SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED

1b. RESTRICTIVE MARKINGS

2a. [illegible]

2b.

AD-A279 558

DTIC ELECTE 1994 D

3. DISTRIBUTION/AVAILABILITY OF REPORT
DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

4. [illegible]

5. MONITORING ORGANIZATION REPORT NUMBER(S)

6a. NAME OF PERFORMING ORGANIZATION: OPERATIONS DEPARTMENT

6b. OFFICE SYMBOL (If applicable): C

7a. NAME OF MONITORING ORGANIZATION

6c. ADDRESS (City, State, and ZIP Code): NAVAL WAR COLLEGE, NEWPORT, R.I. 02841

7b. ADDRESS (City, State, and ZIP Code)

8a. NAME OF FUNDING/SPONSORING ORGANIZATION

8b. OFFICE SYMBOL (If applicable)

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
FROM SILLY PUTTY TO SUPER GLUE: OPERATIONAL LOGISTICS (U)

12. PERSONAL AUTHOR(S)
Barnd, Daniel J. Major, USMC

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
FINAL	FROM _____ TO _____	8 FEB 94	27

16. SUPPLEMENTARY NOTATION: A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Operational Logistics, Sustainment, Requirements Determination, Distribution

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Silly putty is analogous to operational logistics where unique characteristics are mixed or matched resulting in a viable support concept. This paper identifies the elements necessary for the transition from a flexible concept to a coherent attachment of strategy and logistics. The elements and characteristics of the silly putty are defined by the logistics characteristics of requirements determination, sustainment and distribution. Review of World War II and Desert Storm logistics lessons learned emphasize the importance of the transition from silly putty to super glue. To ensure that the logistics process progresses from silly putty to super glue, assignment of responsibilities, coordination and establishment of supply data bases are recommended. The review and evaluation of requirements determination, sustainment and distribution are the basis for operational planning in a theater of war. The manipulation and resiliency achieved by the application of operational logistics, via the logistics plan, is the super glue that joins strategy to logistics and ensures success.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION: UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL: CHAIRMAN, OPERATIONS DEPARTMENT

22b. TELEPHONE (Include Area Code): 841-3414

22c. OFFICE SYMBOL: C

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

* U.S. Government Printing Office: 1988—438-612

UNCLASSIFIED

NAVAL WAR COLLEGE
Newport, R.I.

FROM SILLY PUTTY TO SUPER GLUE: OPERATIONAL LOGISTICS

by

Daniel J. Barnd

Major, US Marine Corps

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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17 June 1994

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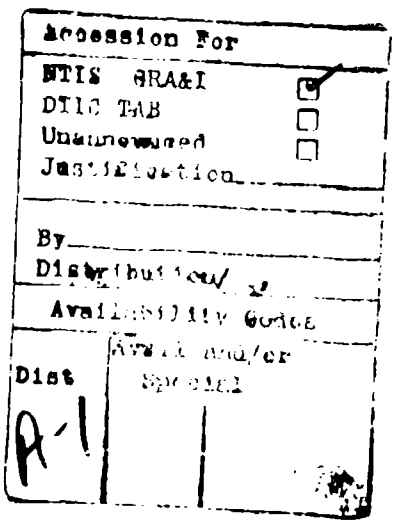
Paul J St Laurent 2 FEB 1994
Faculty Research Advisor Date

Abstract of
FROM SILLY PUTTY TO SUPER GLUE: OPERATIONAL LOGISTICS

Silly putty is analogous to operational logistics where unique characteristics are mixed or matched resulting in a viable support concept. This paper identifies and defines the elements necessary for the transition from a flexible concept to a coherent attachment of strategy and logistics. The elements and characteristics of the silly putty are defined by the logistics characteristics of requirements determination, sustainment and distribution. Review of World War II and Desert Storm logistics lessons learned emphasize the importance of the transition from silly putty to super glue. To ensure that the logistics process progresses from silly putty to super glue, assignment of responsibilities, coordination and establishment of supply data bases are recommended. The review and evaluation of requirements determination, sustainment and distribution are the basis for operational planning in a theater of war. The manipulation and resiliency achieved by the application of operational logistics, via the logistics plan, is the super glue that joins strategy to logistics and ensures success.



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FROM SILLY PUTTY TO SUPER GLUE: OPERATIONAL LOGISTICS

CHAPTER I

INTRODUCTION

There is no dictionary or standard definition for either silly putty or super glue - just a knowledge based on experience and the unique characteristics and functions of each substance. For instance, one would not use silly putty in place of super glue nor would one provide super glue to someone who has not mastered silly putty. This is analogous to operational logistics where unique characteristics are mixed or matched resulting in a viable support concept that ensures success.

The Random House College Dictionary provides the definitions for putty and glue, that when combined with their characteristics provide the framework necessary to understand the dynamic process of operational logistics.

TABLE I
COMBINATION TABLE

TERM	DEFINITION	CHARACTERISTICS
PUTTY	Combination of various substances used to patch or secure.	*Pliant *Reusable *More is better
Glue	To join or attach firmly; make adhere closely.	*Inexpensive *Strong *Small amounts

To be effective, the operational commander must successfully transition from silly putty to super glue in planning operational logistics.

The purpose of this paper is to identify those logistic characteristics that form and compose the silly putty and provide the super glue for the operational commander to be successful. To do this, I will define operational art and how it is related to operational logistics, and define the elements necessary for the transition from a flexible concept to a coherent attachment of strategy and logistics. Once a common basis of understanding is achieved, I will review a recurring logistic problem from World War II and Desert Storm in context of this analogy. Finally, I will offer some recommendations that will allow the operational commander to transition from silly putty to super glue.

CHAPTER II

OPERATIONAL ART AND OPERATIONAL LOGISTICS

Military art can be divided into tactical, operational and strategic levels. Tactics deals with battles and engagements, planned and executed to accomplish military objectives. Strategy deals with national or alliance objectives that support the aims of policy and uses national resources for their achievement.[1] The operational level of war, or operational art, is subordinate to strategy but above the level of tactics. Joint Publication 0-1 defines the operational level of war as follows:

> "The operational level of war is the level at which campaigns and major operations are planned, conducted and sustained to accomplish strategic objectives within theaters or areas of operations. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objective, sequencing events to achieve the operational objectives, initiating actions, and applying resources to cause and sustain these events. These activities imply a broader dimension of time and space than do tactics; they ensure the logistic and administrative support of tactical forces and provide the means by which tactical successes are exploited to achieve strategic objectives."[2]

Just as the levels of war can be divided into tactical, operational and strategic levels, so can logistics support be associated with the tactical (battlefield), the operational (theater), or the strategic (national) levels of war. In the practice of the operational art of war one can not discuss

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[1] Joint Pub 0-1, Basic National Defense Doctrine (Washington, DC: 7 May 1991), pp. IV-3 and IV-20.

[2] Ibid, p. IV-5.

strategy without including logistics. At the operational level much more so than at the tactical level, logistics may determine what is possible and what is not; "for a campaign plan that can not be logistically supported is not a plan at all, but simply an expression of fanciful wishes."[3]

Logistics influences strategy by affecting the composition, balance and deployment of combat forces in such a manner that adequate logistics can be a combat multiplier while inadequate logistics can be a war-stopper. Simply stated the art of operational logistics utilizes the resources supplied at the strategic level, usually through the industrial base and distributes them to the tactical commander in sufficient amounts to sustain combat forces in the conduct of military operations.

Operational art and operational logistics are mutually supporting based on the premise that operational art is the effective development and employment of military capability. Without a development infrastructure in place, new employment strategies will rarely achieve their full potential. The infrastructure facilitates a contributory process in which the appropriate course of action is selected that maximizes resources in order to accomplish the mission. The silly putty is formed by evaluating the logistic influences of requirements determination, sustainment, and distribution. The review and evaluation of the logistic influences result in a flexible logistics plan that

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[3] FMFM 1-1, Campaigning (Washington, DC: 25 January 1990), p. 78.

ensures maximum utilization of all resources provided to sustain the plan. This refinement and subsequent application of logistics is the super glue that joins strategy to logistics and ensures mission success during execution.

CHAPTER III

Silly Putty Substances

Our military challenge for the foreseeable future will be to deal with regional conflicts and contingencies that threaten US interests. The operational logistics challenges will be to maintain the ability to quickly deploy necessary forces to any part of the world and just as importantly to sustain those forces in a hostile environment at the end of a long line of communication. These challenges will have to be met within limited resources. Economies will have to be achieved through joint service acquisitions and cooperative logistic programs with allies. There will be more needs than there are resources, and we must continue to reduce the uncertainties of the future to determine where we can best spend our limited logistic dollars to maximize sustainment and minimize risk. Theater level logistics demands a group effort as the Commander in Chief (CINC) through the design of his theater campaign plan links the strategic aim with the tactical means of achieving that aim. This means that the joint task force commander as well as the ground component commander are operational level commanders who must plan those logistic actions to correspond with the priorities of the main effort and to concurrently support operational and tactical objectives. These actions must be in harmony with the CINC's intent. Every individual service component logistics planner must consider each area of Combat Service Support (CSS) - supply, transportation, maintenance, field services, medical support,

personnel - and weigh each area against force structure, operational status, capabilities, support-to-supported relationships, and deployment requirements. Many commodities and services are needed to support a campaign plan. Tradeoffs in one area may have adverse effects in other areas; solving a problem in one system may create a problem in another.

Logistics planners from the CINC's staff down to the tactical level must be willing and able to take the initiative to sustain the force within the commander's intent. Maintaining combat power allows the force to be agile. This power is maintained by quickly recognizing the need for and executing effective logistic plans to maintain the initiative. The operational logistician only takes these actions if he is viewing the battlefield throughout its depth, in time and resources, as well as in space. He must look ahead and always consider the commander's intent. Though the CINC decides to execute a campaign plan, it is only through the efforts of many staff elements and support units working in coordination that will effectively enable the mission to be accomplished. They must understand the commander's requirements and develop and rehearse responses to any anticipated logistical contingencies. Again, the more logistic staff planners who review the complexity and interdependent nature of support and continually interface with the operational planners, the better the flexibility in terms of options offered to the commander; thus the importance of the Logistics Estimate of the Situation. The silly putty remains

pliant throughout the group planning process and is used to secure the best course of action for the commander. The following factors define the substances that make up this silly putty and afford the opportunity to transition to the stronger, more effective super glue. The foundation of this product (super glue) of the operational logistics processes is a strong infrastructure that can respond to strategic direction which, ultimately, will serve the combat mission. In short it is the properly planned and timely logistic actions that sustain the fight and allow the CINC to execute offensive actions against the enemy and defeat him.

REQUIREMENTS DETERMINATION. Requirements determination is an essential process in supporting the combatant commander as Admiral Eccles described it:

> "The determination of requirements is the first step in the formulation of any logistic plan. It is a military responsibility and prerogative, and it is inextricably involved with strategy and tactics."[1]

Key to the creation and sustaining of military capability is the process of determining what will be required and when. It is aimed at computing, in some manner, a quantity of an item to be required for a specified period. The computation should include such factors as:

*quantity of initial issue of the item to using units.
*replacement rates.
*consumption statistics.
*storage quantities.

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[1].Henry E. Eccles, Operational Naval Logistics (Washington, DC: Bureau of Naval Personnel, 1950) p. 14.

*probable shipping losses.
*losses due to environment or weather.
*quantities in transit.
*procurement lead time.

These requirements are calculated in terms such as days of supply, days of ammunition, etc. Once the requirements are identified, they must be procured and provided by strategy. The operational commander depends on the economic capacity of the nation and available strategic mobility assets to provide his resources. It is the assurance at this point which will determine whether a CINC can assume he has the necessary logistical support needed to execute and sustain his offensive.

Volume 7 (Logistics), Joint Planning Document for FY 1996 through FY 2001 presents the joint logistic policy of the Chairman of the Joint Chiefs of Staff for determining the operational logistic requirements supporting National Military Strategy. It is this document that tasks all the services and Defense agencies to acquire and maintain sufficient materiel, support forces, lift and infrastructure to provide operational logistic support for two nearly simultaneous major regional contingencies (MRC's) and the unique capabilities required to maintain a deterrence posture, generate and execute strategic forces, and support other MRC's and global cooperative initiatives.[2] It is important to note here that this joint

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[2] U.S. Joint Chiefs of Staff, FY-1996 THROUGH FY 2001 JOINT PLANNING DOCUMENT, Volume 7 Logistics, (Washington, DC: 28 September 1993), p.1.

logistics policy in support of National Military Strategy not only focusses on materiel, but the forces, lift and infrastructure as well.

Each CINC determines logistic requirements based on his strategic concept and apportioned forces. Once the force is final, the CINC, through his service components, refines and forwards the logistic requirements to the Services for sourcing. Deficiencies are evaluated for inclusion on the CINC's Integrated Priority List and prioritized for Service consideration. The difficult area of analysis today is in the area of global cooperative initiatives. These are DoD missions which require actions across a wide spectrum of military operations ranging from nation building, humanitarian assistance, and disaster relief to peacekeeping, peace enforcement, and peace keeping with the intent of enhancing worldwide stability, promoting democratization, and furthering US global interests. [3]

The OPLANS of the Combatant Commanders and this aforementioned definition highlight the characteristics of silly putty. It is a combination of various substances where more is better. Simply stated, requirements determination requires all services to maximize joint and combined logistics cooperation in pursuit of interoperability in procedures, logistics command and control, and common support equipment. The next characteristic of

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[3] Ibid, p.1.

the silly putty, based on resource availability, provides the CINC with the capability to generate combat power.

SUSTAINMENT. The adequacy of an operational force's logistics is measured in terms of its ability to perform its sustainment functions and distribute supplies inherent with those functions. Basically, sustainment is the ability to maintain logistic support throughout an operation or campaign. Long-term support is the greatest challenge for the logistics planners, who must not only attain the minimum essential materiel levels to initiate combat operations but must also sustain these operations. The logistics planners must plan for and achieve logistics momentum. This momentum is related to the force's culminating point "...where the strength of the attacker no longer significantly exceeds that of the defender, and beyond which continued offensive operations risk overextension, counterattack and defeat."[4] Culmination occurs because "...the attacker must consume resources and commit forces as he moves into enemy territory."[5] The ability of the force to perform its sustainment functions is what most often determines when culmination occurs.

Five imperatives essential to sustainment operations as listed in FM 100-5, Operations, and key components of the putty are manning, arming, fueling, fixing, and moving the force. These

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[4] FM 100-5, Operations (Washington, DC: 14 June 1993) p. 6-8.

[5] Ibid, p. 6-8.

terms encompass a broad definition which implies that both personnel and weapons platforms are of little use without ammunition, fuel and spare parts; but equally there is little point in maintaining large stocks of these consumables if the forces to employ them are so weak , they will be overcome before the supplies can be used. These imperatives set the stage for critical decisions concerning the interface between operations and logistics within the theater. According to FM 100-5, Operations, these decisions concern the following: lines of support, staging, altering Lines of Communication (LOC), sustainment priorities, and force expansion. Lines of support link the sustainment base to the forward tactical units. Staging requires support bases to move forward to new locations as LOC's become overextended. Altering LOC's must be accomplished while simultaneously continuing support of combat forces. Sustainment priorities must be established to make the most efficient use of limited logistics assets. Finally, force expansion must occur at a balanced rate. The appropriate mix of combat, combat support, and combat service support units must maximize combat effectiveness.[6]

Such decisions are the basis for logistics planning in a theater of war. Each has a significant effect on how and how much the sustainment system delivers the means of conducting combat operations to the commander. Each, therefore, has a significant impact on the operational level commander's ability to generate

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[6] FM 100-5, pp. 12-5 - 12-9.

combat power at the decisive time and place. Once the operational commander obtains his resources, distribution of these resources to satisfy the needs of the tactical level occurs. The time involved in the distribution characteristic of the silly putty affects operational tempo, the ability to shift quickly from one event to another.

DISTRIBUTION. The heart of any theater logistic system is the transportation and distribution system. Distribution has several official meanings that vary from service to service as can be seen from the following definitions:

> [US ARMY] "The functional phase of logistics that embraces the dispensing of materiels, supplies, equipment, products or services, according to need, requisition, order,plans, etc. It includes the authorized delivery of such things."[7]
>
> [USAF] "System of facilities, installations, methods and procedures designed to receive, store, maintain, distribute and control the flow of military materiel between the point of reception into theater and the point of issue to using units."[8]
>
> [USMC] "Controlling and allocating supplies, assigning logistics personnel, and dispensing materiel, facilities and services."[9]

These definitions highlight the fact that distribution can not be exactly defined nor can it be thoroughly examined in a single category by itself. It implies that it is an umbrella for all

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[7] US Army, FM 100-16 Support Operations:Echelons Above Corps, (Washington, DC: 1985), p. Glossary-8.

[8] US Air Force Working Papers from the Supply Depot Consolidation Meeting held in Washington DC, January 1992.

[9] US Marine Corps, FMFM 4 Combat Service Support, (Washington, DC: 23 January 1987), p. 1-2.

logistical functional areas which in order to provide sustained combat power rely on the transportation and distribution system. The distribution system ranges from the continental United States base to the forward areas of the theater. Accordingly, the operational commander must be more the logistician than the tactician. As stated by General Walter Bedell Smith:

> "It is no great matter to change tactical plans in a hurry and to send troops off in new directions. But adjusting supply plans to the altered tactical scheme is more difficult."[10]

The goal of the distribution system should be to maximize the following key principles of logistics; responsiveness, attainability, and sustainability. Responsiveness is the keystone of the principles and is the support in the right place at the right time. It directly influences the operational reach of the CINC which may be thought of as the range at which a CINC can mass and employ forces decisively.[11] The essence of a campaign plan is the extension of the CINCs operational reach, while denying operational reach to the enemy. Responsiveness and operational reach can be influenced by the length, efficiency, and security of the lines of communication or the establishment of advance bases. Attainability is the ability to provide the minimum essential supplies and services required to begin combat

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[10] Henry E. Eccles, Logistics in the National Defense, (Harrisburg, PA: The Stackpole Company, 1959) p. 131.

[11] Joint Chiefs of Staff, Doctrine for Logistic Support of Joint Operations, Joint Pub 4-0 (Washington, DC: June 1990) p. III-4.

operations.[12] This principle demands that operational logistic planners provide special management actions that

> (1) provide instruction or guidance for redistributing assets from low to high priority organizations.
> (2) obtain assets from external sources with lower priority needs.
> (3) control the allocation of new assets in short supply.
> (4) ensure logistic coordination takes place to avoid bottlenecks at ports and airfields and with limited inland transportation.

These management actions ensure that the operational reach of the combat forces is not constrained. Sustainability is the ability to maintain logistic support throughout the operation. Sustainability requires some degree of redundancy and control measures that can adjust the flow of supplies and services in the pipeline to meet changing situations and requirements.

An effective distribution system will provide the right things to the right places, over the most expeditious routes, using the least number of vehicles and facilities. General Heiser, former Department of the Army, Deputy Chief of Staff for Logistics stated that distribution was a logistics imperative when "A theater commander must control the support forwarded to his theater as soon as he and his staff are in position. In other words, he must control what and how much arrives in the theater and where it will go and when."[13]

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[12] Ibid, p.IV-2.

[13] Donald M. Lauer, "Theater Logistics - A Combat Multiplier," Army Logistician, Nov/Dec 1992, p. 16.

CHAPTER IV

HISTORICAL PERSPECTIVE

I chose two conflicts that emphasize the recurring operational logistics problems represented by using super glue when silly putty was called for. These conflicts are World War II and Desert Storm. The following summary is provided to emphasize the recurring problem.

> "Our strategy in general was to hold the enemy at bay while gathering our strength for offensive action and then, because we were unable, either from the standpoint of human or material logistics, to attack and give priority to destruction of the enemy. The holding phase of our strategy included the procurement of all possible logistics material assistance from our allies, the securing of the lines of communications, and a preliminary offensive against the enemies logistic potential by bombing his industrial plant, disrupting his lines of communications and depriving him of raw materials. The second phase of our strategy was implemented only when our men were trained and we were able to bring to bear preponderant weight in material."[1]

This summary was for World War II; but, applies equally to Desert Storm. If any indisputable logistic lesson can be drawn from World War II, it is that in any major war no nation can emerge victorious without substantial and sustained superiority over its enemy in the quality and quantity of its weapons and logistics. [2]

Were the logistic lessons of World War II analyzed and implemented to maximize the operational logistics applied in

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[1] US Army, Logistics Summary of World War II, (Washington, DC: 1947) p.244.

[2] Ibid, p. 245.

modern warfare? The answer is both yes and no which is illustrated in the following table.

TABLE II

LESSONS LEARNED

WORLD WAR II	**DESERT STORM**
Wars can not be won without logistic superiority.	It is necessary to ensure sustainment stocks meet requirements.
Industrial and governmental mobilization planning must be complete and precise.	There is a need to identify and fund surge requirements.
We must be able to strike with full force and to maintain that force until victory is won.	(Prepositioned Equipment) Improvements in the types of equipment and consumables stores as well as increasing the quantities would improve force capabilities significantly.

Sources: WWII - Logistics in WWII, Final Report of the Army Service Forces, p. 252.
Desert Storm - Conduct of the Persian Gulf War: Final Report to Congress, pp. F-76 and F-77.

I believe that super glue was applied prematurely by each Service component determining what was needed without viewing the conflict in depth. By determining a prescribed level of support the difficult issue of war reserve stock utilization and theater support were relegated a low priority. The resiliency was further removed from the silly putty logistic characteristics by the following actions:

*Determination of requirements - each Service component did not view the battle in depth due to over reliance on the fact that each service is responsible for the logistics support of

only its component. This resulted in a lack of combined logistics coordination.

*Sustainment - Inadequate planning for secondary items and consumables again based on individual Service component calculations for fueling, fixing and moving the force.

*Distribution - Control of where the supplies would go was dictated by lack of inland transportation and materiel handling equipment assets.

**The sustainment and distribution factors define agility and momentum that assist in identifying objectives and lines of operation required to ensure timely and adequate logistic support for our combat forces or to deny it to the enemy.

The danger of applying super glue early in the logistics planning process is best stated by A. T. Mahan:

> "War can not be made a rule of thumb; and any attempt to make it so will result in disaster, grave in proportion to the gravity with which the issues of war are ever clothed."[3]

World War II emphasized that requirements determination could not be effectively made without operational planning being made known to logistics. The silly putty was removed from the package for Desert Storm; however, the resiliency of the putty was reduced by lack of emphasis on the characteristics of sustainment and distribution. This lack of resiliency emphasizes that operational logistics can not create or sustain the desired military capability at the end of a long line of communication unless it is included in cooperative and coordinated planning involving all the military services.

By not seeking a pliant, in-depth amount of silly putty the planners limited the capability to apply combat power. By utilizing super glue it dominated the when and where of battle

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[3] Henry E. Eccles, Logistics in the National Defense, (Harrisburg, PA: The Stackpole Company, 1959) p. 323.

and the duration of action necessary to achieve the culminating point.

CHAPTER V

CONCLUSIONS/RECOMMENDATIONS

Today's operational commander must remove the silly putty from the package and allow it to become pliant and flexible in an environment that seeks to maximize the silly putty characteristics. The putty or operational logistics planning, must be versatile and provide the ability to respond in tailored force packages to a wide range of requirements in multiple theaters worldwide. The more people that handle the putty the more resilient it becomes and when more people handle the putty, more can be added to increase the mass and momentum effects. By conducting detailed logistics planning a synergistic combination occurs which increases the CINC's operational reach. This extension is reached by achieving a superior sustainment level and distribution system which provides flexibility, agility and logistics momentum necessary to achieve the culminating point of victory. In short, operational logistics planning must be continuous, coordinated and performed concurrently with operational planning to lay the logistical foundation which is essential to the strategic exploitation of tactical success.

These recommendations are provided to ensure that the progression is from silly putty to super glue:

*Have the CINC or CJTF clearly assign support responsibilities.
*Ensure complete coordination between Service components.
*Substantiate that adequate resources are available to meet requirements.
*Establish a DoD database for supply usage data.

*Include the Defense Logistics Agency and the Federal Emergency Management Agency in planning conferences for sustainment and reconstitution efforts.

The final recommendation is controversial; but, based on operational reality. In order for the operational logistics planner to perform the first three recommendations, Joint Pub 5-00.2 stipulates the use of joint logistic centers, offices and boards. Based on the apparent lack and use of these measures during Desert Storm and subsequently Restore Hope, this final recommendation is provided:

*Position the J-4 as the senior advisor for operational logistics by giving him command authority over all logistics issues vice the present coordinating authority.

The review and evaluation of requirements determination, sustainment and distribution influences are the basis for operational logistics planning in a theater of war. The resiliency of the logistics characteristics of the silly putty help determine the appropriate mix of combat, combat support, and combat service support units. Additionally, each characteristic has a significant effect on how and how much the sustainment system delivers the means of conducting combat operations to the commander. Each, therefore, has a significant impact on the operational level commanders ability to generate combat power at the decisive time and place. By successful manipulation of the silly putty, the commander is able to generate logistics momentum and control the operational tempo necessary to maximize operational reach. This manipulation and resiliency achieved by the application of operational logistics, via the logistics plan, is the super glue that joins strategy to logistics and ensures success.

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