.

The only expeditionary logistics training that occurred prior to expeditionary deployments of the interviewees was on-the-job training (OJT). OJT was cited as the primary means through which all interviewees learned the methods to accomplish expeditionary logistics. No best practices have been standardized across the Marine Corps as a stepping off point for the methods to use to accomplish expeditionary logistics. All respondents indicated that logistics were developed individually based on the situations they faced, and planned based on mission oriented requirements.

When expeditionary logistics training did occur it was provided by Marine Corps Logistics Operations Group (MCLOG) based in Twentynine Palms, CA. MCLOG was established in 2012 to address this shortfall in expeditionary logistics training that the

author has identified. Interviewees that had attended the Intermediate MAGTF Logistics Officers Course (IMLOC) indicated that expeditionary logistics training was being refined within the course.

5. Logistical Command and Control Systems

The use of all of the systems that were identified in the background chapter did occur among the interviewees. Many of the systems that were described have been in flux and significant improvements have occurred with some systems. GCSS-MC has come completely online within the Marine Corps and all logistics officers interviewed were familiar with its use. Difficulties were identified with this system with regards to bandwidth requirements. Several interviewees indicated that the system was not usable within theater because of this limitation. When this limitation occurred GCSS-MC was still used for ordering of requirements; however, phone calls were made to upper echelons of command for the inputs to facilitate these functions of GCSS-MC. This limitation increases order time for parts and necessitates a greater workload to accomplish basic tasks.

Within this analysis, CLC2S was identified as a primary means within theater to order items. This system suffered from the same bandwidth issues indicated for GCSS-MC. Transportation Capacity Planning Tool (TCPT) was used extensively to good effect in the Afghanistan Theater. The majority of the logisticians interviewed had used this system to maximize their combat support to outlying units.

No interviewees had used JOPES or APEX. These strategic level systems were known to exist by all interviewees; however, no respondent had ever used either program. Additionally, no respondent had ever seen APEX in use. No details were identified beyond knowledge of its name. Several of the interviewees had worked with their unit TPFDD prior to conducting deployments abroad.

6. Findings to the Secondary Research Questions

The primary goal of this research thesis was to identify how the U.S. Marine Corps accomplishes expeditionary logistics. The answer to that question was addressed

through the secondary research questions that were outlined in the purpose of this research thesis. The questions and answers to those secondary research questions are as follows:

1. How does the Marine Corps supply basic life support resources to its expeditionary forces?

The U.S. Marine Corps provides basic life support services to its expeditionary forces through many means. Whether it be direct aviation or ground service support, the supplies are delivered by whatever means are available to accomplish the mission. These capabilities were found through both organic and contract means within the interviews it became evident that no two scenarios were handled the same and many answers to this question were possible.

2. How does the Marine Corps supply mission essential materials to its expeditionary forces once deployed?

The Marine Corps provides mission essential materials to its expeditionary forces through many methods. This research identified that the time criticality of essential materials determined the method by which they were delivered. Aviation assets were used where materials were most time critical. Ground assets were used when large quantities were required. It became obvious that no two situations were the same and the local logisticians used sound judgment when deciding the methods used for support.

3. How does the Marine Corps incorporate contingency operations into its expeditionary logistics planning?

Throughout this thesis research it became evident that aviation assets are heavily relied upon for contingency operations. The flexible nature of their employment was the reasoning for this. However, this reliance on aviation to handle difficult contingency operations limits the other capabilities that aviation can provide.

4. How can the Marine Corps improve its expeditionary logistical efforts?

The Marine Corps can improve its expeditionary logistical efforts in many ways. The key element to an expeditionary operation is communication. This research highlighted that communication is also a central place where improvements can be made.

The transition to data systems over the previous decade have started to address communication issues, but further advancements and improvements are required to solve the communication problems that occur when the U.S. Marine Corps deploys to foreign lands.

5. What tools utilized during recent operations proved most useful to facilitate expeditionary operation?

There are numerous answers to this question. Every respondent within this study had differing views on what assets provided what utility. It seems evident that this question is completely situational and that any difference in the problems faced leads to a different answer. Many systems within the Marine Corps were highlighted as the most useful. This led to the belief that the most useful tool to conduct expeditionary operations is a large set of options to address the problem. The unique structure of the U.S. Marine Corps provides it organic assets not present in the other U.S. Services. This structure provides the U.S. Marine on the ground the option of many differing methods to conduct expeditionary logistics.

B. RECOMMENDATIONS

Through this research several best practices and shortfalls have been identified. Additionally, this research is limited in scope. For this reason there are numerous areas that require further research to occur in order to gain better understanding of expeditionary logistics. These issues will be identified and recommendations will be made in order to improve the manner in which the Marine Corps conducts expeditionary logistics.

1. Update Doctrine

Doctrine surrounding expeditionary logistics needs to be updating. Many years have passed since the last revisions have occurred to many of the logistics publications within the Marine Corps. During this rewrite; attention should be given to tying the phase of an operation to how expeditionary logistics are conducted. Additionally, the rewritten doctrine should address expeditionary logistics from the tactical, operational and strategic levels of warfare. A move towards several technology-based control systems within

logistics; requires that doctrine be written that involves the use and methodology that these systems use, replace, and assist. Additionally, doctrine must be written dictating the proper use of these systems in order to maximize their utility. Training for expeditionary logistics must be improved, centering on the tactical level of logistics during initial MOS training and shifting focus toward the operational level at high-level schools like IMLOC.

2. Develop a USMC Logistics Practices Handbook

Many different types of expeditionary operations are identified in this thesis. The methods used to logistically support the individual types of expeditionary operations should be captured. Once these methods are standardized a best practices handbook should be constructed to aid junior logistics officers on the differing methods available to support the differing types of operations. This handbook should provide ideas and methods to accomplish difficult expeditionary logistics tasks. The handbook will help standardize the methods used to conduct expeditionary operation support and will eventually aid in improving efficiency.

3. Minimize Wasteful Logistics Practices during the Sustained Phase of Operations

This thesis did not focus on the cost savings available in expeditionary logistics; however, the methods used by the Marine Corps are wasteful in many areas. In both the initial and retrograde phases of an expeditionary operation, logistics officers are encouraged to push supplies forward to immediately improve the effectiveness of those forces. This wasteful practice is, however, considered important and necessary to the goals of the operation. However, savings could occur in the sustained phase of operations. Wasteful practices often continue throughout the entirety of an operation. This lack of a shift in methodologies during the sustained phase of an operation is extremely wasteful. While the continued push of supplies during this phase of operation remains effective it is also unnecessarily wasteful and expensive. Additionally, the continued push of supplies through the sustained phase operations builds supply stocks where they will ultimately will never be used and must either be shipped out or abandoned.

The phasing approach discussed within this analysis could be used to develop a phased approach to expeditionary logistical support. Further research is required to identify cost savings that could be realized during the sustainment phase of operations. If logistics officers were given understanding and control of costs at the lowest tactical level, less waste would occur during the sustained phase. Additionally, evaluations of their performance should include a measure of wasted resources at the conclusion of an operation in order to minimize the waste of resources. This problem of wasted resources could also be addressed by tying personnel directly to decisions they have made. Care must be given with any change to the evaluation criteria so it does not hinder the distribution of needed supplies during the initial and retrograde phases of an operation. Any control system that is used during an operation must facilitate the transfer of supplies when needed and not hinder their use.

4. Integrate Strategic Asset Planning at the Lowest Level

Integration of strategic assets into expeditionary operation planning is essential to operational success. Planning for these strategic assets should be integrated at the lowest level to facilitate the meeting of unit mission requirements. While these assets are normally available during the initial phase and retrograde of an operation, joint planning and usage must be maximized in order to maximize the utility that these assets can provide. Further training with these assets is also required to ensure their effective employment. Additional research is required to identify methods that could quantify and maximize the utility these assets provide.

5. Improve Field Testing of All New Data Systems

All new system should be beta tested prior to fielding to ensure that the systems bandwidth requirements are achievable during combat operations. Further, systems must be tested to ensure that different systems work seamlessly together. Training and education on these systems must be formalized in order for the systems to be used effectively. Many of the recently procured systems require greater bandwidth then is available in expeditionary situations. This lack of bandwidth is best addressed by developing systems that require less data transfer.

C. CONCLUSION

This research thesis explored the conduct of expeditionary logistics by the U.S. Marine Corps. The U.S. Marine Corps conducts expeditionary logistics through many methods. This thesis, while limited in scope, has identified many of methods that the Marine Corps employs. Several of these methods were explored in this thesis through a hypothetical scenario-based case study.

This research has provided a starting point to better refine these methods. The research began by providing the U.S. Marine Corps definition of expeditionary logistics. This definition provides understanding to the scope at which the U.S. Marine Corps performs expeditionary logistics. Within the research, effort was made to refine the understanding and phasing of events as they occur in an expeditionary operation. This research identified that the methods of expeditionary logistics employed change during the differing phases of an expeditionary operation. These changing phases were found to have profound impact on the methods and resources employed.

Ultimately, this research should lead to better logistics support and reduce overall costs. The potential benefits of improving our logistical support are limitless and every effort should be devoted to a better understanding of the problems surrounding the conduct of expeditionary logistics. With the constrained military spending in the current environment it is essential that the U.S. Marine Corps maximizes the potential of all of its logistical capabilities. Additionally, the U.S. Marine Corps should provide a model for the other services to follow as the United States' experts in expeditionary operations.

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