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REPORT IN BRIEF

Force Multiplying Technologies for Logistics Support to Military Operations

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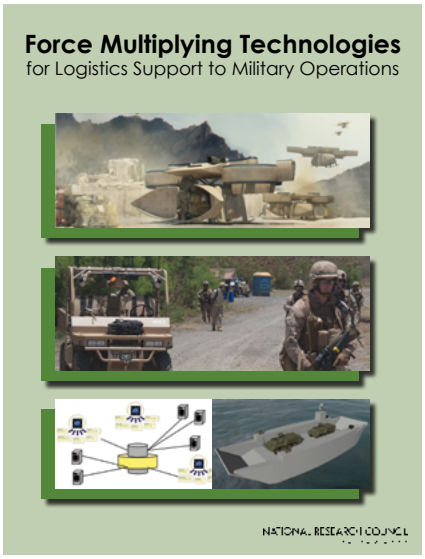
The U.S. Army is moving into a new, more austere, and more joint environment and must develop its equipment and prepare its personnel, force structure, decision making, and concepts of operation for a more expeditionary approach, one with a reduced logistics footprint. Force Multiplying Technologies for Logistics Support to Military Operations responds to a request from the U.S. Army G-4, Logistics, which asked the National Research Council to explore Army logistics in a global, complex environment that includes the increasing use of anti-access and area-denial tactics and technologies by potential adversaries. The report provides recommendations on areas in which burden-reducing R&D efforts should be focused, identifies areas in which logistics efficiencies could be obtained, and reviews the status of the Army's role within the joint logistics effort.



It is difficult to develop insight into what future logistics burdens might be based on what has occurred over the past 13 years. There was a continuous, heavy logistics burden on the system in both Iraq and Afghanistan, but whether the demands from these wars will be seen again in future wars in other geographic locations is hard to say. Both the Marine Corps and the Army now speak in terms of expeditionary missions and expeditionary forces. At the same time, force structure and resources are being reduced, and there is little certainty as to how far the tightening and resource reductions will go. But no matter how the nature of battle develops, logistics will remain a key factor.

Key Finding 1

Logistics activities within the Army do not receive the attention necessary to ensure the effective sustainment of operational forces on the battlefield over the long term. This is because, unlike things that directly affect combat effectiveness, it is difficult to understand the ultimate impact of logistics activities on Army capability. In R&D, analyses, exercises, and planning, logistics challenges are often minimized or postponed to be addressed another day. As a result, when systems are developed or plans are executed, the logistics enterprise is placed in a catch-up position, significantly reducing its ability to support the ongoing operations. Capability requirements, along with off-the-shelf solutions that create logistics burdens, are outpacing the development and fielding of burden-reducing logistics and logistics-related technologies.

Key Recommendation 1

Senior Army leadership should ensure that adequate resources and priorities are given to logistics activities across the spectrum of Army activities, including research and development, analytical support, force structure, military education, and operational planning.

Summary

The first Key Finding and Recommendation of the report carry the highest priority. The report also presents 17 additional Key Findings and Recommendations to reduce the logistics burden and improve the efficiency of Army logistics. If there is going to be substantive improvement in the logistics system of the Army, all of the following areas must be recognized and addressed.

Water

As a matter of doctrine, bottled water is used in the initial stages of operations until the bulk purification, storage, and distribution of water can be established. The use of bottled water weighs heavily on the logistics systems, puts soldiers and civilians at risk to deliver it, and generates a significant waste burden.

The Army should rely on its existing water technologies, and adopt or develop appropriate additional technologies, to satisfy water demand at the point of need and limit the use of bottled water except where the situation dictates its use.

Fuel and Energy

Emerging technologies such as the improved turbine engine program and high-efficiency drive systems would provide significant reductions in fuel demand for aircraft, the M1 Abrams, and the M2 Bradley and increases in system efficiencies.

The Army should strongly support continued development and fielding of a portfolio of promising technologies to reduce fuel and energy demand, including acceleration of the improved turbine engine program and more fuel-efficient engines for the M1 Abrams and the M2 Bradley or their replacements.

Ammunition

Precision munitions potentially offer significant reductions in required munition expenditures and qualitative improvements in effectiveness, thereby reducing ammunition demand and its logistics burden. Similarly, initial tests of directed energy weapons have indicated both their effectiveness and the reduction in logistics support required for their employment. The Army should adopt the use of precision munitions as widely as practical within mission requirements and should use directed-energy weapons systems if ongoing tests are successful.

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The planning of Army production, transportation, maintenance, storage, and expenditure of ammunition are carried out as relatively independent activities that have successfully supported military operations and have improved the efficiency of several elements of the ammunition supply chain. However, there is no indication that the Army is taking advantage of usage data from the past 25 years, experience from changes in weapons technology, or future opportunities that may exist to lessen the ammunition burden.

The Army should conduct a comprehensive analysis of the ammunition system with a view toward linking analysis of battlefield experience with the operations of the system as a whole.

Soldier Systems

Technologies for effectively meeting power demands for individual soldiers are emerging and offer the potential to reduce soldier load and increase soldier trust in the power reliability of carried systems.

The portfolio of projects under way to reduce the weight of power supplies for an individual soldier should be given emphasis and the resulting equipment should be fielded as soon as possible.

Mobility

The Army will be dependent on its organic watercraft capabilities for much of its intratheater transportation in many areas of the world. The age and capabilities of the watercraft currently in the inventory will limit such support. They are slow, have insufficient capacity, are too few in number, are highly sensitive to sea state, and could be impediments to efficient and effective logistics in the Asia-Pacific theater.

The Army should maintain priority support for the acquisition of the Maneuver Support Vessel (MSV) (Light) and concurrent development of the MSV (Medium) and the MSV (Heavy).

Autonomous vehicle technologies offer a significant opportunity to automate military operations in an effort to improve logistics operations. Unmanned and remote-controlled helicopters and precision air drop systems can significantly reduce the demand for ground-based resupply of forward areas in high-risk or limited-access situations.

Autonomous vehicle technologies should be implemented in phases, starting with what is possible now using semiautonomous technologies, so that incremental improvements to logistics can be realized as the technology matures. Research and development should be continued to develop these technologies for use in challenging, unpredictable environments that are currently beyond the capabilities of these technologies.

Additive Manufacturing

Additive manufacturing provides an emerging capability to produce components in support of Army logistics system needs at the point of need and to improve the responsiveness of the Army maintenance system. Additional development is required to fully realize the benefits of additive manufacturing and make it widely useful forward of fixed facilities.

The Army should leverage the industry investments in additive manufacturing and support technology areas that map to the Army's specific needs and implementation constraints. The Army should support standards development that would form the basis for qualifying components produced by additive manufacturing.

Logistics Enterprise Information System

The Army Logistics Enterprise System, which includes the Army Enterprise Systems Integration Program Hub, the Global Combat Support System-Army, and the Logistics Modernization Program, is a viable approach to support efficient and effective logistics for the Army. The Army has expended considerable resources on implementing what may be the largest enterprise resource planning system ever.

To ensure that the Army Logistics Enterprise Systems is fully implemented and operated efficiently over its life, the Army should provide constant resource and organizational support for the Army Enterprise Systems Integration Program, the Global Combat Support System-Army, and the Logistics Modernization Program, even after full implementation of the initial systems and related tools and applications. Without such support, the overall system will rapidly atrophy.

The U.S. Army logistics network has made considerable progress in improving in-transit visibility to the supply support activity and the unit motor pool.

Using the capabilities of Global Combat Support System-Army and the Logistics Modernization Program, the Army, in conjunction with industry, should compare the costs and benefits of extending the in-transit visibility to the end user/individual soldier to those of the current systems.

Logistics Decision Support

Modeling and simulation and systems analysis capabilities in support of Army logistics are insufficient to evaluate, compare, and contrast various S&T initiatives and their respective impacts on both the force structure alternatives currently under consideration and the outcomes across the spectrum of operations.

The Army should revitalize its logistics analysis capability by acquiring the necessary tools and qualified military and civilian analysts in quantities commensurate with the number and impact of logistics decisions that need to be made.

Use of Contractors and the Army Reserve

Contractors and the Army Reserve represent important elements of the Army and joint logistics team and, given the reductions in active military force structure, must be considered an essential component in the planning and execution of operations.

Both Army and combatant command leaders should integrate contractors and the Army Reserve into their contingency planning process from the beginning and on a continuous basis. Planners in both the Army and combatant commands should be schooled in the capabilities of contractor organizations and the Army Reserve to assist in contingency planning.

Guidelines for support of military operations over time by contractors are frequently formulated on the fly as operations evolve. This results in inconsistencies in the provision of services, competition among units and services, and a lack of attention to both potential support costs and the logistical burdens that are created.

Army leadership, in coordination with its sister Services, the Joint Staff, and combatant commanders, should establish guidelines for the support to be provided for contingency operations over time as the mission and needs develop.

Joint Logistics

Given the resource constraints that face today's armed forces and the necessity to develop an effective joint fighting force, jointness in logistics is an imperative. It has been over a decade since the military community began serious discussions of joint logistics and nearly 5 years since the Joint Staff articulated a vision for integrated logistics, and signs of progress are limited.

Wherever possible and appropriate, the Army should strongly support and become a part of joint logistics and related research and development activities.

Logistics Support of Special Operations

An extraordinary opportunity has arisen for the Army and Special Operations Command to jointly revisit and redefine their working relationships in the areas of logistics and sustainment for their mutual benefit.

The Army G-4 should initiate discussions with Special Operations Command (SOCOM) to revisit existing logistics and sustainment support policies, agreements, and capabilities (including linked databases) with the stated objective of revising them for their mutual benefit. In parallel, the Army G-4, working in conjunction with the individual geographic combatant commands and SOCOM, should determine the feasibility and acceptability of designating each Theater Army as the primary logistics and sustainment support organization for special operations forces in each geographic combatant command's area of responsibility.

Taking Advantage of Technology Innovation

Joint, interagency, intergovernmental, multinational, nongovernmental, and commercial organizations remain heavily involved in material development and technology innovation in areas directly relevant to Army logistics operations and sustainment goals.

In carrying out its material development programs, the Army should continue and, where appropriate, increase close collaboration with joint, interagency, intergovernmental, multinational, nongovernmental, and commercial organizations in science and technology areas where these organizations are pursuing programs similar to those required by the Army. The Army should avoid duplication of efforts underway in other sectors wherever possible.

Logistics Science and Technology and R&D Strategy

There is no explicit strategy for Army investment in logistics and related goals, such as a 25 percent reduction in fuel consumption for a given system. Such a strategy is needed to guide efforts to reduce logistics requirements and to guide the non-logistics material development efforts that increase the logistics burden of the Army in the field.

The Army, through the G-4 and with the support of the Combined Arms Support Command, should develop, staff, publish, and annually update an Army Logistics Science and Technology (S&T) and Research and Development (R&D) Strategy that clearly defines the long-range objectives for Army logistics, the programs that influence the attainment of these objectives, and the actions that will be taken to ensure the close integration of Army logistics enhancement activities with those of the joint and Department of Defense community and related industry.

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