

Transformational Logistics within the Infantry Brigade Combat Team (IBCT): Solutions or Shell Game?

**A Monograph
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Abstract

Transformational Logistics within the Infantry Brigade Combat Team (IBCT): Solutions or Shell Game? by MAJ Guy M. Jones, US Army, 78.

The purpose of this monograph is to examine the logistical transportation gap in the tactical segment of the U.S. Army distribution system of the Infantry Brigade Combat Team (IBCT) and to provide recommendations for future capabilities and requirements necessary to reduce the current logistical transportation gap. The U.S. Army has struggled with logistical distribution at all levels since the Revolutionary War. This logistical distribution problem often leads to culmination or tactical pauses of an operation. The loss of capability or freedom of action due to logistics results from the inability to distribute supplies at the far end of the logistical supply chain, the last 1,000 yards. The Army historically has overcome logistical gaps by temporarily supplementing additional capabilities or resources to solve the immediate problem – essentially playing a shell game. As the Army transforms to a campaign quality force with an expeditionary capability, these shell games will no longer enable the desired effectiveness of the Modular Force. The methodology of this monograph consists of establishing critical components of the distribution gap through a historical lens and following these components through the transition of doctrine from the current Legacy Force to the emerging Modular Force. The identified critical components of the logistical transportation gap are transportation platforms, labor forces, and materiel handling equipment. The evaluation of these transportation pillars against the desired capabilities of the Modular Force forms the basis of the solution set required to address the logistical transportation gap. This monograph finds the IBCT's logistical transportation gap to be expanding not contracting under the emergent design of the Modular Force's logistical distribution system. To reverse this expansion process and bridge the logistical transportation gap, the proposed solution set incorporates changes across the spectrum of doctrine, organization, training, materiel, and personnel in terms of the identified transportation pillars. The solution set recommendations include providing separate transportation assets to fulfill the maneuver transportation requirement; reorganizing the existing logistical transportation assets into combat capable organizations; increasing the personnel in each organized transportation unit to supplement the requirement for a dedicated labor force; and adding commercially available materiel handling equipment to each reorganized transportation unit to eliminate the requirement for a large labor force. Additionally, this paper considers the potential risks and criticism of the solution set and the solution set's potential integration with other emerging concepts.

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CHAPTER ONE

INTRODUCTION

How often historically has a military culminated or reached the point at which it no longer had the capability to continue its current form of operations due to a lack of supplies?¹ At least from the perspective of the United States, this situation occurred in every major conflict since the Revolutionary War.² Most recently, the tactical pause or culmination of the ground offensive during Operation IRAQI FREEDOM (OIF) stemmed from a lack of supplies at the point of the spear. At least since World War II, these shortages at the tactical level were not a consequence of supply shortages at the operational or strategic level.

The loss of capability or freedom of action due to logistics results from the inability to distribute supplies to the far end of the logistical supply chain, the element that fuels the point of the spear. Why does this phenomenon continue to occur? Some scholars, such as Max Hastings in *Armageddon: The Battle for Germany 1944-1945*, attributed the lack of supplies at the front to a failure in logistical planning or execution at all levels. “An energetic and imaginative officer occupying the post [Allied logistic officer]...might have found ways to move fuel and supplies to the Allied spearheads in eastern France, to maintain the pace of their advance.”³ However, logistical incompetency cannot be the sole cause for logistical culmination in all cases. The Army consistently relies on the genius of individual officers to determine solutions for

¹ Joint Publication 1-02 defined culmination point as “the point at which a force no longer has the capability to continue its form of operations, offense or defense. In the offense, the point at which continuing the attack is no longer possible and the force must consider reverting to a defensive posture or attempting an operational pause. In the defense, the point at which counteroffensive action is no longer possible.” [Joint Chiefs of Staff, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* (12 April 2001, amended 31 August 2005).] FM 101-5 further identified possible contributing factors of culmination “such as combat power remaining, logistic support, weather, morale, and fatigue.” [U.S. Department of the Army, Field Manual 101-5-1, *Operational Terms and Graphics* (Washington, DC: Government Publishing, 30 September 1997), 1-43.]

² James A. Huston, *The Sinews of War* (Washington: Chief of Military History, United States Army, 1966), 699.

³ Max Hastings, *Armageddon: The Battle for Germany, 1944-1945* (New York, New York: Alfred A. Knopf, 2004), 25.

overcoming logistical obstacles instead of institutionally addressing and solving the problems of logistical distribution. In this respect, the Army historically has overcome logistical gaps by temporarily supplementing additional capabilities or resources to solve the immediate problem – essentially playing a shell game.⁴ With the on-going initiatives to transform the Army, the time has come to institutionally address and resolve the historical problem of distribution at the far end of the logistical supply chain.

The purpose of this monograph is to examine the logistical transportation gap in the tactical segment of the U.S. Army supply chain or distribution system of the Infantry Brigade Combat Team (IBCT) and to provide recommendations for future capabilities and requirements necessary to reduce the current distribution problem. The concluding recommendations will assist in driving the transformation of not only the IBCT but also the other two types of brigade combat teams (BCTs), the Army's core elements, toward an expeditionary force that possesses the required logistical capability to function effectively within the Joint Operating Environment (JOE).

The Army's transformation focus is toward creating an expeditionary force with a "reduced logistical footprint."⁵ The expeditionary quality describes the ability to project military force rapidly and immediately within austere areas normally controlled or influenced by the adversary. General Peter J. Schoomaker, the Army Chief of Staff, attributed the expeditionary quality to more than just speed and duration. He stated, "The uncertainty as to where we must

⁴ The term shell game generally describes a situation in which conspicuous actions are a means taken to cover up deception. For example, the methods used by Enron and Worldcom in their accounting scandals were described as a shell game. The term here simply illustrates that the military often shuffles resources around to subvert the requirement to ask for more assets or openly acknowledge they lack the correct resources.

⁵ U.S. Department of the Army, United States Army White Paper, *Concepts of the Objective Force* (Washington, DC: US Government Printing Office, [No date]), 15. Various nuanced definitions of this term exist. Most sources attribute it to a physical size reduction not a structural or spatial distribution of resources. Technology is the enabler to achieve this quality. They "seek to reduce the physical size and the consumption rates...to produce systems that are more powerful but consume less fuel." [Mark J. O'Konski, "Revolution in Military Logistics: An Overview," *Army Logistician*, Jan-Feb 1999, <http://www.almc.mil/alog/issues/JanFeb99/MS20364.htm> on 3/11/2005.]

deploy, the probability of a very austere operational environment, and the requirement to fight on arrival throughout the battlefield pose an entirely different challenge [from those challenges faced during the Cold War] – and the fundamental distinction of expeditionary operations.”⁶

The logistical characteristics or capabilities required to support the expeditionary concept “include the requirement to support from a distance, to deal with severe austerity, to adapt to the environment and to ensure advantage by seeking innovation.”⁷ These required capabilities logically lead to the concept of modular force packages but not necessarily to the concept of smaller logistical packages or a smaller support structure. However, Secretary of Defense Donald Rumsfeld amplified his belief on numerous occasions that better technology can allow smaller, faster forces to achieve decisive victory over our adversaries through efficiency not effectiveness.⁸ Ryan Henry, the Pentagon’s principle undersecretary for policy, stated, “Speed has a value all its own. It allows you to operate when the enemy is off-balance so you can do more with less.”⁹

The focus on a smaller or reduced logistical footprint hinders once again the ability of the Army to recognize and solve its logistical transportation gap in the supply chain. One can easily argue that the Army is following its historical pattern or institutional logic of dealing with the transformation dichotomy between efficiency and effectiveness by reducing the size of force employed to achieve speed. Traditionally, these force reductions come from the logistical functions or capabilities. Does the Army really want to define logistical transformation by a “reduced logistical footprint” where “not enough trucks, mechanics, fuelers, medics, and more”

⁶ Peter J. Schoomaker, “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities,” (Washington, D.C.: 108th Congress, House Arms Services Committee, 2004), 6. Available [Online] [http://www.house.gov/hasc/openingstatementsandpressrelease/108th congress/04-07-21schoomaker.pdf](http://www.house.gov/hasc/openingstatementsandpressrelease/108th_congress/04-07-21schoomaker.pdf).

⁷ Victor Maccagnan, Jr., “Logistics Transformation-Restarting a Stalled Process,” Monograph, Strategic Studies Institute, January 2005, 32.

⁸ Greg Jaffe, “Rumsfeld’s Push For Speed Fuels Pentagon Dissent,” *Wall Street Journal*, 16 May 2005, p 1. Available [Online] <https://www.us.army.mil/suite/earlybird/May2005/e20050516368688.html> on 5/17/05.

⁹ *Ibid.*, 1.

may achieve speed and efficiency, or should the Army seek an effective logistical structure that has the capability to adapt to the rapidly changing and uncertain environment envisioned for the expeditionary force regardless of speed?¹⁰

The difference between effectiveness and efficiency is a touchstone of this paper. Efficiency is the ability to accomplish tasks with fewer assets, thereby conserving resources.¹¹ Efficiency normally has an inverse relationship to effectiveness.¹² Effectiveness is the ability to produce the desired effect or result. Ideally, leaders seek a balance between these qualities to produce the desired quality of effect with the least amount of resources possible. The key for the military, unlike the business community, is the ability to react rapidly to the changing environment. If too few resources are available and the situation changes, the inability to apply additional resources will not just reduce effectiveness but may have catastrophic results like the loss of soldiers' lives, failed missions, and even the potential loss of a war. General Schoomaker reinforced effectiveness as the Army's focus. Additionally, he provided the level at which transformation efforts must concentrate to achieve the desired effectiveness. "The premium now is on employed combined-arms effectiveness at lower levels vice efficiency at macro levels."¹³ The effectiveness of sought capabilities lies in the "self-sufficiency of brigade combat teams...to

¹⁰ Steven Eden, "What They Don't Teach You at Leavenworth," *Army Magazine*, July 2003. Available [Online] <http://www.ausa.org/www/armymag.nsf> on 5/19/05.

¹¹ For the last several years, the Army pushed the application of "good business" practices to achieve efficiency within the logistical system. The theory of modeling the Army's logistical system exactly like Wal-Mart's fails when placed into the reality of the context and complex conditions in which the military logistical system operates. Also, focusing on efficiencies at the strategic level where dollars are big does not contribute to the effectiveness at the operational and tactical level. The lower level is where the risk of efficiency becomes reality in the form of soldiers' lives, failed missions, and even the potential loss of a war.

¹² Frederick W. Kagan, U.S. Military Academy at West Point, stated that there is an inverse relationship between efficiency and effectiveness during the recent AEI Conference on the Future of the United State Army in Washington, DC. [Rich Dunn, *Rich Dunn's Circulating Notes*, notes from American Enterprise Institute for Public Policy Research (AEI) Conference on the Future of the United State Army, Washington, DC, 11 April 2005, http://www.thedonovan.com/archives/historystuff/AEI_Future_of_the_Army_Conf_Dunns_Notes_4_11_05.pdf on 5/20/05.]

¹³ Schoomaker, 10.

deploy rapidly and fight on arrival.”¹⁴ Therefore, the implied task for logistical transformation is logistical effectiveness at the end of the supply chain to enable brigade combat teams at the point of the spear, not logistical efficiency along the strategic or operational end of the supply chain.

Since the end of the Cold War in 1989, the Army has struggled to achieve the required effectiveness through changes in the overall force structure. To accomplish this end state, the Army sought a modular structure with the BCT as its base or core element. These core elements must be able to conduct full-spectrum operations in a non-contiguous environment while maintaining the ability to be logistically self-sustaining on the battlefield. General Schoomaker identified the key principles for achieving these capabilities as “diversity and adaptability.”¹⁵

The Army’s logistical vision to achieve these key principles lies in the concepts of focused logistics or distribution-based logistics. Focused logistics encompasses the ability to ensure the right commodities are at the right place, at the right time, in the right quantities and in the right configuration with a minimal logistics footprint.¹⁶ This term morphed into what the Army called the distribution-based logistics system in the *Army Logistics: Delivering Materiel Readiness to the Army, Revised*. This logistics publication defined distribution-based logistics as “a system that delivers rapid and precise support when it is needed, [which] must guarantee delivery on time, every time.”¹⁷

Despite these grand concepts, the current logistical transformation focus avoids the reoccurring problems in the tactical level resupply system, and merely shifts the responsibility for

¹⁴ Ibid., 11.

¹⁵ Ibid., 10.

¹⁶ Victor Maccagnan stated, “Whether termed inventory in motion, just-in time logistics, distribution-based logistics, precision logistics, or sense and respond logistics, the concept seeks to leverage select technologies, primarily digital communications and network systems, to reduce the necessity to stockpile resources to meet demands.” [Victor Maccagnan, Jr., “Logistics Transformation-Restarting a Stalled Process,” Monograph, Strategic Studies Institute, January 2005, 18.]

¹⁷ U.S. Department of the Army, *Army Logistics: Delivering Materiel Readiness to the Army, Revised* (Washington, DC: US Government Printing Office, April 2005), 6. Available [Online] [http://www.hqda.army.mil/logweb/UpdatedCombinedpaper.pdf on 9/14/05](http://www.hqda.army.mil/logweb/UpdatedCombinedpaper.pdf%20on%209/14/05). This article also outlines the following key components as critical to the system’s success: total situational visibility or Total Asset Visibility (TAV), modernized delivery platforms, and integrated distribution process.

achieving diversity and adaptability to the “genius” logisticians at “the far end of the [supply] line.”¹⁸ Failure to identify and address this historical problem as an institution will only promulgate the vulnerability of culmination prior to achieving tactical, operational, or even strategic objectives. “Executing logistics by discovery and serendipity is irresponsible and will lead to failure,” according to Maccagnan, another proponent of focusing logistical transformation on the problems residing within the logistical supply chain.¹⁹ Achieving diversity and adaptability at the point of the spear may require stockpiles of resources, which means larger logistical footprints and lower efficiency.

The real question and the focus of this monograph remains: Can these core units, specifically the IBCT, actually bridge the historic logistical transportation gap of the Army’s supply chain and provide supplies to the end-user to prevent culmination in an operational plan under the current modular design and doctrine? James Huston, a renowned historian, stated, “Whenever shortages of supplies or equipment have appeared at the battle front, from the Revolutionary War to the Korean War, more often than not it has been the result of some shortage in transportation somewhere along the line.”²⁰ The term transportation is broader than the composite of air, ground, and sea movement platforms. Transportation refers to the overall physical means required to move an item along the supply line. The primary elements of transportation that enable the military supply chain are transportation platforms, labor forces, and materiel handling equipment (MHE). Though other critical transportation enablers exist, this monograph only considers these in the research, analysis, and development of recommendations.

The method for examination of the logistic transportation gap was with respect to historical examples, existing doctrinal capabilities and principles, and finally, the desired doctrinal capabilities of the Modular Force. The historical perspective reviewed select combat

¹⁸ Huston, 670.

¹⁹ Maccagnan, 19.

²⁰ Huston, 699.

operations involving the United States military since World War I. The historical analysis verified the associated or causal link between transportation platforms, labor forces, and materiel handling equipment with the logistical transportation gap in the inland or tactical distribution systems. The historical perspective was not limited strictly to light forces, which mirror the structure of the IBCT. Consideration of both light and heavy military forces allowed comparison between design structure and capabilities, since heavy forces appear to possess the ability to conduct self-sustainment operations.

A review and analysis of United States Army doctrine, past and present, identified the organizational level changes desired through transformation that affect the associated or causal link between transportation platforms, labor forces, and material handling equipment. The organizational analysis illustrated capability shortfalls not previously addressed in doctrine and capability shortfalls that may prevent the modular structure from achieving the envisioned capability. The doctrine review focused on desired capabilities, the logistic structure designed to achieve these capabilities, and the assumptions used in developing or employing these capabilities.

The final methodical step was the analysis of the capability shortfalls within transportation platforms, labor forces, and materiel handling equipment that may prevent the Modular Force from achieving the envisioned capability. The recommended solutions link the identified shortfalls that perpetuate the logistic transportation gap to the current modular doctrine and consider second and third order effects of the solutions on transformation. Additionally, the effectiveness of desired capabilities is the focus of the proposed solution set.

The presentation of the research, analysis, and recommendations follows the methodology used to investigate the problem. The chapters of this paper consider the historical precedence of the problem, the past and present doctrinal principles used to deal with the problem, and the potential solutions and impacts to the problem. The historical presentation solidifies the problem and verifies the criticality of transportation platforms, labor forces, and

materiel handling equipment. This chapter focuses on what caused logistical transportation gaps of the past and why these gaps were not fixed.

The doctrinal analysis section, Chapter 3, presents how current doctrine addresses the historical causes of the transportation gap in the light force followed by the considerations of the same gaps within the emerging or modular doctrine. The struggle between the dichotomy of efficiency and effectiveness becomes clear through the comparison of stated doctrinal capabilities. The comparison of doctrinal capabilities also establishes the basis of requirements for any solution set. This section concludes by addressing the modular initiatives that expand the logistical gap versus reduce it.

Chapter 4 covers recommended solutions based on the holistic analysis of the problem. The presentation of the solution set is in terms of transportation platforms, labor forces, and materiel handling equipment modifications or requirements within the framework of an operational concept proposal. The impact of these recommendations on the Army's transformation process provides critical information on potential second and third order effects or costs that are associated with the recommendations. Not all recommendations may be acceptable based on the current political, economic, or military situation. This decision falls to the senior leaders of the U.S. military and political institutions.

Finally, Chapter 5 links all the key points back to the defining question of the monograph: Can these core units, specifically the IBCT, actually bridge the historic logistical transportation gap of the Army's supply chain and provide supplies to the end-user to prevent culmination in an operational plan under the current modular design and doctrine? However, the final answer to the question lies at the feet of U.S. senior military and political leaders. Will they choose to fix the age-old problem by implementing real solutions or choose to continue the current shell game?

CHAPTER TWO

HISTORICAL PERSPECTIVE – GETTING THE PROBLEM RIGHT

Is it possible to convert the theory of a “reduced logistical footprint,” as envisioned by the Secretary of Defense and senior leader of the United States Army, into a reality through the current transformation plan? Because the Army’s transformation road map centers on the strategic and operational expeditionary capability, the logistical transformation focus is on the communication zone’s lines of communication, not the growing length of the tactical level’s lines of communication. The current logistical transformation focus avoids the primary problems of tactical level resupply, which do not have easy solutions, and merely shifts the sustainment issues “to the far end of the [supply] line.”²¹

How is this transformational logistics focus different from the Army’s attempted logistical reductions prior to World War II? Traditionally, armies neglect the logistical structure in peace and relegates it to the last structure mobilized in times of conflict. However, the Modular Force focus is not one of logistical neglect but potentially the elimination of “a lot of fat, idle, useless support weenies.”²² Even the Soviet Army understood the necessity of combat support structures and their impact on combat maneuver structures. Marshal Grechko, former Soviet Minister of Defense known for his modernization of the Soviet Army, stated, “War may begin, but without a well prepared rear, without precise and comprehensive rear support, it would end sadly a few days later. That is why we must make every effort to see that the Soviet Armed Forces Rear Services are always combat ready as the forces they are supporting.”²³

²¹ James A. Huston, *The Sinews of War* (Washington: Chief of Military History, United States Army, 1966), 670.

²² Steven Eden, “What They Don’t Teach You at Leavenworth,” *Army Magazine*, July 2003, <http://www.ausa.org/www/armymag.nsf> on 5/19/05.

²³ C. N. Donnelly, “The Sustainability of the Soviet Army in Battle,” Soviet Studies Research Centre The Royal Military Academy Sandhurst, paper C53, 198; quoted in Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict* (London, United Kingdom: Brassey’s, 1991), 289.

What is the value of a historical perspective to a problem? First, history provides a glimpse of how predecessors coped with problems and difficulties, either successfully or unsuccessfully. This glimpse offers potential guidelines or a framework for handling similar problems now or in the future under similar circumstances. Eminent historian, Williamson Murray, in his *The Dynamics of Military Revolution 1300-2050* stated, “History remains the only guide both to the present and to the range of alternatives for the future.”²⁴ However, history is not a predictive tool of the future. It merely allows for education from previous flaws or triumphs. Second, historical perspectives may yield lessons of “direct applicability.” James Huston, another distinguished historian, believed that these direct lessons “often go unrecognized and unheeded, and sometimes are deliberately ignored – presumably on the naïve assumption that this time everything is different.”²⁵ Do the circumstances that created a weakness or flaw still exist? Lastly, history enables the judgment of ideas, theories, policies, procedures, and doctrine. History does not prove theories and ideas to be true. Instead, history provides a factual basis to compare potential success or failure of new or imaginative concepts.

More importantly, how did a historical perspective inform or contribute to the present endeavor of examining the logistical transportation gap in the tactical segment of the U.S. Army supply chain and providing recommendation for future capabilities and requirements? Historically, what made the last 1,000 yards logistically hard?²⁶ This chapter illustrates the validity of using transportation platforms, labor forces, and material handling equipment as the guidelines or intellectual framework pillars to investigate the logistical transportation gap of the inland or tactical distribution systems.

²⁴ MacGregor Knox and Williamson Murray, eds., *The Dynamics of Military Revolution 1300-2050* (Cambridge, United Kingdom: Cambridge University Press, 2001), 176.

²⁵ Huston, ix.

²⁶ The term “last 1,000 yards” merely refers to the termination end of the supply chain. Each operation or situation involving a logistical system is different. Therefore, the logistical system may terminate right below the tactical distribution center, or it may terminate right below the operational level or theater distribution center.

This framework also yields several direct historical lessons that have gone unheeded for a variety of reason but continually resurface conflict after conflict. Martin Van Creveld in *Supplying War: Logistics from Wallenstein to Patton* clearly portrayed this oversight. “On the pages of military history books, armies frequently seem capable of moving in any direction at almost any speed and to almost any distance...[but] in reality, they cannot, and failure to take cognizance of the fact has probably lead to many more campaigns being ruined than ever were by enemy action.”²⁷ Finally, the historical perspective provides the basis to evaluate the recommendations to close the logistical gaps presented in Chapter Four of this paper. To enable this base of knowledge for evaluation fully, the presented historical accounts were not limited to light force structures, which mirror the structure of the Infantry Brigade Combat Team (IBCT). Instead, the historical accounts considered both light and heavy military force structures to enable comparison between design structures and capabilities.

Numerous historical examples exist as far back as the American Civil War that illustrate the chosen framework, provide direct lessons not heeded, and offer a wide base for comparison.²⁸ However, this paper used only select historical examples of the available combat operations involving the United States since World War I. The selected examples best support the chosen framework of analysis. These examples clearly illustrate gaps in the United States’ logistical structure capability that facilitated or created both operational and tactical culmination. Other examples may exist that illustrate a different conclusion, but those are beyond the scope of this paper.

This chapter discusses each of the three framework pillars of transportation separately. The framework pillars of transportation are transportation platforms, labor forces, and material handling equipment. Historical cases supporting each pillar are chronological within the

²⁷ Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (New York, New York: Cambridge University Press, 1977), 2.

²⁸ The best sources of other logistics historical examples are James Huston’s *The Sinews of War: Army Logistics 1775-1953* and Charles Shreader’s *United States Army Logistics 1775-1992*.

respective framework section. The same historical case or event may illustrate more than one pillar. If so, it appears in multiple sections of the selected intellectual framework. Additionally, this chapter concludes with a perspective on why these historic logistical transportation gaps still exist. Has this problem continued to surface, because the culture of the Army ignores logistical constraints in force design or doctrine? Do the gaps still exist because they go unrecognized and unheeded based on the assumption that previous failures in the supply chain were isolated incidents or apparitions?

Transportation Platforms

James Huston stated clearly the common cause for the tactical logistics gap in the last 1,000 yards. “In World War I, as in most wars, the chief logistical limitation on the military effort was transportation.”²⁹ The strategic transportation of supplies across the Atlantic Ocean in this conflict was not the limiting factor. Instead, the inland or tactical transportation system could not keep pace with the arrival rate of materiel.³⁰ Thankfully in one respect, victory prevented this inland shortage potential, which “involved shortages for everyone concerned – in food supply for the Allied population, in munitions for their armies, and in supplies for the AEF,” from reaching a strategic culmination point.³¹ However, victory also obscured this critical gap in the logistical system due to a “decline to a slough of indifference” that follows conflict only to be faced again as “a new national emergency should once more call forth the waves of progress.”³²

Similarly in the Pacific Theater of World War II, the tactical logistical gap dealt with inland transportation. However, the logistical supply chain gap occurred on beaches. Transportation planning and resourcing failures at the operational and tactical levels created

²⁹ Huston, 354.

³⁰ Ibid.

³¹ Ibid., 355.

³² Ibid., 252.

supply problems on the beaches of Guadalcanal and Okinawa.³³ These failures prevented the supplies, which naval transports brought ashore, from reaching the soldiers at the requirement end of the supply chain. Unloading supplies from transport ships on the shore and subsequently reloading the same supplies on limited inland transportation platforms required intense manual labor forces, which were generally fighting soldiers. In many cases when the beaches and trails could not support vehicles, the inland transportation platforms became the fighting soldier instead of mechanized or motorized transport.

On the Western Front of World War II, the unloading capacity at the ports and local transportation beyond the ports, or inland transportation system, were also the greatest logistical problems.³⁴ One temporary solution to this transportation problem led to the creation of the Red Ball Express. The Red Ball Express was an ad hoc organization. Created to move supplies from the beaches of Normandy to the culminated units on the German border in World War II, these organizations successfully bridged the logistical transportation gap temporarily. Luckily, the transportation platforms in these ad hoc organizations were available in theater. “The trucks used in the Red Ball Express would not have been available had not a truck buildup been occurring in England in preparation for the reopening of the Burma Road in the Pacific theater.”³⁵ Once again, the transportation gap that created difficulties in the last 1,000 yards of the supply chain was not recognized or resolved following World War II.

The Korean War illustrated an even further shift of the inland transportation gap towards the end of the supply chain. Task Force Faith, a composite element of the 7th Infantry Division that operated on the east side of the Chosin Reservoir in 1950, required extensive re-enforcement

³³ Recommend Charles R. Anderson’s *Guadalcanal* [The US Army Campaigns of World War II, Center of Military History (CMH) Publication 72-78. Washington, DC: US Army Center of Military History, undated]. For further study on Guadalcanal, and for further study on Okinawa, recommend Arnold G. Fisch’s *Ryukyus* [The US Army Campaigns of World War II, Center of Military History (CMH) Publication 72-35. Washington, DC: US Army Center of Military History, undated].

³⁴ Huston, 673.

³⁵ David C. Rutenberg and Jane S. Allen, eds., *The Logistics of Waging War* (Gunter Aiu Force Station: Air Force Logistics Management Center, 1983), 89.

and resupply to survive. The designated reinforcement battalion was prepared to assist Task Force Faith but was “waiting on transportation from X Corps [7th Infantry Division’s higher headquarters] that never arrived.”³⁶ Internal battalion and brigade transportation was unavailable, because these assets were task organized to support the movement of other units within X Corps. The result was the destruction of Task Force Faith by the Chinese on December 1, 1950.³⁷

Though not fatal, operations in Afghanistan in 2002 by 3rd Brigade, 82nd Airborne Division also demonstrated the logistical transportation gap that continues to exist. Due to extended distances between battalions and the brigade’s Logistic Support Area (LSA), rotary wing assets became the primary means of transportation for both maneuver and sustainment. Air assets, like other transportation platforms, were too limited to support fully both tactical maneuver operations and required sustainment operations simultaneously. Battalions had limited organic transportation assets that could handle the mass movement of both personnel and equipment. Therefore, contracted host nation trucks, known as “Jingle trucks,” augmented the transportation of supplies and personnel, which accomplished both tactical maneuver and sustainment.³⁸ This transportation gap did not influence the operational level receipt of supplies into theater or into the brigade LSA, but this gap did affect the ability to conduct tactical maneuver and sustainment operations at the battalion and company levels.

³⁶ Russell A. Gugeler, *Combat Actions in Korea* (Washington, DC: Center of Military History, [no date]), Chapter 6, “Chosin Reservoir,” pages 62-87, in US Army Command and General Staff College, *Leadership at the Brigade and Battalion Level Advance Sheets and Readings Book* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, September 2004), 125-141. http://www.army.mil/cmh-pg/books/korea/30-2/30-2_6.htm on 05/16/05.

³⁷ This is an illustration of how “pooled” assets such as transportation platforms are only effective until all supported units require the assets at the same time. Pooling may be efficient to some bean counters or economists who only watch the bottom line monetary savings, but it is not always effective in a fluid battlefield where projecting requirements will never be completely accurate.

³⁸ Michael D. Hanley, *Trip Report-US Army Infantry School Afghanistan Combat Lessons Learned Collection Visit to 82nd Airborne Division TF Panther* (Department of the Army, Headquarters, US Army Infantry Center and School, Fort Benning, Georgia, 28 April 2003), Tab D: Team Observation Forms, page 121; excerpt reprinted in US Army Command and General Staff College, *End-of-Course Symposium* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, June 2005), RE-11.

Most recently, the logistical transportation gap appeared in Operation IRAQI FREEDOM (OIF). 3rd Infantry Division (Mechanized)'s After Action Report clearly stated "that 'Just in Time' logistics does not work during continuous offensive operations."³⁹ The lack of transportation platforms hindered continuous combat operations. During planning, a critical assumption was that host nation assets would offset the lack of general transportation assets required for the push to Baghdad. "Host nation trucks never performed as efficiently as assumed. The shortfall in general transportation assets created shortages when carrying capacity could not meet divisional requirements."⁴⁰ The shortage in transportation platforms to meet all logistical requirements created a phenomenon known as "Resupply by Inundation" (RBI). RBI occurred when a shortage in a given class of supply required a disproportionate number of trucks to move the shortage class of supply forward inundating the capability in that class of supply and creating a shortfall in another class of supply. The newly created shortfall from the disproportionate use of supply platforms later required another disproportionate number of trucks to correct. This RBI cycle could not be broken until the operational tempo slowed thereby reducing the logistical requirements.⁴¹

Units in 3rd Infantry Division (Mechanized) did not have the appropriate cargo carrying capacity to support projected and realized requirements for the 21-day combat operation of OIF. Units were directed to carry five Days of Supply (DOS) of Class I and water, 15 DOS of Class III

³⁹ Peter C. Bayer, Jr., *Third Infantry Division (Mechanized) "Rock of the Marne" After Action Report Final Draft* (Department of the Army, Headquarters, 3d Infantry Division (Mechanized), Baghdad, Iraq, 12 May 2003), Chapter 1, page 10; excerpt reprinted in US Army Command and General Staff College, *End-of-Course Symposium* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, June 2005), RC-3.

⁴⁰ *Ibid.*, Chapter 18, page 1; RC-12.

⁴¹ This cyclic problem referred to by 3rd Infantry Division as RBI existed in the American Civil War and World War I. During these historic conflicts, the cyclic problem dealt with wagons and fodder for the animals that pulled the wagons. As the size of the ground force increased or the distance from the stores increased, the requirement for wagons increased. As the number of wagons to carry supplies increased, the amount of fodder for the animals pulling the wagons also increased. This increase in fodder required more wagons to haul the fodder. With more wagons comes the need for more fodder. This cycle ends only as resources diminish or the requirement for supply decreases.

(P), half of the Unit Basic Load (UBL), and 30 DOS of Class II (toilet paper, acetate, etc.).⁴²

These supply requirements are not high for planned combat operations. According to Joint Publication 3-35, *Joint Deployment and Redeployment Operations*, “routine sustainment” does not begin until about 30 days into a deployment.⁴³ Therefore, expeditionary forces must possess the capability to transport more in terms of supplies than required for daily operations, at least until the routine sustainment is available.⁴⁴ Currently under Modularity planning capabilities, BCTs must be self-sufficient in an undeveloped theater.⁴⁵ Iraq was not an undeveloped theater, so the Modular Force must be able to handle at least the prescribed DOS of 3rd Infantry Division (Mechanized), if not more. Is this envisioned BCT capability even possible with the current distribution of general transportation assets such as Light/Medium and Medium truck companies? Chapter Three will answer this question.

⁴² Peter C. Bayer, Jr., *Third Infantry Division (Mechanized) “Rock of the Marne” After Action Report Final Draft* (Department of the Army, Headquarters, 3d Infantry Division (Mechanized), Baghdad, Iraq, 12 May 2003), Chapter 18, page 1; excerpt reprinted in US Army Command and General Staff College, *End-of-Course Symposium* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, June 2005), RC-13.

⁴³ Joint Chiefs of Staff, Joint Publication 3-35, *Joint Deployment and Redeployment Operations* (07 September 1999), III-30.

⁴⁴ The necessity to transport supplies above the daily operations requirements does not imply that combat formations must carry all its supplies with it each time it moves on the battlefield. Units must have the capability to distribute these initial stores of sustainment supplies that accompany initial entry forces until the establishment of the routine sustainment flow. According to Gordon R. Sullivan, former Army Chief of Staff, “the Army’s senior leadership is investing in more active component combat support and combat service support capability for the first 30 days of an operation” to assist units with these sustainment requirements. [Gordon R. Sullivan, “The U.S. Army: A Modular Force for the 21st Century,” *Torchbearer National Security Report* (Arlington, Virginia: Institute of Land Warfare, Association of the United States Army, March 2005), 16.]

⁴⁵ In terms of sustainment, the *Army Comprehensive Guide to Modularity* describes the BCT’s capability as 72-hours of continuous operations. This capability simply describes the quantities of supplies that the unit can organically transport during combat operations. Self-sufficiency is not prescriptively described within this same document.

Labor Forces

Closely related to the tactical transportation gap illustrated thus far is the lack of a designated labor force.⁴⁶ Throughout America's history, a reoccurring problem has been finding soldiers to perform "various service tasks necessary for logistical support."⁴⁷ Habitually, the Army measures efficiency through a ratio of combat troops to service troops commonly referred to as the "tooth to tail" ratio.⁴⁸ This ratio is meaningless unless the ratio accomplishes the desired effect on the enemy or the established capabilities desired for a future conflict. James Huston eloquently illustrated this point: "If the greatest total of effective power can be delivered with one combat man for each service man then this is the desired ratio, but if 1,000 service troops for one combat man are needed to achieve that maximum, then that is the desired ration. If it impairs combat effectiveness to maintain a small ratio of service to combat troops then such a ratio is to be avoided rather than sought."⁴⁹

Historically, the "emphasis in war preparation had been directed toward the 'fighting men,' while little attention was given to the ever increasing needs of support forces."⁵⁰ Logistical planning immediately preceding World War II in both the Navy and the Army was "grossly inadequate" according to Lieutenant Colonel David Rutenberg of the Air Force Logistics Management Center.⁵¹ At the start of World War II mobilization, "only 11 percent of the Army

⁴⁶ This problem has been the source of questions concerning the number of men needed; of whether soldiers can be replaced by contractors to gain economic efficiency; the extent to which local labor should be used in foreign countries; of whether sufficient combat forces can be detailed to perform the required functions temporarily; of the training soldiers or civilians need to accomplish these logistic tasks; and of unit or individual morale.

⁴⁷ Huston, 674.

⁴⁸ The desire for efficiency over effectiveness grew from the Vietnam era bureaucracy promulgated by Robert McNamara's "predictive frictionless technological universe." During the 1980's, the Vietnam era military leaders attempted to change this culture of business efficiency to one of effectiveness. These Vietnam veterans understood that McNamara's "quantitative indicators of theoretical efficiency were not merely irrelevant to the battlefield effectiveness, but its mortal enemy." [Knox, 192.]

⁴⁹ Huston, 674.

⁵⁰ Rutenberg, 84.

⁵¹ Ibid., 83.

consisted of service troops, compared to 34 percent at the end of World War I.”⁵² Compare these historic ratios to Modular Force estimates of support troops: “32 percent of the heavy brigade combat team (HBCT) and 29 percent of the infantry brigade combat team (IBCT).”⁵³

These modularity ratios would seem adequate, until the increase in logistic support, which is required to match technological advances, is considered. World War II demonstrated the requirement for more support troops to complement the increase in technological innovations such as the “mechanization of combat equipment ... [which] leaped forward between the two World Wars.”⁵⁴ The technical complexity of modular units is incomparable to units of either World War, as “the real goal is to move beyond marginal improvements – to replace existing programs...to skip a generation of technology.”⁵⁵ Therefore, the modularity ratios should be greater due to technology advancement. However, some current and potential technological advancements may reduce the ratios of labor forces actually deployed to a theater of operation.⁵⁶

Prior to World War I, force planners failed to realize the breadth of troop-to-task requirements and the necessary size of the labor force to accomplish support functions on a large-scale deployment, because the United States had not embarked on any large force deployments prior to 1917-1918. Therefore, World War I lessons learned exemplified the lack of labor forces

⁵² Ibid., 83.

⁵³ U.S. Army Training and Doctrine Command. *Army Comprehensive Guide to Modularity*, Vol. I, Version 1.0 (Fort Monroe, VA, 2004), 10-9.

⁵⁴ Rutenberg, 83.

⁵⁵ George W. Bush, “A Period of Consequence,” speech at the Citadel, Charleston, South Carolina, 23 September 1999; quoted in James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation, April 25, 2005), <http://www.heritage.org/Research/NationalSecurity/bg1847.cfm>.

⁵⁶ The Army is currently developing technologies that reduce some in theater support requirements. Advances in many of the communication systems reduces the number of support personnel required to transmit and manage logistical and operational requests. However, even these new systems require some maintenance personnel, but these maintenance personnel normally are not located within the theater of operation. The Army is developing other technologies that may further reduce the required support ratios in a theater of operation, such as greater fuel efficient vehicles and self-diagnosing and reporting vehicles. The May 2005 issue of *Army* magazine contained several articles on these and other evolving technologies.

at ports and forward bases.⁵⁷ Since the United States Government believed World War I to be an isolated incident and maintaining a large labor force during peace would be costly, retaining service troops with experience in movement of personnel and supplies was not critical to national security in 1918.

The low availability of service troops at the outset of World War II created logistical constraints for overseas deployment due to a lack of trained service troops. These “service troops, beyond all others, were required in the early phases of the war. It was imperative that they prepare depots, receive equipment and supplies, and establish the essential services for the combat troops.”⁵⁸ The lesson learned from Operation BOLERO⁵⁹ was the necessity for “pre-shipment” of military materiel in advance of troops. This concept required large quantities of service troops to deploy prior to any combat units.

To rectify the labor force problem, combat forces historically rotated between service chores and combat functions. James Huston stated that this practice “has always been done as an expedient to meet a necessity of the moment and never as a deliberate policy with the prior planning and training necessary to make it most effective.”⁶⁰ The rotation of combat forces between service chores and combat function ignored the necessity of experience in logistical functions. This rotation concept also assumed that combat forces would be available to perform the service chores. This assumption proved false throughout historical American conflict.

As the operations area of Army units increased, the size of the required labor force has not grown to effectively deal with the dispersion of forces. Combat observations from 3rd Brigade, 82nd Airborne Division, on operations in Afghanistan stated, “There were simply not

⁵⁷ Huston, 387.

⁵⁸ Rutenberg, 83.

⁵⁹ Operation BOLERO was the name given to the United States’ build-up in United Kingdom in preparation for Operation OVERLORD in 1944.

⁶⁰ Huston, 676-677.

enough mechanics and supply personnel to provide the type of support required.”⁶¹ The supporting Forward Support Battalion (FSB) originally deployed with approximately 400 personnel but grew to over 800 personnel.⁶² This increase in personnel still did not meet all the requirements for the increased battlespace and joint logistical operations. As forward operating bases were established, support personnel with training and experience to manage the supply chain were not available to help manage these bases.⁶³

As the Army moves toward the reality of a campaign quality expeditionary force, the criticality of labor forces with training and experience will only increase. No longer can the Army wait for mobilization of critical service support personnel from the Reserve component to meet the needs of BCTs deployed to undeveloped theaters. According to Gordon R. Sullivan, a former Army Chief of Staff, “the Army’s senior leadership is investing in more active component combat support and combat service support capability” to help rebalance the Active and Reserve components’ labor forces.⁶⁴ However, the current support plan with “Just in Time” logistics depends on the Army’s ability to send preconfigured supply packages from the manufacturer to the soldier or unit at the far end of the supply chain. Configuring these supply packages requires a dedicated and trained labor force. Can the Army contract this required labor force or rebalance the active component’s logistical labor force to make “Just in Time” logistics possible? Maybe or maybe not, but either way the Army requires a labor force as it has since the fielding of mass armies.

⁶¹ Michael D. Hanley, *Trip Report-US Army Infantry School Afghanistan Combat Lessons Learned Collection Visit to 82nd Airborne Division TF Panther* (Department of the Army, Headquarters, US Army Infantry Center and School, Fort Benning, Georgia, 28 April 2003), Tab D: Team Observation Forms, page 40; excerpt reprinted in US Army Command and General Staff College, *End-of-Course Symposium* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, June 2005), RE-10.

⁶² Ibid.

⁶³ The management of these forward bases fell to combat soldiers or other service soldiers with no experience or training. The 82nd FSB in Afghanistan used members of the rigger company to manage the Class I yard at Kandahar Airfield.

⁶⁴ Gordon R. Sullivan, “The U.S. Army: A Modular Force for the 21st Century,” *Torchbearer National Security Report* (Arlington, Virginia: Institute of Land Warfare, Association of the United States Army, March 2005), 16.

Materiel Handling Equipment

Another critical contributing factor to the tactical logistical transportation gap, which links directly to both transportation platforms and labor forces, is materiel handling equipment (MHE). The Industrial Revolution at the turn of the 19th century introduced machinery to assist in the manual labor tasks of loading and unloading large volumes of equipment. As the United States began to deploy large volumes of equipment as part of both World Wars, materiel handling equipment became critical at transportation nodes such as ports and railway hubs.

Throughout history, the requirement to hand carry supplies declined with the introduction of machinery but has not disappeared.⁶⁵ The reduction in the labor force required to handle supplies occurred primarily at the strategic and operational levels of the lines of communication instead at the far end of the logistic chain, the last 1,000 yards. Large manual labor forces were still required to hand carrying or transfer supplies. During many occasions in both World Wars, manual labor was the only means available to get food, water, and ammunition to units on the front lines.

In the Pacific Theater of World War II, combat units unloaded naval transports that ferried supplies from ship to shore and reloaded received supplies on limited inland transport. These operations were lengthy and required large amounts of soldiers, which came from combat soldiers tasked with fighting the Japanese inland. Materiel handling equipment was not available for support or combat units to reduce the labor force requirement. At Guadalcanal, inland maneuver culminated due to a lack of combat forces in the fight as a significant number of combat forces attempted to unload supplies on the beach.⁶⁶

Similarly, in Korea, the lack of materiel handling equipment at the far end of the supply chain created a “renewed significance with the organization of the Korean Service Corps carrying

⁶⁵ Huston, 670.

⁶⁶ Charles R. Anderson, *Guadalcanal* (The US Army Campaigns of World War II, Center of Military History (CMH) Publication 72-78, Washington, DC: US Army Center of Military History, undated).

parties.”⁶⁷ The Korean Service Corps provided the supplemental labor force as supplies moved inland away from the materiel handling equipment available at the ports. The Korean Service Corps was nothing more than a contracted labor that attempted to fill a portion of the logistical transportation gap not resourced with materiel handling equipment.

Today’s military force still must move supplies by hand. Units do not have sufficient resources, either a labor force or materiel handling equipment, to reduce the tactical logistical gap. In Afghanistan as part of Operation ENDURING FREEDOM (OEF), tactical logistical units at both the brigade and battalion level were stretched thin attempting to receive and distribute supplies daily.⁶⁸ These requirements forced units to pool all available labor, no matter what their military occupation specialty, and materiel handling equipment to load and unload the daily sustainment operation’s trucks, planes, and helicopters.⁶⁹ The units that owned materiel handling equipment found the quantities to be insufficient to prevent the need for this pooled labor force.⁷⁰ Units that did not own organic materiel handling equipment were forced either to barter with other units to utilize the limited materiel handling equipment assets or to conduct all loading and unloading of supplies by hand with an ad hoc labor force. Neither option was efficient or effective.

⁶⁷ Huston, 670.

⁶⁸ Similarly, the Soviet conflict in Afghanistan was for the control of the line of communication. Virtually every item to support the Soviet forces as well as the Afghan Army had to come from the Soviet Union, including wood for cooking. “Mechanical handling equipment, improved palletisation and packaging, and containerization all enhanced the logistic capability” of the Soviet Army in the austere environment of Afghanistan. [Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict* (London, United Kingdom: Brassey’s, 1991), 308.]

⁶⁹ These observations are from personal experience of the author as the Headquarters and Headquarters Company Commander, 3rd Battalion, 505th Parachute Infantry Regiment, Task Force Panther. The author participated in OEF from June 2002 until January 2003. He was responsible for all logistical operations of 3rd Battalion, 505th Parachute Infantry Regiment.

⁷⁰ Beside the assigned quantity being insufficient, maintenance problems reduced the available materiel handling equipment even further. Another contributing factor to the available quantities of materiel handling equipment was the non-contiguous environment. In a non-contiguous environment, commanders must allocate authorized equipment between multiple sites. These were the author’s personal observations of elements assigned to TF Panther in 2002-2003 during combat operations in Afghanistan.

Enduring Logistical Gaps

Why were these obvious historical examples of logistical transportation gaps not fixed previously as the Army transformed and improved since the Civil War? General Douglas MacArthur before the Inchon landing in Korea stated, “The history of war proves that nine out of ten times an army has been destroyed because its supply lines have been cut off.”⁷¹ If he and other senior leaders believed this statement, why has the United States Army not put more effort in protecting this critical vulnerability? Several possibilities exist.

First, maybe the Army has not effectively used history to provide guidepost or a framework for future conflict requirements. Major General (Retired) Robert H. Scales, Jr. proposed at the Combat Studies Institute Conference on Transformation in August 2005 that the Army does not fully integrate history into the study of the future.⁷² As an institution, the Army has improved its process of collecting lessons learned from operations but attempts to formulate overarching conclusions too soon following the event.⁷³ Currently, the capturing of lessons learned from on-going operations does not adequately portray the context or operating environment from which the lesson originated.

Secondly, maybe the Army’s focus is at the wrong level of war to assess correctly the historical logistical gap implications. In his monograph on transformational logistics, Lieutenant Colonel Victor Maccagnan, Jr. believes the key to transformation is people. “The people of the

⁷¹ R.E. Appleman, *South to the Naktong, North to the Yalu/The United State Army in the Korean War* (Office of the Chief of Military History, Department of the Army, Washington, DC, 1961), 488; quoted in Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict* (London, United Kingdom: Brassey’s, 1991), 105.

⁷² Even the Army Chief of Staff General Schoomaker believes transformation requires an integration of “theory, history, experimentation, and practice.” [Peter J. Schoomaker, “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities” (Washington, D.C.: 108th Congress, House Arms Services Committee, 2004), 17. Available [Online] http://www.house.gov/hasc/openingstatementsandpressrelease/108th_congress/04-07-21schoomaker.pdf.]

⁷³ Major General (Retired) Scales suggested that recent history, within ten years, really just captured the facts. Attempting to form overarching conclusions too soon following the event may lead to incorrect or faulty conclusions, because one does not have the advantage of hindsight. Ten years following an event allows for reflection on the breadth of the event, not just the immediate causal links.

Army, soldiers and civilians, must be involved to transform it. No technology or piece of equipment or new and revolutionary process will make it happen without people involvement. This may explain why it has been so easily overlooked or taken for granted.”⁷⁴ This statement about the criticality of people does not mean simply form groups of people to study and provide recommendation for the future of the Army. It means designing the logistics system and capabilities from the “bottom up.” General Scales supports this bottom up concept, since the center of gravity is at the tactical not the operational level. “We have to transform small units to make them as good as we can.”⁷⁵ This transformation includes resources and procedures that reduce the logistical transportation gaps at the small unit level.

Lastly, maybe the lessons of the past went unheeded due to the Army’s culture. This culture is one based on “The American Way” described by David Potter in *People of Plenty: Economic Abundance and the American Character*. “The American Way” described a culture of unlimited resources, the ability to always win, and the ability to produce anything and everything required especially in times of conflict. This culture feeds the assumption that past logistical friction in war was natural, unavoidable, or an isolated phenomenon. This same culture transposed to the Army leads to what historian James Huston called a slough of indifference. “The surge toward modernization stimulated by war once again would decline to a slough of indifference, to be distributed only now and then...by a few imaginative officers seeking steady improvement, until a new national emergency should once more call forth the waves of progress.”⁷⁶ The new national emergency results in the waves of progress being focused on

⁷⁴ Victor Maccagnan, Jr., “Logistics Transformation-Restarting a Stalled Process,” Monograph, Strategic Studies Institute, January 2005, 33.

⁷⁵ Rich Dunn, *Rich Dunn’s Circulating Notes*, notes from American Enterprise Institute for Public Policy Research (AEI) Conference on the Future of the United State Army, Washington, DC, 11 April 2005, http://www.thedonovan.com/archives/historystuff/AEI_Future_of_the_Army_Conf_Dunns_Notes_4_11_05.pdf on 5/20/05.

⁷⁶ Huston, 252.

strategic and operational maneuver not the critical logistical components that are necessary for a campaign quality Army.⁷⁷

Conclusion

So, what has made the last 1,000 yards logistically hard? One clear answer could be the enemy, but the enemy also affects other parts of the supply chain, not just the last 1,000 yards. Another easy answer would be to blame the difficulties on Clausewitzian friction or merely chance as the Army has done countless times before. However, historical examples clearly point to the significance of transportation platforms, labor forces, and materiel handling equipment at the tactical end of the logistical lines of communication in defining this problem. Most people, however, have not recognized that the Army has a logistical transportation gap at the far end of the supply chain, the last 1,000 yards. Some, who have recognized this logistical problem, point toward logistical operations in large, merchandise businesses such as Wal-Mart for potential solutions.⁷⁸ However, unlike Wal-Mart, the military's disposition changes rapidly and continuously the closer one approaches the "tip of the spear" or the far end of the supply chain. Therefore, the business solutions have limited application in the Army.⁷⁹

⁷⁷ Many military historians hail the German transformation in the Interwar years as forward thinking and brilliant. However, Williamson Murray claims that the Germans effectively transformed their maneuver concepts but avoided logistical transformation. Failure to match the tactical and operational modern doctrine with available resources led to the unsuccessful outcome of Operation Barbarossa against the Soviets in 1941. "The bulk of the German Army in 1939 and for the remainder of the war...remained a foot and horse-drawn army – tactically and operationally modern, but obsolete in how it moved and was supplied. The logistical infrastructure simply could not support the drives deep into Soviet territory." [Williamson Murray and Allan R. Millett, ed., *Military Innovation In The Interwar Period* (Cambridge, United Kingdom: Cambridge University Press, 1996),46-47.]

⁷⁸ Major Paul Herbert in *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations* clearly stated why the Army is not and will never be like commercial businesses. "The U.S. Army's problem is different because it has little margin for error and no definite criteria for success prior to actual combat." [Paul H. Herbert, *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations*. Leavenworth Papers No. 16 (Fort Leavenworth, Kansas: Combat Studies Institute, United States Army Command and General Staff College, 1988), 4.]

⁷⁹ The tactical disposition of units is not restricted to its mere location. A unit's tactical disposition may include a rapid change in types and quantities of supplies required. It is almost impossible

Do historical examples exist that illustrate the success of logistical transportation in the tactical segment of the supply chain? Yes, but are these successes the exception or the rule? If the logistical transportation successes are the exception and the last 1,000 yard is truly difficult, then the hypothesis of this paper has validity. If the logistical transportation gaps in the supply chain are merely mirages, then this paper is purely academic considering a “what if” scenario. It is for the reader to decide. If the reader believes the historical cases that support the hypothesis of an enduring logistical gap in the United States Army’s supply chain are the rule, then the time for action is now. Without action, a slough of indifference will recover these identified flaws as the Army’s transformation efforts fall back to the non-intellectual depth of PowerPoint slide concepts.⁸⁰

to predict requirements in the contemporary operating environment, because the enemy gets a vote in the tactical situation with out any requirement to consult with friendly forces.

⁸⁰ James Jay Carafano, Jack Spencer, and Kathy Gudgel in “A Congressional Guide to Defense Transformation: Issues and Answer” point to the tendency of the services to merely label acquisition programs as transformational without wrestling with the intellectual problem of what is really required. “Thus, the services could label acquisition programs that begun long before the end of the Cold War as transformational or define their goals and rationale with little more than colorful PowerPoint slides and a plethora of adjectives like faster, lighter, and more lethal.” [James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation, April 25, 2005), <http://www.heritage.org/Research/NationalSecurity/bg1847.cfm>.]

CHAPTER THREE

DOCTRINE – IS THE EMERGING ROAD CORRECT?⁸¹

As the Army pursues a transformed campaign quality force with expeditionary capability, it is critical to determine if the current transformation strategy will result in the desired, effective fighting force to complement the other elements of national power necessary to protect U.S. interests over the next decade or more.⁸² Soon, the large national budget commitments to Army transformation will decline. The Army must ensure the current strategy for transformation correctly addresses the extensive and ever changing set of commitments of the nation. Strategist Michael J. Mazarr believes in accomplishing this “through a careful balancing of interest and resources, of requirements and capabilities, [and] of ends and mean.”⁸³ This approach will prevent the failure of light infantry forces that occurred in previous conflicts where resource limitations, primarily in the realm of mobility, drove force designs that “were unable to sustain themselves in combat and proved extremely unpopular with U.S. commanders.”⁸⁴

How do the nation and the Army achieve this balance of interest, resources, requirements, capabilities, ends, and means to form the correct strategy? The Army captures its vision of the

⁸¹ The term “Legacy” or “Legacy Force” will describe doctrine, concepts, and organizations that function under the current doctrine. This term does not imply disrespect towards these units. It simply aids in distinguishing between what came before Modularity and those things that have come after. The term “current” only refers to Legacy concepts even though some organizations of the Army already operate under the emerging Modularity doctrine.

⁸² Transformation is a term used by the Pentagon “to describe its efforts to shift the military away from its Cold War posture and toward a structure that is better prepared for future conflict and threats,” according to the article “A Congressional Guide to Defense Transformation: Issues and Answers.” The article further describes the two aspects of transformation. First, it is an attempt to apply emerging technologies to overmatch any opponent. Secondly, transformation attempts “to address the diverse security challenges that the United States anticipates facing in the 21st century.” [James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation, April 25, 2005), 1. Available [Online] <http://www.heritage.org/Research/NationalSecurity/bg1847.cfm>.]

⁸³ Michael J. Mazarr, *Light Forces & the Future of U.S. Military Strategy* (New York, New York: Brassey’s (US), Inc., 1990), 1.

⁸⁴ The light infantry divisions developed during World War II, the Tenth, Seventy-first, and Eighty-ninth, were developed since the War Department believed that limits to available sealift would impose severe constraints on force mobility. These units tested poorly, and no theater commander wanted them. [Mazarr, *Light Forces & the Future of U.S. Military Strategy*, 7.]

“overarching concept of warfare” in something known as doctrine.⁸⁵ The first modern doctrine written under the supervision of General William E. Depuy, the 1976 edition of FM 100-5, established the “new role for military doctrine as a key integrating medium for an increasingly complex military bureaucracy.”⁸⁶ The manual provided the rationalization the Army required to preserve its investments in new technology and weapon systems. According to historian and doctrinal expert Paul Herbert, this “manual was at once a fighting doctrine and a procurement strategy.”⁸⁷

Today’s definition of doctrine has changed little. The Department of Defense defines doctrine as the “fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.”⁸⁸ Doctrine does not prescribe solutions but provides a common framework to describe capabilities in context, while not prescribing their rigid application in any particular case. Doctrine must avoid both prediction and prescription of future application of force. The Army Chief of Staff General Peter J. Schoomaker in “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities” stated, “Doctrine links theory, history, experimentation, and practice. It encapsulates a much larger body of knowledge and experience,

⁸⁵ Paul H. Herbert, *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations*. Leavenworth Papers No. 16 (Fort Leavenworth, Kansas: Combat Studies Institute, United States Army Command and General Staff College, 1988), 1.

⁸⁶ *Ibid.*, 1.

⁸⁷ The 1976 edition of FM 100-5, *Operations*, was the first doctrinal statement of the post-Vietnam years. This manual renewed the nation’s focus on the threat of the Soviet Union in the European theater and changed the Army’s focus from dismounted infantry operations to armored operations and overwhelming application of combat power. This manual was the predecessor of Airland Battle Doctrine of the 1980’s and the current concept of Full Spectrum operations of FM 3-0, *Operations*. [Herbert, 1.]

⁸⁸ Joint Chiefs of Staff, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, amended 31 August 2005. <http://www.dtic.mil/doctrine/jel/doddict/index.html> on 10/20/05. Also found in U.S. Department of the Army, Field Manual 101-5-1, *Operational Terms and Graphics*. (Washington, DC: Government Publishing, 30 September 1997), 1-55.

providing an authoritative statement about how military forces do business and a common lexicon with which to describe it.”⁸⁹

Because doctrine is authoritative and provides a common base of reference for the entire force, the Army’s doctrinal development process is long, complex, and does not change often. The long doctrinal development process hinders doctrinal change in highly technical armed forces such as the United States Army, because technical changes occur rapidly and because a technical advance in one area may require procedural or materiel changes in other areas. According to Herbert, “weapons development takes a long time and because, in democracies, funding for weapons is a highly visible political process, an army...cannot adopt a doctrine inconsistent with its available weapons” and technology.⁹⁰ Therefore, a correct strategy of what capabilities the Army requires on the battlefield, what capabilities its potential enemies possess, and what technical and organizational innovations are possible now is critical to the success of any transformation process.⁹¹

Historically with respect to doctrine and technology, transformation occurred in one of two methods. First, a developed doctrine drives the development of technologies that support the accepted doctrine. This is how Air Land Battle doctrine of the 1980’s drove the development of a heavy-centric force of the Cold War. It is also how the German Army developed its maneuver

⁸⁹ Peter J. Schoomaker, “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities” (Washington, D.C.: 108th Congress, House Arms Services Committee, 2004), 17. Available [Online] [http://www.house.gov/hasc/openingstatementsandpressrelease/108th congress/04-07-21schoomaker.pdf](http://www.house.gov/hasc/openingstatementsandpressrelease/108th_congress/04-07-21schoomaker.pdf).

⁹⁰ Herbert, 4.

⁹¹ John Schmitt, a defense expert on development and writing military operating concepts, stated that technologies used for concepts have to be possible in the near term not just concepts or technologies waiting to be developed. “It is not the primary purpose of a concept to envision new technologies, but to envision new ways of operating with technologies that...exist. A concept must not assume the existence of technologies that are unlikely with the future time horizon of the concept.” However, this is exactly what drives the concept of a reduced logistical tail – greater fuel efficiency. [John F. Schmitt, “A Practical Guide for Developing and Writing Military Concepts,” Defense Adaptive Red Team (DART), Working Paper #02-4, December 2002, 14.]

doctrine in the Interwar years, the *Blitzkrieg*.⁹² Conversely, technological advances can drive the development of an overarching, integrated doctrine. This second method was the basis for U.S. Army transformation during the interwar period prior to World War II. This is also the current method employed by the Department of Defense to achieve Modularity transformation.

Both President George W. Bush and Secretary of Defense Donald Rumsfeld place the transformation strategy emphasis on skip-a-head technology.⁹³ The leading experts on revolutions in military affairs, McGregor Knox and Williamson Murray, state that technology alone has rarely driven a successful military transformation, though “it has functioned above all as a catalyst” for change. Successful transformations “require coherent frameworks of doctrine and concepts built on service cultures that are deeply *realistic*,” and “rest upon [a] thorough understanding of the fundamentally chaotic nature of war.”⁹⁴

Does the Modular transformation doctrine found in the *Army Comprehensive Guide to Modularity* provide the required coherent framework in terms of logistics to bridge the historically identified logistical transportation gaps in the tactical segment of the U.S. Army supply chain of the Infantry Brigade Combat Team (IBCT)? To answer this question, the starting point resides with the logistical doctrine that governs the supply chain of the Legacy Forces’ light infantry brigades and its faults in relation to the historical transportation gaps in terms of transportation platforms, labor forces, and materiel handling equipment. After establishing what came before Modularity doctrine, the doctrine governing the current transformation can provide

⁹² Matthew Cooper, *The German Army, 1933-1945* (Lanham, Maryland: Scarborough House, 1990), 113-159, contains a full discussion of the development of the German World War II doctrine.

⁹³ During a speech at the Citadel in 1999, President Bush stated that he and his administration wanted to “take advantage of a tremendous opportunity...created by a revolution in the technology of war....[T]he real goal is to move beyond marginal improvements – to replace existing programs...to skip a generation of technology.” [U.S. Department of Defense, *Transformation Planning Guidance*, (Washington, DC: US Government Printing Office, April 2003), 3; quoted in James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation, April 25, 2005), 2.]

⁹⁴ MacGregor Knox and Williamson Murray, eds., *The Dynamics of Military Revolution 1300-2050* (Cambridge, United Kingdom: Cambridge University Press, 2001), 192-193.

insight into enduring faults or improvements in terms of the three pillars of logistical transportation.

This chapter attempts to answer this critical question. The first part of the chapter outlines the key elements of the Legacy Force logistical doctrine as it pertains to the historical pillars of logistical transportation. This part defines the supply-based logistical concepts that drove logistics operations throughout the 20th century. Next, an analysis of Modular doctrine with respect to the historical transportation pillars and the IBCT design demonstrates where the logistical transportation gaps still exist in the emergent doctrine. Finally, the chapter concludes with the initiatives or goals of Modularity transformation doctrine that grow instead of reduce the logistical transportation gap of the IBCT.

Legacy Force Logistical Doctrine

Logistical doctrine changed little between World War II and Operation DESERT STORM.⁹⁵ World War II logistical doctrine transformed the prior logistical system from one of manual labor to one of mechanization. Victor Maccagnan, a logistical transformation proponent, stated:

The basic principles and a good bit of the doctrinal underpinning of logistics support are much the same as they were 60 years ago...[and] since 1991, the official beginning of the Army's transformational journey, very little has change in the way that the U.S. Army executes combat service support.⁹⁶

The logistical doctrine of World War II through the Cold War era was the Legacy Force doctrine.

⁹⁵ The 1944 edition of FM 101-10, *Staff Officers' Field Manual: Organization, Technical and Logistical Data*, shows distribution schematics used in logistical field manuals today. Some of the acronyms changed, but the concept of distribution of Class I, water, Class III, and Class V have not changed.

⁹⁶ Victor Maccagnan, Jr., "Logistics Transformation-Restarting a Stalled Process" (Monograph, Strategic Studies Institute, January 2005), 2. Available [Online] <http://www.carlisle.army.mil/ssi/pdffiles/PUB593.pdf>.

The Legacy Force of the Cold War designed the logistical structure for developed theaters. These developed theaters consisted of an extensive network of host-nation infrastructure or large pre-positioned stockpiles. This was the case for both Operation DESERT STORM and Operation IRAQI FREEDOM. In cases of underdeveloped or immature theaters, “CSS [combat service support] and construction units are needed much earlier in the deployment flow” to prepare an adequate support base.⁹⁷ These support bases are critical for the early stages of any operation to enable reception, staging, onward movement, and integration (RSOI), which is logistically intensive in terms of transportation platforms, labor forces, and materiel handling equipment.

The Legacy logistical system is a supply-based logistics system. This supply-based system consists of a layered support structure where stockpiles at different levels contain the necessary supplies and assets above the units’ organic base of supply or unit basic load (UBL). This system emphasizes effectiveness over efficiency – “from parts and supply distribution to the physical equipping of CSS units.”⁹⁸ The supply-based system focuses on logistics by mass with huge amounts of stockpiled material in theater to support tactical unit requests. This system does not rely on accurate, rapid predictions of sustainment requirements from the tactical units.

In the Legacy Force structure, multiple elements of the Forward Support Battalion (FSB) provide and manage the supply-based stockpiles for all the elements of a brigade. The supply company of the FSB is the unit responsible for providing supply support to maneuver brigades. In the light infantry force structure, the supply company is the Headquarters and Supply Company. The supply aspect of this company is only a platoon. This platoon provides supply point distribution of food, personal equipment, packaged POL, fuel, barrier materials, and

⁹⁷ U.S. Department of the Army, Field Manual 3-0, *Operations* (Washington, DC: Government Publishing, June 2001), 12-17.

⁹⁸ Gregory Fontenot, E.J. Degen, and David Tohn, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), xxvii.

ammunition and operates a Supply Support Activity (SSA) or “warehouse.”⁹⁹ The Forward Maintenance Company of the FSB provides repair parts support through operating a separate SSA. Yet another SSA, the Forward Medical Company of the FSB manages and distributes the required medical supplies.

Supplies from these separate SSAs and others at the division and corps levels get to the subordinate battalions of the supported brigade by one of three methods: supply point distribution, unit distribution, and throughput distribution.¹⁰⁰ Supply point distribution is the normal method within a brigade due to the limited transportation assets of the FSB. Supported units use organic transportation assets to pick-up supplies at the various SSAs normally located within the Brigade Support Area (BSA). Unit distribution is the standard method of distribution from General Support (GS) supply units to Direct Support (DS) supply units, which are FSBs. Corps and theater transportation assets deliver the required supplies, and the receiving unit is responsible for downloading the transportation platforms. Throughput distribution is similar to unit distribution except it “bypasses one or more echelons in the supply system to minimize handling and speed delivery forward.”¹⁰¹ Unit distribution and throughput distribution normally do not go beyond the FSB level due to the inability of subordinate units to unload and handle large quantities of supplies. Additionally, the security level and the inability to know the precise location of units forward of the FSB also contribute to the lack of unit distribution and throughput distribution beyond the FSB level.

Below the FSB in infantry brigades, the subordinate battalions’ Headquarters and Headquarters Company (HHC) is responsible for receiving and distributing all the required supplies from the various supporting SSAs, because the FSB has no direct transportation assets. The primary element of HHC responsible for the pick-up and delivery of supplies to the far end

⁹⁹ U.S. Department of the Army, Field Manual 63-20, *Forward Support Battalion* (Washington, DC: Government Publishing, 26 February 1990), 7-1.

¹⁰⁰ *Ibid.*, 7-2 – 7-3.

¹⁰¹ *Ibid.*, 7-2.

of the supply chain is the support platoon or support and transportation platoon. The support platoon owns all of the battalion's transportation platforms, labor forces, and materiel handling equipment. This is the only element within the supply chain that is responsible for both retrieving supplies from a higher element and distributing supplies to lower units utilizing the same transportation assets.

By Legacy Force doctrine, support platoons distribute supplies by truck convoy known as a LOGPAC to each of the battalion's respective companies or dispersed elements. These LOGPACs move from the battalion's Field Trains Command Post, which is normally located within the perimeter of the BSA, to the Combat Trains Command Post or a logistics resupply point (LRP). At this location, the transportation assets divide into company convoy packages, which deliver the supplies to the end users in the supply system.¹⁰²

The Legacy Force logistical doctrine is linear by design, and this linear construct was reality for World War II and Operation DESERT STORM. It assumes that a forward line of troops (FLOT) is present and logistical operations occur in relatively safe areas behind the forward combat units. This doctrine assumes standard areas of operation (AOs) are contiguous and a BSA location of only 20-25 km behind the FLOT.¹⁰³ A different battlefield geometry requires commanders to design an ad hoc logistical system according to Field Manual 3-90. "Using noncontiguous AOs place a premium on the use of innovative means to conduct

¹⁰² This logistics system design causes "three separate units to provide supply support to the brigade and creates a multitude of supply points that must be managed as separate entities by logistics managers within the support battalion. Also by design, there are three separate organizations involved with the physical distribution of one unit's supplies within the brigade area, two of which are not logistics units. This creates longer lead times for units requiring support." [Trenton J. Conner, "The Transformation of Military Logistics from Supply-Point Based to Distribution Based Logistics at the Brigade Level," Stryker Brigade News, 07 April 2005. Available [Online] http://www.strykernews.com/archives/2005/04/07/transformation_of_logistics.html.]

¹⁰³ These figures were taken from U.S. Department of the Army, Field Manual 100-10, *Combat Service Support* (Washington, DC: Government Publishing, 03 October 1995), Chapter 2.

sustaining operations, including aerial resupply.”¹⁰⁴ Obviously, the Legacy doctrine also assumes that aerial resupply is the exception, not the standard.

The historical logistical gaps discussed in Chapter Two demonstrate the lack information, physical capability, and resources of the Legacy Force doctrine in relation to transportation platforms, labor forces, and materiel handling equipment. No effective system of information management existed to achieve “asset visibility” or understand the requirements among the various units within the tactical end of the supply chain.¹⁰⁵ The physical capacity of three pillars of transportation was not sufficient to support light infantry combat operations, especially in an environment of increasing battlespace demonstrated in conflict since Operation DESERT STORM. Field Manual 4-0, *Combat Service Support*, states the physical capacity of the distribution network “defines the point of diminishing returns of resources . . . , influences the feasibility of courses of action, and characterizes the risk inherent” in the established supply chain system. Resources of the supply system “consist of people, materiel, and machines,” or put in more familiar terms labor forces, transportation platforms and materiel handling equipment.¹⁰⁶

Due to the limited resources of the supply chain, the Legacy Force doctrine attempted to solve the limited resource problem through “pooled” assets.¹⁰⁷ By pooling transportation assets

¹⁰⁴ U.S. Department of the Army, Field Manual 3-90, *Tactics* (Washington, DC: Government Publishing, 4 July 2001), 2-56.

¹⁰⁵ Asset visibility refers to the ability to track materiel movement from “a depot, commercial vendor, or a storage facility” in CONUS through the entire supply chain until it reaches the end user of the materiel. “Timely and accurate visibility is necessary to distribute assets on time.” [U.S. Department of the Army, Field Manual 4-0, *Combat Service Support* (Washington, DC: Government Publishing, August 2003), 1-56.]

¹⁰⁶ U.S. Department of the Army, Field Manual 4-0, *Combat Service Support* (Washington, DC: Government Publishing, August 2003), 3-23.

¹⁰⁷ Pooling began with the design of the triangular division prior to World War II. Pooling consisted of placing assets that were not required continuously or were too costly to field to the appropriate levels into resource “provider” units at higher levels of the Army. These pooled assets would support subordinate operation upon request. World War II proved that “pooling” was not as effective as it mistakenly appeared to be efficient. Sharing assets is a valid alternative in emergency situations, but the Army should be wary of being reliant upon pooled assets to meet its steady-state capability instead of an emergency driven capability. For more information on pooling during the Interwar period, see Chapter 3 of Jonathan M. House’s *Toward Combined Army Warfare: A Survey of 20th Century Tactics, Doctrine, and Organization*.

consisting of transportation platforms, labor forces, and materiel handling equipment to divisions, corps, and echelons above corps, subordinate units could share these necessary assets as required during operations.¹⁰⁸ These pooled transportation assets supported the throughput and unit distribution methods of Legacy doctrine but never addressed limitations that forced units at the far end of the supply chain to conduct supply point distribution. Pooled transportation assets also reduced the materiel cost and strategic lift requirement of the Light Infantry Division (LID) and light infantry brigades of the 1980's.¹⁰⁹ The failure to address the limited transportation assets at the FSB level and below promulgated the logistical transportation gap of the U.S. Army supply chain and made success in rapid operations almost impossible. Jomini stated, "It is impossible to advance unless attended by trains of provisions....Not only is it necessary to collect large quantities of supplies, but it is indispensable to have the means of conveying them with or after the army. This is the greatest difficulty, particularly on rapid expeditions."¹¹⁰

The linear, contiguous battlefield described by the Legacy doctrine proved anything but valid in the nation's conflicts since Operations Desert Storm. Most environments are non-linear and noncontiguous as seen in Operation ENDURING FREEDOM (OEF) and Operation IRAQI FREEDOM (OIF). Logistical transportation platforms, labor forces, and materiel handling equipment are not currently sufficient to support "innovative means to conduct sustaining operations" described by Field Manual 3-90, especially through pooling.¹¹¹ What new logistical

¹⁰⁸ The concept of pooling exists throughout the Army and is not an invalid concept. Maintenance assets are pooled at each level above the operator level. Fuel distribution, water distribution, and even medical support assets are also pooled. However, the pool of assets must be able to handle the required load of the units, which rely on the pool of assets.

¹⁰⁹ Michael J. Mazarr discussed the evolution of the design of the LID in the 1980's. He stated that the requirement to add additional combat capability forced the reduction of logistical structure to achieve no net gain in the unit's cost both monetarily and in strategic lift. "Perhaps the greatest failing of LIDs remains the lack of tactical mobility." [Mazarr, *Light Forces & the Future of U.S. Military Strategy*, 38.]

¹¹⁰ Jomini and his *Summary of The Art of War*, ed. Brigadier General J. D. Hittle, Book 2, *Roots of Strategy* (Harrisburg, Pennsylvania: Stackpole Books, 1987), 482.

¹¹¹ Field Manual 3-90, *Tactics*, 2-56.

doctrinal changes are necessary to address the change in contemporary operating environment?

Does the Modular Force doctrine address these necessary changes?

Modular Force Logistical Doctrine

As the Army transforms to a campaign quality force with an expeditionary capability, General Schoomaker claims the Army's critical challenge "is to reconcile expeditionary agility and responsiveness with the staying power, durability, and adaptability to carry a conflict to a victorious conclusion no matter what form it eventually takes."¹¹² The Modular doctrine must address this eventual form of success and clearly meet the force requirements to not only "win decisive combat operations, but also...to sustain those operations for as long as necessary."¹¹³ The current emerging Modular Force doctrine consists primarily of the *Army Comprehensive Guide to Modularity*. However, the draft version of *Modular Force Logistics Concept* provides insight and clarification on logistical specific doctrine to support the Modular Force.¹¹⁴

This emergent doctrine must address the logistical transportation gaps that plagued militaries throughout history. The change from Legacy logistical doctrine to Modular logistical doctrine will not be easy, but it is necessary for the Army to transform successfully. According to logistical transformation proponent Victor Maccagnan, "every Chief of Staff of the Army (CSA), every Chairman of the Joint Chiefs of Staff (CJCS), and both Secretaries of Defense in the last 15 years have stated unequivocally that a true transformation of the U.S. Army cannot occur without significantly changing the way we conduct logistics."¹¹⁵

¹¹² Schoomaker, 8.

¹¹³ Ibid.

¹¹⁴ According to this draft concept, the tactical level is critical to achieving the staying power of the Army. "At the tactical level, sustaining operations determine the staying power of the Army forces and operation reach. Perhaps more importantly, they enable commanders to mass effects and maintain freedom of action." [U.S. Army Combined Arms Support Command, *Modular Force Logistics Concept (Draft)*, Version 1.2 (Fort Lee, Virginia, 31 August 2005), 7.]

¹¹⁵ Maccagnan, 2.

Unlike the Legacy Force, the Modular Force logistical structure cannot rely on developed theaters. It must address the current world realities that U.S. forces may deploy with little time to support operational campaigns with pre-positioned assets and infrastructure. The Army's capstone concept of the Future Force contained in TRADOC Pamphlet 525-3-0 states, "The continuing revolution in military logistics is essential to enable the Future Force...to operate within austere theaters without the establishment of the kind of heavy logistical structure that has characterized past operations."¹¹⁶ This document points to the Modular doctrinal concept of distribution-based logistics as the key for achieving logistical transformational success. However, this capstone document and Modular doctrine assume technological revolutions can reduce sustainment demands and logistical infrastructure to achieve the "reduced logistical footprint."¹¹⁷

Distribution-based logistics is a change from the supply-based system of the Legacy Force, at least in theory. This new Modular logistical doctrine concept focuses all "efforts and activities on delivering the right supplies to the right location at the right time."¹¹⁸ This system involves more than increased speed and efficiency of moving supplies along the supply chain.¹¹⁹ It is a logistical system with a modernized, integrated information component and a

¹¹⁶ U.S. Army Training and Doctrine Command, TRADOC Pamphlet 525-3-0, *The Army in Joint Operations: The Army's Future Force Capstone Concept 2015-2024*, Version 2.0 (Fort Monroe, Virginia, 7 April 2005), 38.

¹¹⁷ The technological revolutions sought to reduce the logistical infrastructure are "higher fuel efficiencies, new power sources, higher levels of reliability, improvements in maintainability, innovative solutions to water supply and generation, and smaller, more effective munitions." [U.S. Army Training and Doctrine Command, TRADOC Pamphlet 525-3-0, *The Army in Joint Operations: The Army's Future Force Capstone Concept 2015-2024*, Version 2.0 (Fort Monroe, Virginia, 7 April 2005), 38.]

¹¹⁸ David Payne, "Distribution-Based Logistics," *Army Logistician*, Jan-Feb 1999. Available [Online] <http://www.almc.mil/alog/issues/JanFeb99/MS375.htm>.

¹¹⁹ Mark O'Konski believes the speed of supplies along the supply chain is the key to logistical transformation success. "Velocity offsets mass, as echelons of inventory are replaced by managed flows of materiel. The key is inventory in motion. The distribution pipeline effectively becomes the RML [Revolution in Military Logistics] warehouse." However true this may be according to better business practices, it assumes that the requirements at the far end of the supply chain are fixed or predictable. This also assumes that transportation along the entire supply chain – from depot to user – is always available. These are big assumptions that historically have never proven true. [Mark J. O'Konski, "Revolution in Military Logistics: An Overview," *Army Logistician*, Jan-Feb 1999. Available (Online) <http://www.almc.mil/alog/issues/JanFeb99/MS20364.htm>.

technologically enhanced physical capability. The assumption of this new theoretical concept is that both an enhanced information system and an increased technological capability will achieve the desired reduction in logistical resources required to support a campaign quality Army by properly “managing the flow rates of supplies along each arc and node of the distribution-based logistical network.”¹²⁰ According to General Schoomaker, this “means eliminating today’s layered support structure...at the tactical level...[and] bridging the distance from theater or regional support commands to brigade combat teams with modular, distribution-based capabilities packages.”¹²¹

What doctrinal logistics structures does the distribution-based logistical system eliminate to achieve “on time” supplies to the far end of the supply chain? According to the emerging Modular doctrine expressed in the *Army Comprehensive Guide to Modularity*, only three echelons of Combat Service Support (CSS) units provide sustainment for a deployed Army force compared to the multitude of CSS units under the Legacy doctrine.¹²² In Modular doctrine, the lowest echelon is the organic support battalions or brigade support battalions (BSB), which support the BCT. The next echelon is the tactical sustainment brigades, which support UEx¹²³ organizations. The final echelon is the theater support command (TSC), which supports the total Army, Joint, multinational, and interagency forces in the Joint force commander’s area of operation. Operational-level sustainment brigades form the core of the TSC.¹²⁴

The Modularity Guide provides some delineation of responsibilities between these levels of logistical support within the distribution-based system but does not clearly define the role of

¹²⁰ Payne, “Distribution-Based Logistics.”

¹²¹ Schoomaker, 19.

¹²² The Legacy Force structure did not limit the number of logistical structures in a theater of operation. Each level of command from strategic to tactical had organizations and requirements within the supply-based logistical system.

¹²³ The term UEx changed to Division and Corps depending upon the rank of the commander and the structure of the organization. The currently printed and published doctrine still refers to these organizations as UEx. The Army Chief of Staff approved this terminology change on September 21, 2005.

¹²⁴ U.S. Army Training and Doctrine Command, *Army Comprehensive Guide to Modularity*, Vol. I, Version 1.0 (Fort Monroe, VA, 2004), 5-78.

each with respect to the other levels. The TSC, the highest echelon of deployed support, executes its responsibilities through operational-level sustainment brigades.¹²⁵ The TSC acts as the theater logistics headquarters and provides “obligatory theater support” by operating a theater-level Army logistics base, a Joint logistics base, or an intermediate staging base. The obligatory support includes direct support to Army theater-level assets as well as common-user logistics and general support to other services, other governmental agencies, and coalition partners through a central distribution management center. “The TSC will have full visibility of all services and supplies, current information on force logistics needs, and the ability to direct incoming supplies and materiel to the brigades that need them.”¹²⁶ This echelon is also responsible for theater opening operations, which include reception, staging, onward movement, and integration (RSOI) for the Army and the Joint force and Army-specific reconstitution operations.¹²⁷

The middle echelon of deployed logistic support falls to the tactical sustainment brigade, which has the same organizational design as the operational-level sustainment brigade. The role of this middle echelon is to “provide distribution-based [replenishment] logistics” to the supporting or assigned elements of a UEx.¹²⁸ These brigades are responsible for establishing temporary bases within the UEx area of operation to conduct mission staging operations (MSO).¹²⁹ This is also the echelon responsible for logistically supporting the Army’s concept of “plug and play” with all three types of brigades: heavy brigade combat teams (HBCT), stryker brigade combat teams (SBCT), and infantry brigade combat teams (IBCT). This task alone

¹²⁵ Operational-level sustainment bridges and tactical-level sustainment brigades are identical with respect to organizational design. The only distinguishing attributes between these organizations are the subordinate battalions and companies attached for operations and the assigned responsibilities. Both levels can perform the functions of the other, as long as the required battalions and companies are present in the task organization.

¹²⁶ *Army Comprehensive Guide to Modularity*, Vol. I, 1-69.

¹²⁷ *Ibid.*, 3-24, 4-18, 5-88.

¹²⁸ *Ibid.*, 5-80.

¹²⁹ Mission staging operations are deliberately planned operations to rotate brigade combat teams out of current operations to conduct refit, rearm, and replenishment operations. These operations for a single brigade normally require 24 to 72 hours. For more information, see paragraph 5-86 of the *Army Comprehensive Guide to Modularity*.

produces major modifications to the sustainment brigade's task organization each time an attachment or detachment of a different type of BCT occurs to the UEx organization.

Finally, the lowest echelon of deployed logistics support as defined by the Modularity Guide is the Brigade Support Battalion (BSB), which replicates the function of the FSB in the Legacy Force. Figure 1 shows the structure of the BSB. The primary role of the BSB is to act as a logistics support area (LSA) or supply distribution point, which provides subordinated battalions of a BCT with logistics support for up to 72 hours of continuous operations known as replenishment operations. Unlike the sustainment brigades, this echelon is not responsible for mission staging operations. However, the BSB is responsible for reinforcing medical support with a casualty holding capability and for reinforcing direct support maintenance or field maintenance as required.¹³⁰ Depending upon the type of supported BCT, the BSB is responsible for tactical transportation of maneuver units. When in support of an infantry brigade combat team, the BSB is responsible for the transportation of one battalion of dismounted soldiers.¹³¹

¹³⁰ The Army Maintenance System under the Legacy Force doctrine consisted of five levels of repair: operators, organizational, direct support, general support, and depot levels. The new Standard Army Maintenance System consists of two levels: field and sustainment. The basis of these two levels is the concept of "fix forward/repair rear." The field maintenance level essentially combined the organizational and direct support levels of the old system. This level focuses on "component replacement, battle damage assessment and repair, recovery, and services." The sustainment maintenance level combines the general support and depot levels. This level focuses on "end item and component repair with some component replacement." The sustainment maintenance level normally resides above the BCT level. Therefore, sustainment brigades are normally responsible for the sustainment maintenance level. The BSB provides supporting field maintenance, but the Forward Support Companies have the primary responsibility for field maintenance level of the Standard Army Maintenance System - Enhanced. [Alyssa Astphan, "Two-level Maintenance: Task Force Modularity, Transformation of Army Maintenance," *Army Communicator*, Fall 2005. Available [Online] <http://www.gordon.army.mil/ac/Fall/Fall%2005.pdf>.]

¹³¹ To accomplish this transportation requirement, all the organic transportation assets of both the BSB and the Forward Support Company (FSC) are necessary according to paragraph 9-8 of the *Army Comprehensive Guide to Modularity*. To lift all the fighting soldiers of an infantry brigade combat team (IBCT), all the transportation assets of the BSB and the FSCs are necessary with an additional 24 trucks from the supporting sustainment brigade. This clearly indicates that IBCTs are not logistically self-sufficient.

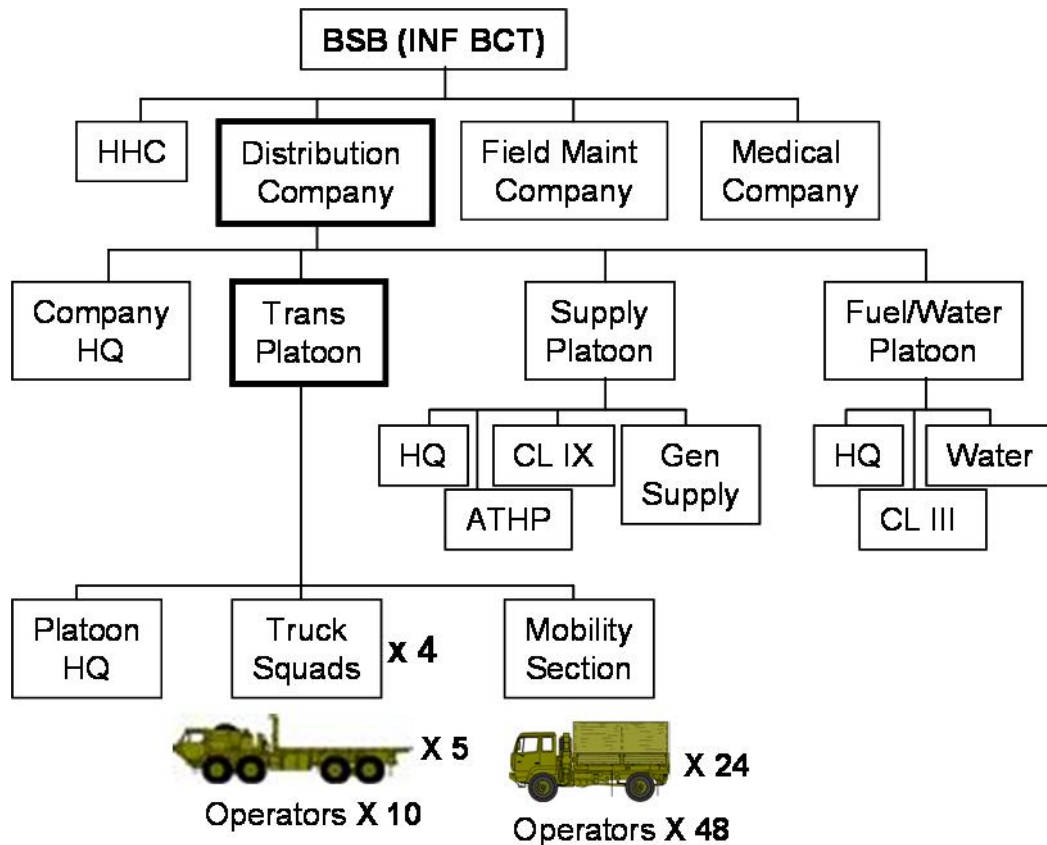


Figure 1: BSB Structure in IBCT

The BSB is the closest element of the three echelons to the last 1,000 yards, but the majority of its responsibilities involve reception and staging of assets for distribution. The BSB has a similar structure to the FSB. However, the Headquarters and Supply Company of the FSB became a headquarters element and a Distribution Company.¹³² Additionally, the BSB gained companies to support other battalions of the BCT. Although operating at a tactical level, the BSB still deals primarily in bulk items. These units rarely “push” required supplies to battalions, companies, and platoons on the battlefield due to limited transportation assets, which is exactly what was wrong with the Legacy Force FSB structure.

¹³² The BSB, like the sustainment brigades, are expandable, which is the capability to accept additional CSS modules based on the forces assigned to the brigade combat team. [Army Comprehensive Guide to Modularity, Vol. I, 5-79.]

Obviously, these three echelons of logistics support are important, but none are directly responsible for providing the supplies to the end user, whose location and requirements change rapidly. What level is responsible for the last 1,000 yards, and how can the emerging doctrine ignore the elements that are so critical to bridging the logistical transportation gap? Below the lowest echelon defined by the Modularity Guide is an echelon known as the Forward Support Company (FSC), which directly supports the organic battalions of each brigade combat team. Originally, the FSC, as illustrated in Figure 2, was organic to the supported battalions of the BCT, but subsequently the BSB gained ownership of the FSC.¹³³ However, all of the transformed organizations considered by the Army as IBCTs view the FSC as organic to the battalions that the FSC supports.¹³⁴ Therefore, this paper will consider the FSC as organic to the battalion it supports.

¹³³ The current MTOE of the 10th Mountain Division's IBCTs, the 101st Airborne Division's IBCTs, and the 82nd Airborne Division's IBCTs reflect the FSC as subordinate to the respective BSB. [U.S. Army Force Management Support Agency, Force Management System Web Site. Available [Online] <https://webtaads.belvoir.army.mil/usafmsa/>.

¹³⁴ The 101st Airborne Division issued assignment orders for the FSCs to their respective supported battalions according to LTC Henry A. Arnold, the commander of 2-187 Infantry from June 2003 until March 2005. The 10th Mountain Division and the 82nd Airborne Division consider the FSCs under the operational control (OPCON) of the respective maneuver battalions according to MAJ Blue Hilburn, the current G35 Logistics Plans Officer, and LTC Michael Peterman, the current commander of 782 BSB, respectively. Though each may differ on the terms of support the BSB still provides to the FSC, the command relationship is clear – the FSC works for the maneuver battalion commander and is part of the maneuver battalion. The 25th Infantry Division Plans Officer, MAJ Brian Payne, described the relationship of the FSC as similar to the traditional relationship of the Fire Support Officer and the Brigade Commander. “The FSC works with and reports to the Man Commander, but still gets technical guidance/property management from the BSB.” [personal interview with MAJ Brian Payne on 24 February 2006.]

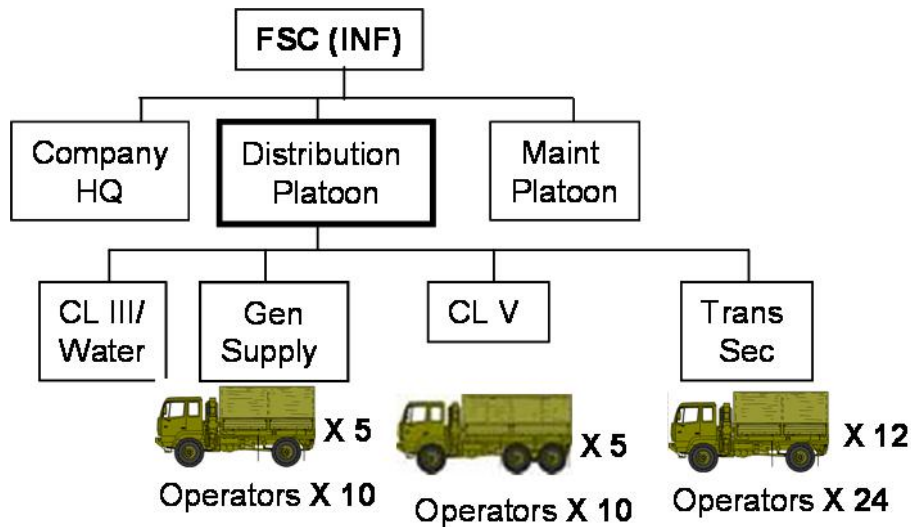


Figure 2: FSC Structure in IBCT

The responsibilities of the FSC differ little from those of the Legacy Force’s HHC. The FSC did not replace the Headquarters and Headquarters Company (HHC) of the Legacy logistical doctrine. However, the FSC assumed control of the Support Platoon and the Maintenance Platoon but did not receive any additional transportation assets above those contained in the Legacy Force structure.¹³⁵ Responsibilities of the FSC include providing elements of the battalion with one to two days of supply,¹³⁶ replenishing these supplies from the single day of supply maintained by the BSB, providing mobility assets to support maneuver and logistics, and conducting field level maintenance for all assigned or attached equipment. The FSC is also responsible for both “pushing” and “pulling” assets within the supply chain. The FSC pushes

¹³⁵ This is another example of a shell game within Modular Logistics. The touted increase of the BSB’s transportation capability is partially due to the inclusion of transportation assets that previously belonged to the Legacy Force HHCs. The overall gain within the logistical structure of the IBCT in terms of transportation is equivalent to a transportation platoon. However, the BSB gained other additional assets from higher logistical echelons, which increased its capabilities in other areas such as fuel, water, and maintenance.

¹³⁶ Each company normally maintains one day of supply or maybe two depending upon the situation and the type of brigade combat team. The FSC will normally maintain one day of supply, therefore giving it the ability to provide immediate replenishment to companies. The BSB also maintains enough materiel to provide an additional day of supply for each battalion within the brigade combat team. Together, these three levels provide the BCT with the ability to conduct 72 hours of operations without drawing supplies from the supporting tactical sustainment brigade operating the tactical distribution center.

required supplies to companies and potentially platoons while maintaining the responsibility for retrieving or “pulling” supplies from the BSB. This is clearly the level responsible for the last 1,000 yards of the logistics chain as it was in the Legacy Force. The only assets responsible for logistics below the FSC are a few individuals that assist with requisitions, tracking, and distribution management.

Clearly from the above logistical structure description, the Army’s logistical transformation focuses primarily at the strategic and operational levels, not the entire length of the logistical supply chain. This focus overlooks the historical logistical transportation gap at the tactical level that plagued the U.S. Army since before the World War II. Major General (Retired) Robert Scales, a current military theorist and author of *Yellow Smoke: The Future of Land War for America's Military*, stated that the Army’s transformation center of gravity or source of power is at the tactical, not the operational level of refinement. “We have to transform small units to make them as good as we can.”¹³⁷ If this statement is correct, then the design of the logistical system and logistics capabilities must originate from the “bottom up.”¹³⁸ In the Modular, BCT-centric force, the bottom is at the company and battalion levels. These are the lowest levels at which assembled logistical assets execute replenishment operations.

Growing the Logistical Transportation Gap

The end state of transformation is an improved force capability. The basis of these improved capabilities is assumptions about the current and future operating environment and

¹³⁷ Rich Dunn, *Rich Dunn’s Circulating Notes*, notes from American Enterprise Institute for Public Policy Research (AEI) Conference on the Future of the United State Army, Washington, DC, 11 April 2005.

¹³⁸ JFCOM’s *The Joint Operational Environment-Into the Future* (Coordinating Draft) supports the concept of designing capabilities from the ground up. “Capabilities result from combinations of technologies, systems, connectivity, operating procedures, doctrine, training, leaders, and personnel. Discrete, tactical capabilities are designed from the ground up, with all of these pieces serving as parts of the whole.” [Headquarters, U.S. Joint Forces Command, *The Joint Operational Environment-Into the Future* (Coordinating Draft), 11 January 2005, 3-4.]

assumptions about the enemy that will pose the next threat.¹³⁹ The future operating environment might be similar to the current conflict in Afghanistan and Iraq or might be in a remote jungle of the world or even in China. The enemy that poses the next threat could be similar to those faced in Iraq or might be a conventional force that supports the whims of a strong state government. Regardless of the environment or the threat, the American people expect the Army's costly transformation plan to fix anything that previously did not work and to handle any environment or enemy effectively.

The emerging Modular doctrine bases many of its assumptions and desired capabilities on the reality of the contemporary operating environment (COE). The COE according to Field Manual 3-0, *Operations*, "affects how Army forces combine, sequence, and conduct military operations."¹⁴⁰ The COE drives the concept of Brigade Combat Team (BCT) centric operations, which is a touchstone of the new Modular doctrine. This differs from the Legacy Force's doctrinal focus of the division. The COE also forces Modular doctrine to address the reality of non-linear, noncontiguous operations in a geo-strategic environment of considerable instability.¹⁴¹

These two critical shifts from the Legacy doctrine affect the envisioned logistical support system of Modular doctrine. BCTs must now operate within a larger battlespace than previously described in Legacy doctrine. This increased depth and breath of battlespace simultaneously increase the battlespace size of subordinate units. BCTs now operate within Legacy Force doctrinal areas of a division, in terms of size. Intuitively, the increased size of a BCT's

¹³⁹ Capabilities and assumptions about the future threat are the basis for doctrine. A great discussion concerning the evolution of doctrine is found in Major Paul Herbert in *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations*.

¹⁴⁰ Field Manual 3-0, *Operations*, 1-24.

¹⁴¹ One of the significant paradigm shifts within emerging, contemporary doctrine is from the threat-based approach of current doctrine to a capabilities-based approach. "U.S. defense planning will focus less on where and when a conflict will occur and more on the broad set of capabilities U.S. military forces need to deter, deny, and defeat adversaries who will rely on surprise, deception, and asymmetric warfare to achieve their objectives." [Headquarters, U.S. Joint Forces Command, *The Joint Operational Environment-Into the Future* (Coordinating Draft), 11 January 2005, 3.]

battlespace also increases the logistical transportation requirements in terms of transportation platforms, labor forces, and materiel handling equipment. In addition, the non-linear and noncontiguous aspects of the Modular doctrine increase the distances between the FSB and the end user as well as the distances between the FSB and its supporting SSAs. These increased distances also require an increase in logistical transportation assets.¹⁴² Despite this known requirement to deal with extended lines of communications, the Modular doctrine fails to resource the IBCT appropriately to conduct effective replenishment operations in all conditions of the COE.

The increased battlespace combined with the non-linear, noncontiguous structure of the future combat environment only amplify the historic logistical gaps previously identified in terms of transportation platforms, labor forces, and materiel handling equipment. The Modular logistical doctrine does not fix the identified lack of physical capability and resources of the supply-based Legacy system. However, the Modular Force's logistical information systems appear to improve with the addition of a satellite-based communication network that allows the tracking of supplies along the entire length of the supply chain. The ability to track items along the supply chain may increase "asset visibility," but the historical logistical gap concerns the physical capacity and resources necessary to deliver the supplies to the far end of the supply chain. Computers and other parts of the information system do not physically load, move, separate, or deliver the parts or materiel to the end user. The information system will also allow for the rapid transfer of changing requirements from the consumer end of the supply chain to the originating end, but transportation assets are still the limiting factor of the supply chain. While the *Modular Force Logistics Concept* recognizes the "distribution system capacity is constrained

¹⁴² Throughout history, the US Army has been an expeditionary force. Inherently, this requires long lines of communications both in and out of a theater of operation. Historic examples of this requirement are World War II (both theaters), Vietnam, Operation DESERT STORM, Operation ENDURING FREEDOM, and Operation IRAQI FREEDOM. An easy case could be made that all of America's conflicts including the Revolutionary War and the Civil War were fought over extended lines of communication.

by the most limiting part of the distribution system,” it does not acknowledge the lack of physical capacity and resources at the tactical level to be the limiting part of the Modular doctrine’s distribution-based system.¹⁴³

The physical capacity and resources of the three pillars of transportation are still insufficient to close the historical transportation gap and improve the support of the IBCT.¹⁴⁴ The Army still intends to solve this shortfall through pooling assets. The Army’s transition to the triangular division prior to World War II demonstrated that “pooling” was not as effective as it mistakenly appeared to be efficient.¹⁴⁵ During numerous conflicts, ad hoc organizations fashioned a bridge across the asset gaps created by pooling.¹⁴⁶ Sharing assets is a valid alternative under emergency conditions, but the Army should be wary of being reliant upon pooled assets to meet its steady-state capability. If units operate continuously under ad hoc or emergency situations, then what happens during a real asset emergency? Pooling does not create redundancy, flexibility, or effectiveness, unless units have enough organic assets to fulfill assigned capabilities. Pooled resources should act solely as backup or replacement assets to fulfill unforeseen requirements during tactical or operational crisis conditions.¹⁴⁷

The Modular doctrine’s reduction in the number of CSS levels between the BSB and the TSC potentially decrease the number of available pooled assets that are available to BCTs and

¹⁴³ The limiting factors identified are at the operational and strategic level. [*Modular Force Logistics Concept (Draft)*, Version 1.2, 25.]

¹⁴⁴ The aspects of training are outside the scope of this paper. However, flaws in the training structure or culture do not help the logistical transportation gap. In major training exercises, logistics units are not the primary training audience, so artificiality is accepted and almost required to prevent logistical problems from negatively affecting the primary training audience, the maneuver force. Therefore, training avoids dealing with and working through the true tactical logistical problems under realistic conditions.

¹⁴⁵ For more information on pooling during the Interwar period, see chapter 3 of Jonathan M. House’s *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization*.

¹⁴⁶ Any ad hoc organization requires both time and training to become either effective or efficient. The Army cannot expect to be successful if required capabilities are not recognized or resourced appropriately. The Army can no longer expect to win through pure “ad hocery.”

¹⁴⁷ Pooled assets are only efficient until their use is required continuously. Pooled assets utilized continuously exponentially increase equipment maintenance requirements. Additionally, the equipment experiences a dramatic reduction in “life span.” These two second-order effects of pooling will result in an increase of personnel to maintain and operate the pooled equipment as well as an increase of requirements on the supply system for parts and new equipment.

below. This may or may not be a true statement based on the unfixed or expandable structure of the Tactical Sustainment Brigades and the TSC's Sustain Brigades. Regardless whether the pooled assets are equivalent to those available in the Legacy Force supply-based system, transportation asset utilization will only increase based on the distribution-based system of "inventory in motion."¹⁴⁸ Since the increased organic transportation assets of the Modular BSB cannot handle even the increase in distances and battlespace size of the BCT, it is doubtful that pooled transportation assets could handle all the necessary increases in logistical requirements.¹⁴⁹

To complicate the transportation requirement deficit further, the *Army Comprehensive Guide to Modularity* depicts the IBCT as a force with more mobility than the Legacy Force in terms of tactical maneuver. However, IBCTs cannot simultaneously execute both logistical and maneuver transport. The IBCT vignette of this manual describes infantry forces employed through either aerial or ground transportation platforms. "Almost every operation will require some, if not all, of the infantry in the IBCT to move by truck."¹⁵⁰ As previously described, the BSB and the FSCs combined require more transportation platforms from higher pooled assets to accomplish this capability.¹⁵¹ Employing elements of an IBCT in this manner limit simultaneous

¹⁴⁸ Mark J. O'Konski, "Revolution in Military Logistics: An Overview," *Army Logistician*, Jan-Feb 1999. Available [Online] <http://www.almc.mil/alog/issues/JanFeb99/MS20364.htm>.

¹⁴⁹ BSBs cannot physically move all their organic personnel and equipment at one time with only internal transportation assets. These internal transportation assets are also the same assets the *Army Comprehensive Guide to Modularity* assumes are available to perform tactical maneuver transport of infantry soldiers for a single battalion of an IBCT.

¹⁵⁰ *Army Comprehensive Guide to Modularity*, Vol. I, 9-23.

¹⁵¹ The over-use of pooled equipment result in low operational readiness rates and the unavailability of equipment to fulfill requests. According to "A Congressional Guide to Defense Transformation: Issues and Answers," "underfunding and overuse...have left the United States with military equipment that is worn down and aging." A low operational readiness rate and the unavailability of equipment may indicate subordinate organizations are not effectively resourced. This was the case for 3rd ID's experience in OIF. [James Jay Carafano, Jack Spencer, and Kathy Gudgel, "A Congressional Guide to Defense Transformation: Issues and Answers," *Backgrounder* (Washington, DC: The Heritage Foundation, April 25, 2005), 7; Peter C. Bayer, Jr., *Third Infantry Division (Mechanized) "Rock of the Marne" After Action Report Final Draft* (Department of the Army, Headquarters, 3d Infantry Division (Mechanized), Baghdad, Iraq, 12 May 2003), Chapter 18, page 1; excerpt reprinted in US Army Command and General Staff College, *End-of-Course Symposium* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, June 2005), RC-12.]

operations at all levels based on the number of assets required from the asset pool.¹⁵² If all of an IBCT's organic transportation assets are essential to support maneuver, what assets are available to conduct normal replenishment operations or support the distribution-based system? Once again, the emergent doctrine has not fixed the logistical transportation gap at the far end of the supply chain.

One proposed ad hoc solution to the lack of mobility for both maneuver and logistics tasks at battalion level and below is the addition of the Light Utility Mobility Enhancement System (LUMES). The LUMES is a "small and inexpensive all terrain vehicle" designed "to carry loads beyond the 50 pounds per soldier [individual maximum combat load], at least for part of the mission."¹⁵³ If these vehicles are similar to the currently fielded John Deer Gators, then its speed restrictions prevent self-deployment in conjunction with other forms of motor transport. Therefore, these new mobility assets require additional motor transport to deliver them to the battlefield. Additionally, the acquisition of the LUMES increases the amount of fuel moved over the last 1,000 yards of the logistic chain.¹⁵⁴ When these vehicles are not in use for some reason or another, the vehicles become like most other deployed equipment or containers. They become the responsibility of the respective unit's FSC or HHC for accountability until the tactical situation once again requires these assets. The LUMES are additional equipment that only compound the BSB's and FSC's existing problem of conducting single lift movements, unless

¹⁵² How are the "pooled" resources or ad hoc organization trained to meet the demands of their assigned tasks? The Army continues to overlook the risks associated with pooled assets. Pooled assets are required to adapt quickly not only to rapidly changing conditions of the contemporary operating environment but also to the rotation of controlling headquarters. Though units may function similarly, each unit has a unique command climate. It is critical for pooled assets to conduct detailed rehearsals and training with the supported unit to understand these unique climates. If the pooled assets are continuously used, when do they conduct these rehearsals and training?

¹⁵³ *Army Comprehensive Guide to Modularity*, Vol. I, 9-23.

¹⁵⁴ The limited operational range, haul capacity, and speed of these vehicles may prevent them being an effective asset to cover the new extended battlespace. The incurred maintenance aspects of additional parts and repair skills are additional components of the problem, which are worthy of consideration in respect to a viable solution.

additional transportation assets are available to transport all the required equipment and personnel correctly.

The LUMES provides some means of bridging the logistical transportation gap at the lowest levels but does not solve the entire problem. This equipment definitely makes the strategic deployment easier with respect to its weight and size in lieu of resourcing units with larger transportation assets that have the required capabilities of operational range, haul capacity, and speed to make units effective. “Lighter” equipment or forces might make the strategic deployment requirement of the expeditionary force easier and more cost efficient, but “lighter” does not necessarily meet the required capability to survive and win on the battlefield. Once again, efficiency in strategic deployment does not equal effective logistical operations at the point of the spear.

Another declaration found in Modular doctrine that will expand the logistical transportation gap concerns the requirement for all assets of an IBCT to be rotary wing transportable. The Modularity Guide clearly states that an IBCT’s focus mode of tactical transportation is rotary wing assets, either CH-47 or UH-60. “Ideally, there should be no organic equipment in the IBCT that cannot be transported by CH-47, and no mission essential equipment in rifle companies that cannot be transported by UH-60.”¹⁵⁵ This desired capability assumes that rotary wing assets will always be available to an IBCT for both maneuver and logistics. Even the Legacy Force brigades of the 101st Airborne Division, which were habitually task organized with an entire assault aviation battalion, did not validate this capability assumption. This capability requires a smaller haul capacity to meet the size and weight criteria of rotary wing assets. The haul capacity is directly proportional to the number of assets required.¹⁵⁶

¹⁵⁵ *Army Comprehensive Guide to Modularity*, Vol. I, 9-22.

¹⁵⁶ History clearly demonstrates this relationship. Napoleon’s Army as well as the American force in the Civil War and World War I continuously experienced “fodder” problems. If the number of wagons required grows, so does the quantity of fodder to feed the additional mule teams. As additional fodder is

Corresponding to the doctrines' vision of aviation support to an IBCT for maneuver operations is the envisioned capability of having supplies delivered by aviation to the forward elements of an IBCT engaged in combat. Besides the fact that this envisioned capability assumes the existence of "ideal conditions" of the COE to deliver the necessary supplies, it also assumes that aviation assets, which are limited like other transportation platforms, would be available for logistical replenishment. This method of replenishment is the exception not a rule. Additionally, these types of replenishment operations brief well but ignore the fact that a labor force with a specific knowledge requirement must construct the pre-positioned packages at "the forward base of support" prior to or during operations.¹⁵⁷ This oversight might appear "minor" in planning. However, bad assumptions have cost lives, because support or the right, configured support was not available when required.

The Army utilized or tested some of the Modular logistical doctrinal concepts during the execution of OIF and OEF. In December of 2003, the Army G4 published *Logistics White Paper: Delivering Materiel Readiness to the Army*. This paper addresses "known shortfalls" in some of the concepts that still require improvement.¹⁵⁸ It identifies key areas "that fell far short of expectations; namely logistics communications and data connectivity; an effective theater distribution system...; and an integrated supply chain."¹⁵⁹ The Army's commissioned study of OIF, *On Point*, was even harsher:

From the recent shift to "just-in-time" logistics to the training and equipping of CSS soldiers and units, the CSS community and the Army must rethink how they conduct operations. The current system emphasizes efficiency over effectiveness – from parts and supply distribution to the physical equipping of CSS units. In combat, however, effectiveness is the only real measure

required, more wagons are needed to transport this fodder. It results in a never-ending cycle of balance between haul capacity and the number of transport vehicles required.

¹⁵⁷ *Army Comprehensive Guide to Modularity*, Vol. 1, 9-58.

¹⁵⁸ U.S. Department of the Army, *Army Logistics White Paper: Delivering Materiel Readiness to the Army* (Washington, DC: US Government Printing Office, 2003), 2. Available [Online] <http://www.hqda.army.mil/logweb/sitemap/2003-Web/visnstmt/Whitepaper.pdf>.

¹⁵⁹ Maccagnan, 18.

of success; many CSS units struggled to perform their mission due to “savings” realized in recent changes in organization, equipment, training resources, and doctrine.¹⁶⁰

Conclusion

The Army’s pursuit of a campaign quality force with an expeditionary capability is valid based on the emerging, realistic aspects of the contemporary operating environment in terms of dispersed threat and potential undeveloped theater environments. This chapter addressed the effectiveness of the framework or doctrine used by the Army to develop the capabilities of the campaign quality, expeditionary force known as the Modular Force. In terms of logistics, the Modular Force described in the emerging doctrine of the *Army Comprehensive Guide to Modularity* fails to incorporate the right mix of resources and capabilities to meet the requirements of the nation within the context of the contemporary operating environment.

General Schoomaker stated that the critical aspect for achieving success with the Modular Force is the ability to achieve “staying power.”¹⁶¹ The staying power of a military force is directly proportional to its ability to provide the required supplies to the end-users at the right time to prevent culmination and the forfeiture of the initiative. In both the Legacy Force doctrine and the emerging Modular Force doctrine, the solutions to the logistical transportation gap, which prevents success over the last 1,000 yards, were the same. The supply-based system of the Legacy Force and the distribution-based system of the Modular Force look to the concept of pooled assets to solve the lack of physical capability and resources. Since perceived efficiencies of pooling have not historically solved the logistical transportation gap, it is doubtful if these efficiencies will solve the logistical gap for the Modular Force. General Schoomaker even stated

¹⁶⁰ Fontenot, xxvii.

¹⁶¹ Schoomaker, 8.

efficiency is not as critical as effectiveness. “The premium now is on employed combined-arms effectiveness at lower levels vice efficiency at macro levels.”¹⁶²

Besides primarily relying on the flawed concept of pooling to achieve efficiency instead of effectiveness, the Modular Force doctrine appears to not only maintain the same logistical transportation gap of the Legacy Force, but to actually expand the gap with the pursuit of a smaller logistical tail to support the campaign quality, expeditionary force. The Modular Force doctrine is highly dependent upon the discovery of skip-a-head technology to achieve this smaller logistical tail. This desire for a smaller logistical tail through technology drives several faulty assumptions found in the emerging doctrine while overlooking the historic problem, which plagued the force since before World War II. The historic problem is tactical logistics mobility in terms of transportation platforms, labor forces, and materiel handling equipment.

Doctrine for the Modular Force is not set as authoritative yet. The current war efforts demonstrated several critical shortcomings of this emerging doctrine that require correction. However, solutions for the identified shortcomings must occur rapidly to enable the emerging doctrine to become authoritative and useful.¹⁶³ As Maccagnan illustrated perfectly with the statement, “Distribution-based logistics offers efficiencies, but it cannot seek these as the expense of the ultimate bottom line, which is effective support.”¹⁶⁴ Therefore, the next chapter of this paper presents possible solutions for the enduring logistical transportation gap in the tactical segment of the U.S. Army supply chain of the Infantry Brigade Combat Team (IBCT).

¹⁶² Ibid., 10.

¹⁶³ Currently, 13 of the 38 BCTs have begun transforming to the Modular Force. Most units will achieve the transformed structure by 2008. However, support brigades will not be complete until 2011.

¹⁶⁴ Maccagnan, 19.

CHAPTER FOUR

SOLUTIONS NOT SHELL GAMES

The German Army of World War II failed to acknowledge critical flaws in their logistical system and seek corrective actions or solutions. These failures led to not only disastrous strategic mistakes in 1941 but also disastrous tactical impacts as the Eastern Front forces lost thousands of soldiers due to a logistics culmination during Operation BARBAROSSA. Williamson Murray points to a slough of indifference from a 1940 logistical war game as the origin of these critical mistakes that resulted in the “infamous August pause” and the “near collapse of the Wehrmacht’s logistical system.” This war game “indicated that the German supply system could only function effectively...two-thirds of the way to Leningrad....Yet these sobering results had absolutely no effect on the operational planning of Operation BARBAROSSA.”¹⁶⁵

The U.S. Army, like the German Army of 1940, has continuously failed to acknowledge the criticality of its own logistical transportation gap. The German experience of 1941 almost became a reality for the U.S. Army’s V Corps during Operation IRAQI FREEDOM (OIF) as logistical constraints contributed to the infamous pause of combat operation prior to the seizure of Baghdad. It is now time for the U.S. Army to accept the problem presented thus far as a reality and take corrective action to fix the logistical transportation gap. Previous attempted solutions were either menial and not effective or not implemented. Additionally, solutions to this problem must achieve effectiveness of the campaign quality, expeditionary force vice efficiency of cost through a reduced logistics footprint.¹⁶⁶

As stated previously, the Army’s historic attempts to solve the logistical transportation gap occurred along the margins of the true problem through essentially shell games. Pooling was a shell game for the Army prior to World War II. It allowed the Army to supplement additional

¹⁶⁵ Williamson Murray, “Thoughts on Red Teaming” (Defense Adaptive Red Team (DART), Working Paper #03-2, May 2003), 9.

¹⁶⁶ U.S. Department of the Army, United States Army White Paper, *Concepts of the Objective Force* (Washington, DC: US Government Printing Office, [No date]), 15.

capabilities or resources temporarily to solve an immediate problem without fully fixing the origin of the problem. These efficiencies proved anything but effective. In terms of inherited second and third order effects, the necessity to replace large amounts of equipment due to overuse is also far from efficient.¹⁶⁷ However, shell games are still present today. The logistical structure of the Stryker Brigade Combat Team (SBCT) illustrates that the Army continues to focus on shell games to solve identified problems.¹⁶⁸

The solutions presented in this paper attempt to provide real solutions, not a continuation of the shell game practice. The proposed solutions may not achieve efficiency in terms of cost, but they effectively solve the logistical transportation gap.¹⁶⁹ The proposal is a set of solutions focused on enabling the emerging Modular Force to achieve the envisioned capabilities required to ensure the success of the distribution-based logistics system. As the Army G-4 stated in *Army Logistics White Paper: Delivering Materiel Readiness to the Army*, “Effective theater sustainment rests solidly on the fundamental concepts of distribution-based logistics....Our success will be measured at the last tactical mile with the Soldier.”¹⁷⁰

The structure of the solutions and this chapter mirror the framework of an operating concept proposal as outlined by John Schmitt in “A Practical Guide for Developing and Writing

¹⁶⁷ According to a *Backgrounder* article on defense transformation, overuse of equipment has left the military lacking. “Underfunding and overuse during the 1990s, followed by three years of war since September 11, 2001, have left the United with military equipment that is worn down and aging. Large portions of the force will need to be replaced in the next decade.” [James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation), April 25, 2005.]

¹⁶⁸ The organic Brigade Support Battalion (BSB) of the SBCT requires the support of an additional Combat Service Support Battalion (CSSB) from the high headquarters’ tactical sustainment brigade to achieve self-sufficiency on the battlefield. The reduction in logistical assets during the design of the SBCT achieved perceived efficiency of the SBCT in monetary cost as well as in the cost of strategic lift capability. However, the Army now bears the weight of the true or complete cost as these units deployed to combat in Iraq.

¹⁶⁹ The proposed solution set was not constrained by the requirement to maintain the same overall force size of the Army. If the force structure requirement of the proposed solution must come from the current force, then the structure could come from one or more of the proposed BCTs. It is more important to have fewer effective forces than to have more forces that are not self-sufficient.

¹⁷⁰ U.S. Department of the Army, *Army Logistics White Paper: Delivering Materiel Readiness to the Army* (Washington, DC: US Government Printing Office, 2003), 4. Available [Online] <http://www.hqda.army.mil/logweb/sitemap/2003-Web/visnstmt/Whitepaper.pdf>.

Military Concepts.”¹⁷¹ The preceding chapters clearly define the purpose of the solution set and the description of the military problem. This chapter begins with a quick summary of the required capabilities and guiding principles that bear on all available solution sets. The proposed solution set is next. It includes additional options to address each element of the transportation pillars separately. Following the solution set, supporting or enabling concepts describe those other Army initiatives that enhance the proposals. Finally, the chapter concludes with the risks and potential criticism of the proposed solutions.

Requirements

If it is possible for the Army to close, reduce, or bridge the enduring logistical transportation gap, what are the guiding principles or requirements that define the possible solution set? First and most importantly, the solution set must support the Army Chief of Staff’s vision of a campaign quality force with expeditionary capabilities. In his own words, “the foundation of Army Transformation must be diversity and adaptability.”¹⁷² These requirements taken together describe a distribution-based logistics system “that delivers rapid and precise support” under all conditions of the contemporary operating environment (COE) regardless of the size, intensity, or duration of conflict.¹⁷³ The logistical system must be expandable in terms of transportation platforms, labor forces, and materiel handling equipment to accommodate the rapid changing conditions found in the COE. This expandable or adaptable quality cannot be through a

¹⁷¹ Schmitt provides the following as elements of future operating concepts: purpose of the concept; time horizon, assumptions, and risks; description of the military problem; synopsis of the central idea; application and integration of military functions; necessary capabilities; and spatial and temporal dimensions. [John F. Schmitt, “A Practical Guide for Developing and Writing Military Concepts,” Defense Adaptive Red Team (DART), Working Paper #02-4, December 2002. Available [Online] http://www.dtic.mil/jointvision/drafthls_joc.doc.

¹⁷² Peter J. Schoomaker, “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities” (Washington, D.C.: 108th Congress, House Arms Services Committee, 2004), 10. Available [Online] http://www.house.gov/hasc/openingstatementsandpressrelease/108th_congress/04-07-21schoomaker.pdf.

¹⁷³ U.S. Department of the Army, *Army Logistics: Delivering Materiel Readiness to the Army, Revised* (Washington, DC: US Government Printing Office, April 2005), 6. Available [Online] <http://www.hqda.army.mil/logweb/UpdatedCombinedpaper.pdf>.

shell game of pooled resources in the Continental United States (CONUS) or at echelons above the required level.

According to “A Congressional Guide to Defense Transformation: Issues and Answers,” another principle to guide the solution set is the criticality of near-term requirements versus the long-term investment of future systems. The Army’s logistical system must “sustain the ability to conduct current missions.”¹⁷⁴ To accomplish this principle, more transportation assets are required. The solution must build-in flexibility and expandability with the requisite amounts of transportation assets. Besides the increases in battlespace and distance of an IBCT, emerging technological integration will continue to increase the logistical requirements of the Future Force, and the IBCT logistical transportation system must be prepared to expand. Accompanying the increase in space and distance is the requirement for elements of the logistical system to maintain their warfighting capability at the lowest level due to the decreased security of the COE for all elements including logistical assets.

The solution set must not neglect the requirement for warfighting, which equally applies to the identified transportation pillars. Under the emerging doctrine, BCTs must be self-sufficient. As General Schoomaker stated, “The inherent robustness and self-sufficiency of brigade combat teams will enhance their ability to deploy rapidly and fight upon arrival.”¹⁷⁵ To obtain this self-sufficiency, the IBCT must be capable of both maneuver and sustainment under non-ideal conditions. Transportation assets must support rapid movement of both personnel and supplies simultaneously. The force design cannot assume aviation asset availability in support of all assigned missions due to weather and resource limitations. Additionally, the transportation pillars must incorporate the essential capabilities for warfighting as outlined by the Army G4:

¹⁷⁴ Carafano, “A Congressional Guide to Defense Transformation: Issues and Answers.”

¹⁷⁵ Schoomaker, 11.

“improved vehicle and crew connectivity; improved crew/operator protection; [and] enhanced maintainability.”¹⁷⁶

Besides the warfighting aspects, the solution set must ensure the fighting force maintains a competitive advantage over potential adversaries. In terms of logistics, this competitive advantage includes the ability to operate in undeveloped theaters of all types of terrain. A key to operating in undeveloped or under developed theaters is an ability to transfer supplies between logistics nodes of the supply chain rapidly. This “rapid inter-modal transfer of supplies,” according to the Army G4, is dependent on “modernizing sustainment packaging” to ensure minimal requirement for repackaging.¹⁷⁷ Regardless of the packaging method at the depot level, a labor force is necessary at the tactical level to configure loads based on changing requirements. The ability to reconfigure loads prevents unneeded supplies from overloading a combat force and wasting limited transportation platforms to move unneeded supplies. Finally, flexibility within the available transportation assets enables the IBCT to maintain a mobility advantage over the adversary in the uncertain environment of the COE.

Despite the requirement to maintain a competitive advantage over the enemy, the solution set cannot depend solely on technology. As was one of General DePuy’s foundational principles with doctrine development, “new, more efficient technologies” of the distant future should not be the basis of solutions to current problems.¹⁷⁸ Force design should deal with innovative solutions using existing technology. The solution set must be “designed to satisfy the space and weight limitation of our major tactical intra theater lift capabilities,” according to General Schoomaker.¹⁷⁹ However, this requirement does not necessitate all equipment of an IBCT to be UH-60 or CH-47 compatible, as specified in the *Army Comprehensive Guide to Modularity*. Nor

¹⁷⁶ *Army Logistics: Delivering Materiel Readiness to the Army, Revised*, 7.

¹⁷⁷ *Ibid.*

¹⁷⁸ Carafano, “A Congressional Guide to Defense Transformation: Issues and Answers.”

¹⁷⁹ Schoomaker, 21.

does it necessitate a zero sum gain in strategic lift requirements for an IBCT, which is the fate that befell the Light Infantry Division (LID) design of the late 1980's.¹⁸⁰

Solution Set

The outlined requirements for the solution set clearly point to the criticality of some increase in transportation assets, which include transportation platforms, labor force, and materiel handling equipment. The increase in capacity with respect to these transportation pillars is crucial to the realization of the envisioned distribution-based supply system of the Modular Force. The proposed solution set provides some degree of latitude and flexibility, since a perfect solution is not actually possible based on the adaptive nature of the COE. General Schoomaker clearly illustrated this reality. “Confronting an adaptive adversary, no single solution will succeed, no matter how elegant, synchronized, or advanced. Its very ‘perfection’ will ensure its irrelevance.”¹⁸¹ Therefore, the proposed solution set only attempts to reduce the logistical transportation gap along the tactical segment of the U.S. Army supply chain of the IBCT in order to prevent further proliferation of logistical ineffectiveness seen throughout history.

The first step toward a solution involves an increase of transportation platforms to handle the desired increase in tactical mobility of personnel, which is separate from the transportation platforms necessary for distribution of supplies and material across the noncontiguous battlespace. To provide the IBCT with simultaneous maneuver and supply capabilities, the IBCT requires a transportation company consisting of four truck platoons. This organization would fall within the Brigade Troops Battalion (BTB) and support maneuver requirements of subordinate battalions similar to the supporting relationship between the IBCT and an assault aviation

¹⁸⁰ Michael J. Mazarr, a U.S. conventional force development historian, in *Light Forces & The Future of U.S. Military Strategy* clearly points to the flawed requirement of no net gain in strategic lift as the origin of logistical failure for this unit. The resulting reduction in structure to meet deployment criteria produced “a lack of sustainability” and “severe tactical limitations.” This severe tactical limitation “remained the lack of tactical mobility.” [Michael J. Mazarr, *Light Forces & the Future of U.S. Military Strategy* (New York, New York: Brassey’s (US), Inc., 1990), 38 and 59.]

¹⁸¹ Schoomaker, 10.

battalion.¹⁸² This transportation company would be responsible for all aspects of maneuver in accordance with the supported commander's intent, including loading sight security, fire support coordination, route selection, en route security, and debarkation sight security. The company's design integrates the capabilities of a response force, which includes the ability to delay, disrupt, or isolate a threat until a designated Quick Reaction Force (QRF) or Tactical Combat Force (TCF) arrives if it cannot destroy or deter the threat independently.¹⁸³ The envisioned threat that this company can handle "consists of enemy special operations teams, long-range reconnaissance units, mounted and dismounted combat reconnaissance teams, and partially attrited small combat units."¹⁸⁴

All four platoons of this company would be symmetric in terms of personnel, organization, and equipment. Each platoon would be composed of six Family of Medium Tactical Vehicles (FMTVs) and four High Mobility Multi-Wheeled Vehicle (HMMWV), as shown in Figure 3. Each vehicle would require a crew of three: driver, vehicle commander, and gunner. The platoon would organize into four sections: two transport sections, a security section, and headquarters or command and control section. The two transport sections would consist of three FMTVs, two with M2 .50 Machine Guns as the primary weapon system and one with a MK19 40mm Automatic Grenade Launcher. The section leader, a staff sergeant, would act as one of the vehicle commanders. The security section would consist of two HMMWV, each with a M2 .50 Machine Gun. The section leader, a staff sergeant, would act as one of the vehicle commanders. The headquarters section would mirror the security section except the platoon

¹⁸² Subordinating this new transportation unit to the BTB is intentional. By placing this organization under the BTB, it clearly differentiates its mission and training requirement from the transportation units of the BSB and FSC. Additionally, this separation will help prevent subsequent, superficial degradations in transportation assets without cognitive reasoning. Bean counters are less likely to degrade small units that provide a unique capability to a unit.

¹⁸³ Field Manual 3-90, *Tactics*, E-28-E-29.

¹⁸⁴ *Ibid.*, E-7.

leader and the platoon sergeant would serve as the vehicle commanders.¹⁸⁵ All vehicles will require internal communication systems for crew coordination as well as line of sight communications to communicate between vehicles. The headquarters section vehicles would have an additional communication system to communicate with the supported commander, both voice and digital. The minimum requirement for Future Battle Command Brigade and Below (FBCB2) is the two headquarters section vehicles, but FBCB2 in section leader vehicles would provide additional communication means and versatility.

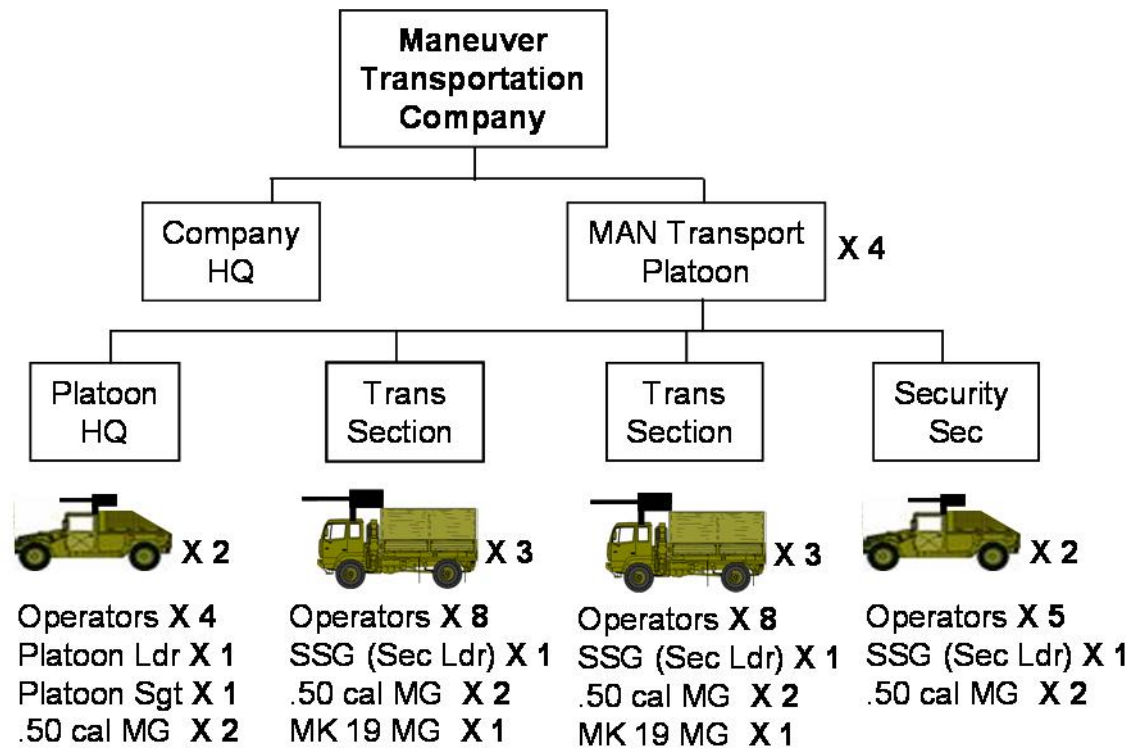


Figure 3: Maneuver Transportation Company Structure

The basis for the organization of this transportation company is the requirement to transport one infantry battalion. Each platoon has the capacity to transport one infantry company.

¹⁸⁵ Officers and NCO for this unit do not require a specific branch or MOS skill set. The skills required for this unit should be common throughout all branches and MOSs. This will prevent the large expansion of the Transportation Corps in terms of personnel to support the creation of these units. Transportation and Support Platoons currently have a similar generic skill set requirement under the Legacy Tables of Organization and Equipment (TOE).

The fourth platoon would act as additional assets to transport other elements of the battalion or attachments that may require separate transportation. These additional assets also provide redundancy to prevent ineffectiveness of the company if a vehicle is lost in combat or due to maintenance. Additionally, the size of the platoon allows this transportation company to distribute transportation assets to several elements of the IBCT simultaneously. If multiple platoons support a single commander, the maneuver battalion commander may choose to employ his Headquarters and Headquarters Company commander as the movement control leader.

One transportation company does not allow the IBCT to employ both maneuver battalions simultaneously. According to the *Army Comprehensive Guide to Modularity's* description of IBCT combat operations, employment of one or both maneuver battalions may be through aviation assets, or employment may occur sequentially. In either case, more than one transportation company is not required for maneuver. However, the next part of the solution set provides for the potential requirement to employ both maneuver battalions by ground without affecting the transportation assets required to conduct replenishment operations.¹⁸⁶

To provide flexibility within the IBCT in terms of maneuver transportation platforms, a UEx¹⁸⁷ would receive a maneuver transportation battalion consisting of three transportation companies. These transportation companies would mirror the organization, personnel, and equipment previously described for the IBCT's transportation company. Additionally, this battalion would receive a Headquarters and Headquarters Company and a FSC. These additional

¹⁸⁶ If required to employ both battalions by ground, the IBCT with the proposed transportation company could satisfy the requirement. However, this requires diverting all the transportation platforms from both maneuver battalion FSCs. This diversion of resources creates a logistics distribution gap that previously plagued Legacy Force units. Units employed by this method will not have an accompanying logistical tail and depending upon the distance of employment, may go without resupply for several days.

¹⁸⁷ The term UEx changed to Division and Corps depending upon the rank of the commander and the structure of the organization. The currently printed and published doctrine still refers to these organizations as UEx.

assets provide the unit the ability to plan, coordinate, employ, and support its subordinate transportation companies.¹⁸⁸

The role of this transportation battalion is similar to that of other supporting elements of a UEx. The transportation battalion would provide maneuver augmentation to assigned or attached BCTs of the UEx. It could augment an IBCT with an additional transportation company to allow the simultaneous ground employment of both maneuver battalions. The transportation battalion requires three companies in case the UEx controls three separate IBCTs simultaneously. Additionally, this transportation battalion could provide non-standard maneuver transportation to a Heavy Brigade Combat Teams (HBCT) that conducts stability or support missions within the construct of full spectrum operations.¹⁸⁹ This transportation battalion would also provide reinforcing support to either a Tactical Sustainment Brigade or an Operational Sustainment Brigade for either replenishment operation's transport or non-standard medical evacuation transport.

The next two components of the solution set focus on the organization, personnel, and equipment of the transportation platforms found within the FSC and BSB structures of the Modular Force that support logistical replenishment operations. At the FSC level, the logistical transportation platforms must have the capability to function as the Red Ball Express organizations of World War II. Currently, the FSC organically controls 22 transportation

¹⁸⁸ Since the supporting brigades structures of the UEx as well as the UEx structure itself are modular, the proposed maneuver transportation battalion would be assigned to the UEx or a subordinate support brigade as required based on the contingency requirements. Ideally, this transportation battalion would be task organized or assigned to the Maneuver Enhancement Brigade (MEB). Assigning this unit to the MEB follows the same logic of assigning the maneuver transportation companies of the IBCT to the BTB and not the BSB. Placing the maneuver transportation battalion under the MEB clearly differentiates its mission and training requirements from the transportation units found in the Sustainment Brigades. This unit's focus is combat maneuver support not combat service support.

¹⁸⁹ The reality of this potential use of transportation assets bears out in current operations in Iraq. HBCTs may require maneuver platforms different from their organic equipment based on the conditions and mission assigned. Without the transportation assets of the proposed transportation battalion, the HBCT would continue use its organic assets, which may adversely affect the accomplishment of their assigned mission.

platforms to accomplish both the “push” and “pull” sides of replenishment operations.¹⁹⁰ These assets subdivide into three sections: ammunition, supply, and transportation. Figure 2 previously illustrated the structure of the FSC. However, the realities of executing replenishment operations demonstrate these sections function as one element in retrieving assets from the BSB and distributing them to the end user at the far end of the supply chain. Therefore, the distribution element of the FSB should become two platoons with duplicate capabilities.

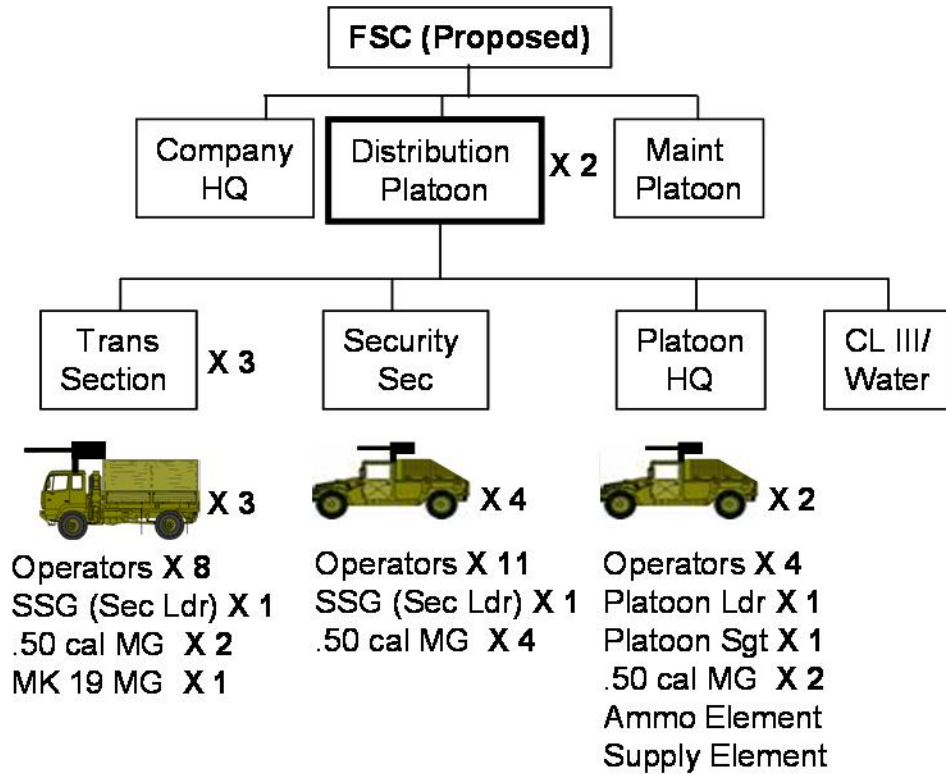
Each of these two platoons would consist of nine FMTVs and six HMMWVs divided into three transportation sections, a security section, and a headquarters section.¹⁹¹ Figure 4 illustrates this design’s organization. This design is of the same vein as the proposed maneuver transportation company of the BTB. Each vehicle would require a crew of three: driver, vehicle commander, and gunner. The three transport sections would consist of three FMTVs each, two with M2 .50 Machine Guns as the primary weapon system and one with a MK19 40mm Automatic Grenade Launcher. The section leader, a staff sergeant, would act as one of the vehicle commanders. The security section would consist of four HMMWV, each with a M2 .50 Machine Gun. The section leader, a staff sergeant, would act as one of the vehicle commanders. The headquarters section consisting of two HMMWV and two M2 .50 Machine Guns mirrors the platoon headquarters of the maneuver transportation platoon. The specific skills of the previous ammunition and supply sections would be included within this headquarters section.¹⁹² Additionally, the communication architecture of these logistical transportation platoons mirrors

¹⁹⁰ U.S. Army Command and General Staff College, Student Text 101-6, *Combat Service Support Battle Book* (Fort Leavenworth, Kansas: United States Army Command and General Staff College, July 2005), 8-15.

¹⁹¹ This proposed organization design reduces the overall vehicle capacity by four transportation platforms. However, the reduction of the necessity to conduct maneuver transportation support and the reduction of task specific transportation platforms provides at least an equal capacity for logistical replenishment operations.

¹⁹² The Class III and Water section assets of the current Modular FSC design for an IBCT would split between the two proposed platoons to provide equal capacity to “push” and “pull” supplies. This section may also reside under the company headquarters section of the FSC for allocation as required by each replenishment mission.

the maneuver transportation platoon, which enables crew coordination, inter-vehicle communication, inter-unit communication, and digital communication.



two separate platoons of 10 HEMTTs. The three LMTV transportation platoons would mirror the design of the transportation platoons proposed for the FSC. The two HEMTT platoons would consist of two HEMTT sections, one security section, and a headquarters section. Each HEMTT section would contain five HEMTTs, where the section leader would act as one of the vehicle commanders. The security section and headquarters section would mirror those of the FSC transportation platoons. Additionally, the communication architecture would mirror that of all the proposed transportation platoons.

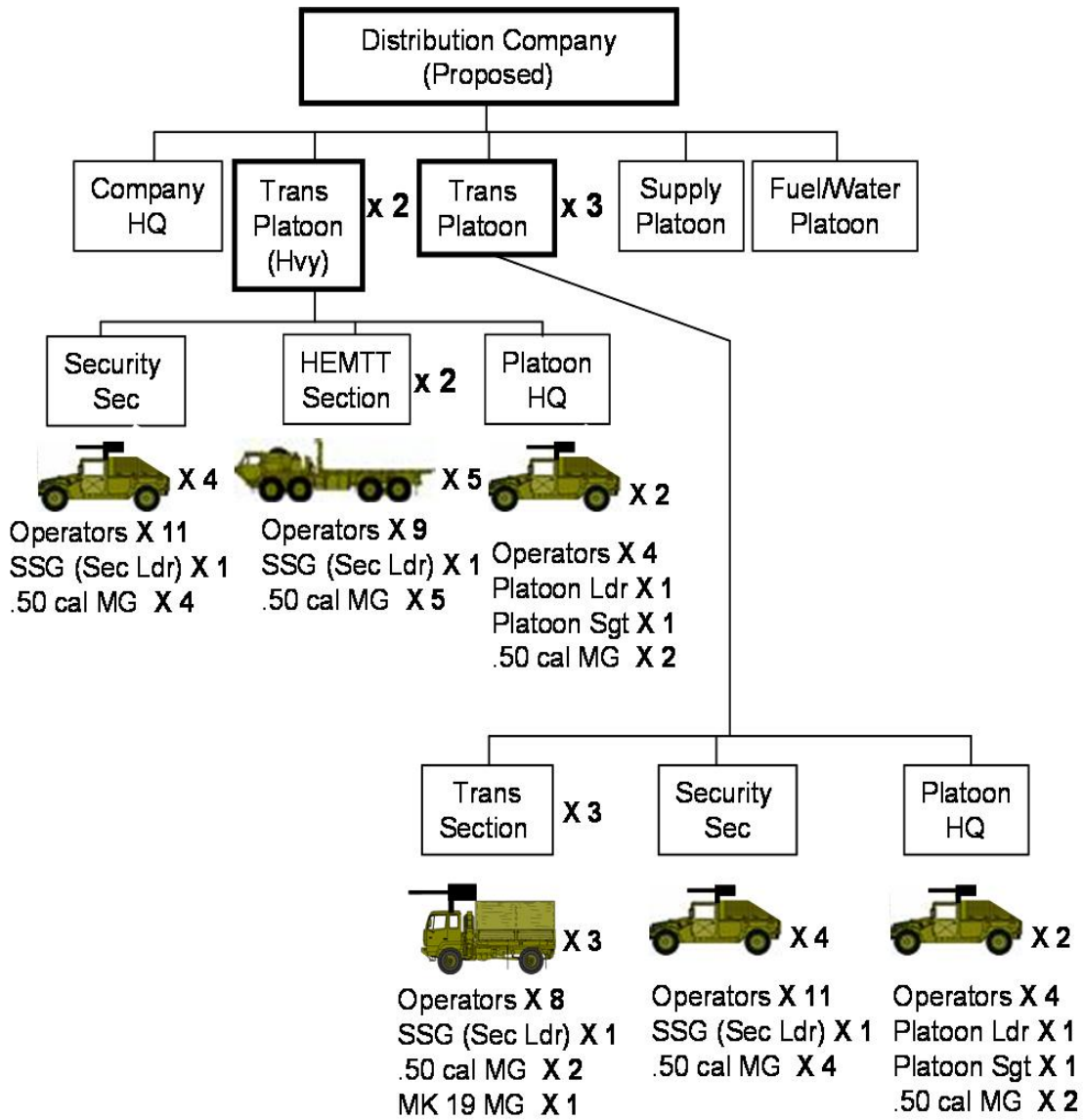


Figure 5: Proposed Distribution Company Structure for IBCT

The proposed solution set for the Modular Force in terms of transportation platforms satisfies many of the identified requirements to reduce the historic logistical transportation gap such as adaptability, expandable structure, embedded warfighting capability, simultaneous movement of personnel and equipment, and improved connectivity. This solution set thus far reduces the requirement for the pooled transportation assets held above the BCT level. However, other requirements remain, and additional components of the solution set are necessary to reduce the logistical transportation gap successfully. The next components of the solution set address labor forces followed by materiel handling equipment.

The necessity of the labor force component illustrated previously is critical to the overall success of the distribution-based supply system of the Modular Force. However, the size of the necessary labor force is inversely proportional to the quantities of material handling equipment. Even with a proposed increase in material handling equipment, the current Modular design will not provide enough soldiers within the FSC or the BSB to offer a sufficient labor force for logistical replenishment operations. The proposed increase in personnel that accompanies the transportation platform portion of the solution set will provide a sizable labor force within both logistical levels of the IBCT. Increasing the vehicle crew size from two to three and the addition of a security element will provide these transportation organizations with sufficient labor forces to prevent any diversion of combat troops to a labor force mission. Furthermore, the addition of the maneuver transportation company to the IBCT structure provides additional personnel, which may serve as a labor force. These organizations may support the BSB or FSC logistical resupply missions' directly through augmentation of replenishment operations or be temporarily task organized to the BSB as a labor force when not conducting tactical transportation missions.

The personnel of these redesigned transportation units that will fulfill the role of the required labor force must increase the breadth of their skills to effectively perform the tasks of a labor force. These transportation unit soldiers both within the maneuver transportation company of the BTB and within the FSC and BSB logistical transportation units require training on load

construction, transport, security, storage, distribution, and tracking. They must have the skills to build combat configured loads of all classes of supplies for all size combat units from battalion down to team level. Their skill set must include knowledge on load construction for all modes of transport including fixed-wing, rotary-wing, ground, and water. Additionally, all transportation unit soldiers will require skills to operate multiple forms of materiel handling equipment.

The final component of the solution set outlines the required increase in materiel handling equipment, which ensures a larger labor force is not necessary and the distribution-based supply system can rapidly deliver large quantities of supplies to the end user, the soldier at the tip of the spear. As discussed previously, the Legacy Force and the Modular Force designs lack sufficient quantities of materiel handling equipment to assist with bridging the logistical transportation gap. No materiel handling equipment exists in the IBCT outside the limited quantities organic to the BSB.¹⁹⁴ Various units within the IBCT structure could help bridge the logistical transportation gap with the addition of all terrain, extendable boom, lightweight forklifts, which are currently available through commercial vendors and shown in Figure 6.¹⁹⁵

¹⁹⁴ The Forward Support Battalion (FSB) traditionally had four to six materiel handlers. The mix consisted of both 10,000 lb and 6,000 lb forklifts. Not all forklifts have extendable booms, which limit their application within the requirements of equipment and supply transfer between modals. Not all of the materiel handling equipment is organic to the Headquarters and Supply Company or the Modular Distribution Company.

¹⁹⁵ For more information on commercial vendors, visit Princeton Delivery Systems Inc. or Quality Corporation web sites. These are only two of the many vendors of these types of materiel handling equipment.



Figure 6: Examples of commercially available forklifts that may fulfill the materiel handling requirement

The basis for forklift distribution depends on available transport platforms and combat load packaging requirements. Based on the proposed transportation unit model of the solution set, each transportation platform section would receive one forklift. This distribution would provide each FSC with six forklifts and the BSB with nine additional forklifts. The HEMTT platoons of the BSB would not require these assets since they transport interchangeable platforms. Providing these materiel handling equipment assets to the maneuver transportation company's platoons would create redundancy and increase the unit's flexibility to augment logistical replenishment operations, but the maneuver transportation company does not require these transportation assets.

For the proposed materiel handling equipment to fulfill the sought requirements, these assets require specific capabilities and some modifications to current fielded equipment. The proposed forklifts are lightweight, durable, truck transportable, and have a 5,000 lb lift capability. These assets must also have the ability to lift cargo above the bed height of an LMTV and extend

the lifted cargo to the interior of the bed platform as shown in Figure 7.¹⁹⁶ In order to integrate the truck transportable attribute within the current LMTV design model, a slight modification to the bed of the LMTV is necessary to secure the forklift to the back of the truck for transport as shown in Figure 8.¹⁹⁷ These modification kits are commercially available, or local fabrications is an option. Additionally, each LMTV needs a detachable cargo roller system similar to those found in a CH-47 Helicopter or a C-17 Globemaster to aid with rapid on-load and off-load of materiel. These roller systems, as illustrated in Figure 9,¹⁹⁸ would be detachable parts of the LMTV, so the truck can still effectively perform non-palletized cargo missions.¹⁹⁹



Figure 7: Illustration of the extendable reach capability required of the proposed forklift

¹⁹⁶ Pictures obtained from Princeton Delivery Systems Inc., Piggy-Back Web Page. Available [Online] <http://www.piggy-back.com>.

¹⁹⁷ Ibid.

¹⁹⁸ Pictures obtained from AAR Corp, AAR Cargo Systems Web Page. Available [Online] http://www.aarcorp.com/manufact/cargo_systems.html

¹⁹⁹ Another LMTV modification that would assist in troop transport would be a seat redesign. The new design could mirror the collapsible seats of the UH-60 Helicopter. If these seats are in the center of the vehicle with the occupants facing out, the occupants could effectively react to contact. These seats would also provide a restraint system, which is currently not available for the passengers of an LMTV. When the LMTV transports cargo, the seats would be stored under the cargo platform of the truck.



Figure 8: Demonstration of the truck transportable capability

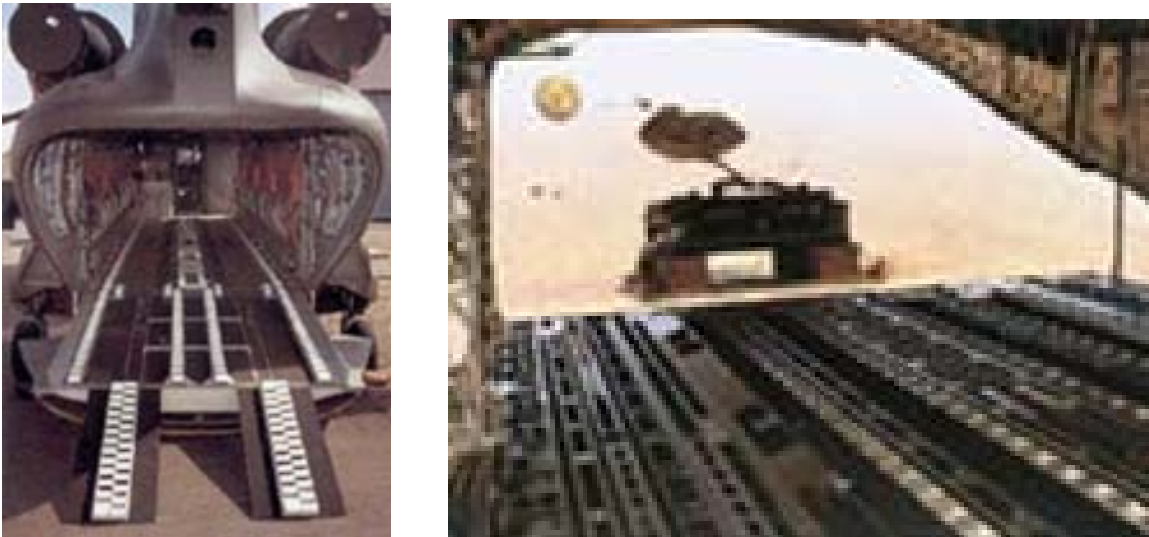


Figure 9: Example of the detachable roller system for the CH-47 and C-17 respectively

The increase of material handling equipment and respective vehicle modifications complete the proposed solution set for the identified logistical transportation gap. The complete solution set in terms of transportation platforms, labor forces, and material handling equipment satisfies the demonstrated requirements of the identified problem. Though the proposed solution set provides the Army an opportunity to reduce the historical logistical transportation gap and realize the true potential of the distribution-based supply system of the Modular Force doctrine, the Army must continue to pursue other solutions that continually improve the logistical system at

all levels along the supply chain. The next section identifies other current Army initiatives that enhance the proposed solution set.

Enabling Concepts

The Army's current transformation roadmap outlines other concepts that will enable the proposed solution set and increase the effectiveness of the overall Modular logistical system. This section does not attempt to capture all the on-going concepts but tries to focus on a few critical initiatives, which demonstrate the proposed solution is not outside of the strategic transformation goals. One of the most important concepts is Joint logistical interdependence. The Army Chief of Staff desires more than just Joint logistical interoperability. He believes "interdependence is central to both the expeditionary mindset and campaign quality....There is a pressing demand for a joint end-to-end logistics structure that permits reliable support of distributed operations."²⁰⁰ All the services will share the weight of transportation assets at the strategic and operational level within the Joint system, but the Army's transportation capability at the operational and tactical levels will bear the majority of increased requirements. This initiative only reinforces the need for the Army to increase its capability to bridge the historical transportation gap at the tactical level. At the lowest levels, the other services will look to the Army for support. This Joint concept will reduce some of the current transportation requirements at the strategic and theater levels.

Another major Army initiative that will enhance the logistical capability of the Army is the Combat Service Support Very Small Aperture Terminal (CSS VSAT) satellite communication system. According to the Army G4, this system will improve the logistician's ability to: "calculate requirements accurately, tell suppliers what soldiers want or need,...see the progress in the fulfillment of the requisition, see the location of supplies in the pipeline, and communicate

²⁰⁰ Schoomaker, 21.

with suppliers/customers to prioritize shipments.”²⁰¹ This initiative includes the Movement Tracking System (MTS), the Battle Command Sustainment Support System (BCS3), and the integration of Native Radio Frequency Identification (RFID) in the Standard Army Retail Supply System (SARSS). These systems in combination with a physical transportation capability allow supplies to rapidly move along the supply chain under uncertain conditions and still provide the right supplies to the right user at the right time. These communication systems support the independent warfighting structure of the proposed solution set. The digital systems allow transportation assets to redirect pick-up or drop-off locations and quantities of supplies without committing additional transportation assets to fulfill the changed requirements. According to *Army Logistics: Delivering Materiel Readiness to the Army*, “providing global end-to-end visibility is the best way to gain customer confidence and eliminate duplication of effort.”²⁰²

Another enabling concept that can assist with supply distribution and Joint logistical interdependence is new air delivery technologies such as the Integrated Logistics Air Resupply (ILAR) system.²⁰³ These systems provide a previously unattainable accuracy and capacity to air delivery platforms. The ability to deliver more supplies at specific locations and times will only reduce the distances transportation assets must cover to deliver supplies to the end user. With logistical transportation platoons that have sufficient security, labor forces, and materiel handling equipment, these air delivered supplies can be rapidly collected and distributed to the required locations. Additionally, this air delivery capability reduces the Army specific transportation requirement above the BCT level by integrating Joint transportation platforms.

Risk and Criticism

A critical part of any solution or solution set is to understand and identify the weaknesses or potential second and third order effects that accompany the solution. Some risks endure

²⁰¹ *Army Logistics: Delivering Materiel Readiness to the Army, Revised*, 2.

²⁰² *Ibid.*, 7.

²⁰³ *Ibid.*, 7-8.

regardless of the contrived solution or mitigation, because conflict is inherently risky. The laws of physics govern some of these potential enduring risks such as the relationship between time and distance, adverse weather reducing the trafficability of routes, and the relationship between quantity required and space available. This section focuses on risks not governed by physics and on potential criticisms of the proposed solution set including a continuation of shell game strategies, mission failure, monetary costs of maintenance and replacement systems, and growth of the size of the Army.

The proposed solution set is specifically dependant on organizational change and materiel acquisition. In the past, the Army mitigated the risk of required organizational expansion or materiel acquisition by shell games. Specifically, senior leaders justified the inability to field specific organizations or equipment fully by demonstrating how stockpiling or pooling a reduced number of organizations or assets could still achieve success. The same action could befall the proposed solution set. However, even the reorganization of the exiting transportation assets into combat capable units would help reduce the logistical transportation gap, because more assets would reach the required destination with a reduced cost of lives and equipment.

The solution set design is also susceptible to mission degradation if combat losses or maintenance reduce the number of transportation platforms within the IBCT. The basis for the maneuver transportation platoon's design is the number of transportation platforms required to move a single infantry company of the IBCT. The loss of a single transportation platform during combat operations results in the transportation platoon and more specifically the IBCT loosing the capability to transport one battalion by ground without augmentation. The mitigation of this risk occurs through the fourth platoon of the maneuver transportation company or through the transportation battalion under the UEx. Additionally, the reorganization of the FSC and BSB transportation units will allow the cross attachment of transportation sections to fulfill the mobility requirement of the IBCT. Therefore, the inherent flexibility of the solution set prevents mission culmination of any specific unit or the IBCT as a whole.

The solution set's increase in available transportation assets also creates an increase in unit support requirements. The increase in transportation assets equates to an increase in required sustainment resources such as maintenance assets, spare parts, and fuel. Once again, the old "fodder" problems of the Civil War or the "Resupply by Inundation" (RBI) of 3rd Infantry Division in OIF resurface in the proposed solution set. However, the current overuse of pooled assets also increases the maintenance and fuel requirements due to equipment "approaching or...exceed[ing] its Economic Useful Life (EUL)."²⁰⁴ According to the Army G4, "operational and sustainment costs continue to climb...[as] increased operational requirements accelerate the aging the TWV [Tactical Wheeled Vehicle] fleet."²⁰⁵ Although the solution set increases sustainment requirements in the near term, the current course of action also increase the sustainment requirements. However, the key difference between these increases is one has a fixed increase, while the other one has an exponential growth increase. Therefore, the solution set may decrease fuel and maintenance requirements in the long term as equipment will not reach its EUL as rapidly as the current approach to transportation.

Gaining flexibility within both the maneuver and resupply functions of the logistical chain requires an increase in funding. Some critics view this funding or cost increase as a disadvantage or risk of the proposed solution set. These critics have not considered the rising costs hidden in the emergent Modular Force logistics system. Pooling transportation resources reduces the mean life expectancy of all transportation equipment. James Carafano, Senior Research Fellow for National Security and Homeland Security, supports this assertion: "Underfunding and overuse...have left the United States with military equipment that is worn down and aging."²⁰⁶ Due to overuse, the logistical transportation assets cost the Army more in

²⁰⁴ Ibid., 16.

²⁰⁵ Ibid.

²⁰⁶ Carafano, "A Congressional Guide to Defense Transformation: Issues and Answers."

terms of routine maintenance and replacement systems.²⁰⁷ The proposed solution set reduces the required hours per system to an acceptable level. This use reduction prevents an exponential decrease in equipment life expectancy that will continue under the Modular Force's current resourcing of the distribution-based logistical system.

Another criticism that often accompanies monetary cost is the increased cost in terms of strategic lift requirements to make a unit expeditionary. The proposed solution set increases an IBCT's strategic lift requirement, but the increase is not significant. The additional lift requirement is for about 19 LMTVs and 16 HMMWVs. This strategic lift increase would still be necessary without the proposed solution set additions to the IBCT, because an IBCT deployed into an austere theater of operation would require an augmentation of pooled transportation assets to deliver the desired mobility portrayed by the Modular Force doctrine. The Modular Force's ability for increased mobility is currently only capable through another shell game. Therefore, the strategic lift cost increase turns out to be a zero sum situation between the proposed solution set and the Modular Force design.²⁰⁸

The personnel and equipment increases that accompany the solution set are not zero sum gains. Fully implementing the proposed solution set will grow the size of the Army. After years with tight budgets, the culture of the Army sought only zero sum solutions. Historically with every proposal, the key question was what would one give up to provide personnel and equipment for the new proposal? The culture of zero sum gain contributed to the enduring logistical transportation gap of the IBCT design, which stemmed from the 1980's Light Infantry Division

²⁰⁷ According to the Army G4, usage rates of the current fleet and the corresponding costs are exponentially growing. "Over 50% of the Army's existing TWV[Tactical Wheeled Vehicle] fleet is approaching, or has exceeded, its Economic Useful Life (EUL)...[and] increased operational requirements accelerate the aging of the TWV fleet. Since the commencement of hostilities in Iraq, TWV usage rates have grown eight-fold." [*Army Logistics: Delivering Materiel Readiness to the Army, Revised*, 16.]

²⁰⁸ According to Wikipedia, "zero-sum describes a situation in which a participant's gain (or loss) is exactly balanced by the losses (or gains) of the other participant(s). It is so named because when you add up the total gains of the participants and subtract the total losses then they will sum to zero." [Wikimedia Foundation, Inc., Wikipedia: The Free Encyclopedia Web Page. Available [Online] http://en.wikipedia.org/wiki/Main_Page.]

(LID) design. The risk of not fixing the illustrated logistical transportation gap is far worse than the political and economic risks of growing the size of the force. If the political and economic environments force senior leaders to consider only zero sum solutions, then the risk with the lack of logistical transportation assets should transfer to the overall force size. Stated another way, the Army should reduce the total number of desired BCTs to gain truly effective, campaign quality, self-sufficient, and expeditionary capable units. Carafano’s recommendations to Congress in “A Congressional Guide to Defense Transformation: Issues and Answers” reflect a similar approach. He states, “Long-term investments should not be made at the expense of near-term requirements.”²⁰⁹ The near-term requirement is transportation assets in terms of transportation platforms, labor forces, and materiel handling equipment.

²⁰⁹ Carafano, “A Congressional Guide to Defense Transformation: Issues and Answers.”

CHAPTER FIVE

CONCLUSIONS

Force commanders face decisions between competing risks and must decide which risks carry the greater weight with respect to influencing the operation. The Army's *Combat Service Support* manual describes these decisions in terms of logistical commitment as "a potentially larger Army CSS [Combat Service Support] footprint, to the detriment of combat force capabilities."²¹⁰ These described competing risks are between an increased logistical footprint, which requires additional security and cost in strategic lift, and a less than optimal distribution system required to maintain the capability of the combat force.

Historically, commanders and senior leaders choose to assume risk with a reduced logistical distribution system instead of the risk associated with a more robust logistical footprint. This choice can and does lead to culmination when the reduced logistical system cannot support the maneuver force as was seen in World War II through Operation IRAQI FREEDOM (OIF). Charles Shrader, a renowned logistics historian, clearly believes that logistics is of primary importance in all operations. He stated, "The reality is that logistics is the primary consideration in all modern military operations and can be ignored only at peril."²¹¹ The contemporary operating environment of noncontiguous, non-linear, and adaptive battlefield dynamics only serves to expand the requirement for a more robust logistical distribution system. The Army can no longer afford to play shell games as a means to mitigate logistical risks. Supplementing assets is not a solution and does not fulfill the espoused capability of self-sufficiency in the Modular Force.

General Schoomaker and other senior leaders repeatedly describe transformation as a journey not an end. General Schoomaker states, "This [transformation] is merely the beginning.

²¹⁰ U.S. Department of the Army, Field Manual 4-0, *Combat Service Support* (Washington, DC: Government Publishing, August 2003), 3-5.

²¹¹ Charles R. Shrader, ed., *United States Army Logistics, 1775-1992: An Anthology*. Vol. I-III (Honolulu, Hawaii: University of the Pacific, 2001), 4.

Our incentive is not change for change's sake. Our incentive is effectiveness in this protracted conflict.”²¹² He defines effectiveness of transformation as achieving a campaign quality force with expeditionary capability. In terms of logistics, effectiveness means possessing logistical capabilities throughout the length of the supply line that enables self-sufficiency in the key core unit, the Brigade Combat Team (BCT), for the duration of a conflict. The logistical capabilities required to support this campaign quality, expeditionary force “include the requirement to support from a distance, to deal with severe austerity, to adapt to the environment and to ensure advantage by seeking innovation.”²¹³ These required capabilities espoused by Maccagnan, a logistician by trade, logically lead to the concept of Modular Force packages but not necessarily to the concept of smaller logistical packages or a smaller support structure.

The key or defining question of this monograph was whether these core units, specifically the Infantry Brigade Combat Team (IBCT), could bridge the historic logistical transportation gap of the Army's supply chain and provide supplies to the end-user to prevent culmination in an operational plan under the current Modular design and doctrine? The answer to this question lies at the far end of the supply chain where companies and platoons form the point of the spear. By the Army G4's own admission, “We must have a distribution system that reaches from the Soldier at the tip of the spear to the source of support, wherever that may be. Our success will be measured at the last tactical mile with the Soldier.”²¹⁴ Thus far, analysis of the historic logistical transportation gap clearly shows a growth and not a reduction in the gap with the current design and doctrine of the Modular Force.

²¹² Peter J. Schoomaker, “Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities” (Washington, D.C.: 108th Congress, House Arms Services Committee, 2004), 22. Available [Online] http://www.house.gov/hasc/openingstatementsandpressrelease/108th_congress/04-07-21schoomaker.pdf.

²¹³ Victor Maccagnan, Jr., “Logistics Transformation-Restarting a Stalled Process,” Monograph, Strategic Studies Institute, January 2005, 32.

²¹⁴ U.S. Department of the Army, *Army Logistics White Paper: Delivering Materiel Readiness to the Army* (Washington, DC: US Government Printing Office, 2003), 4. Available [Online] <http://www.hqda.army.mil/logweb/sitemap/2003-Web/visnstmt/Whitepaper.pdf>.

The current logistical concepts of the Army's transformational roadmap focus primarily at the strategic level and avoid the principal problems involved with tactical level distribution, which historically plague the United States military forces. This misdirected focus, disconnected from the reality of true requirements, points to a lack of historical perspective during concept development necessary to form a factual basis or framework for the comparison of new or imaginative concepts. Historical evidence clearly points to the significance of transportation platforms, labor forces, and materiel handling equipment at the tactical end of the logistics supply chain in defining the Army's logistical problem. However, most people choose to ignore the historic logistical transportation gap at the far end of the supply chain or the last 1,000 yards and hope this potential culmination catalyst miraculously disintegrates or disappears with the addition of more technology.

As the Army seeks to design a Modular Force based on emergent technology, it must address the historic problems of the current or Legacy Force design, or the envisioned Modular Force may have the same or greater weaknesses. Leveraging the capabilities of the Future Force depends on fixing the problems of the Current Force. In terms of logistics, the Modular Force described in the emerging doctrine of the *Army Comprehensive Guide to Modularity* fails to incorporate the right mix of resources and capabilities to meet the requirements of the United States within the context of the contemporary operating environment.

In both the Legacy Force and the emerging Modular Force doctrines, the solutions to the logistical transportation gap, which prevents success over the last 1,000 yards, look to the concept of pooled assets to solve the lack physical capability and resources. Since perceived efficiencies of pooling have not historically solved the logistical transportation gap, it is doubtful if these efficiencies will solve the logistical gap for the Modular Force. Besides primarily relying on the flawed concept of pooling to achieve efficiency instead of effectiveness, the Modular Force doctrine appears to not only maintain the same logistical transportation gap of the Legacy Force but to actually expand the gap with the pursuit of a smaller logistical tail to support the campaign

quality, expeditionary force. This desire for a smaller logistical tail through technology drives several faulty assumptions found in the emerging doctrine while overlooking the historic problem that plagued the force since before World War II, which is tactical logistics mobility in terms of transportation platforms, labor forces, and materiel handling equipment.

Though the emergent Modular Force doctrine expands the tactical logistical gap, a solution set addressing transportation platforms, labor forces, and materiel handling equipment is capable of bridging the tactical logistical gap. The solution set consists of restructuring the current transportation assets into organizations designed and resourced to conduct combat logistical missions. The solution set also enables the IBCT to conduct ground maneuver, which is an espoused capability of the Modular Force doctrine, without jeopardizing the logistical capability of the Modular Force doctrine's distribution-based system. Additionally, in terms of transportation platforms, the solution set provides flexibility, redundancy, and mitigation for combat loss risks by providing similarly organized transportation units to the UEx.

In terms of labor forces and materiel handling equipment, the proposed solution set provides for an increased IBCT capacity to support rapid movement of both personnel and supplies along the last 1,000 yards of the supply chain under non-ideal conditions. The IBCT would gain a dedicated labor force to support each supply distribution mission through an increase of personnel within each transportation unit. The addition of a maneuver transportation unit at the BCT level also provides a contingency labor force to augment sustainment requirements. Additionally, the integration of small, highly mobile, commercially available materiel handling equipment into the logistical transportation unit design reduces the overall requirement for a sizeable labor force.

The proposed solution set has potential risks and criticisms, but it does not attempt to continue the Army's tradition of constructing shell games to reduce costs and mitigate known risks. The solution set focuses on achieving the desired effectiveness of the Modular Force by reducing the logistical transportation gap in the tactical segment of the U.S. Army distribution

system of the IBCT. As General Schoomaker stated, “The premium now is on employed combined-arms effectiveness at lower levels vice efficiency at macro levels.”²¹⁵ Additionally, the proposed solution set directly contributes to the realization of the overall transformation goal: a campaign quality force with expeditionary capability.

Regardless of potential contributions possible through the proposed solution set, the reduction of the historic logistical transportation gap depends on action. Huston’s conclusion in *The Sinews of War* best expresses the enduring challenges of Army logistics that require consideration in concert with the transition to the Modular Force:

The Army cannot rest on past laurels in logistics. The complexity of modern weapons is multiplying, the geographical areas of possible conflict are expanding, and the need for economy in the national defense continues. Recognizing that the United States is at the apex of defense of the free world, and acknowledging the success of potential enemies in the improving of their own military capabilities, the challenges to Army logistics today are even greater than challenges of the past.²¹⁶

Considering the ever-increasing challenges, U.S. senior military and political leaders can choose to fix the age-old problems by implementing real solutions similar to the proposed solution set or choose to continue to play shell games. Without action, a slough of indifference will conceal the identified potential culmination catalyst of the Modular Force as the Army’s transformation journey falls back to the non-intellectual depth of PowerPoint espoused by Carafano and others.²¹⁷

²¹⁵ Schoomaker, 10.

²¹⁶ Huston, 692.

²¹⁷ James Jay Carafano, Jack Spencer, and Kathy Gudgel, “A Congressional Guide to Defense Transformation: Issues and Answers,” *Backgrounder* (Washington, DC: The Heritage Foundation), April 25, 2005. Available [Online] <http://www.heritage.org/Research/NationalSecurity/bg1847.cfm>.

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