LOGISTICS MANAGEMENT PRACTICES

THE CASE OF OPERATION ENDURING FREEEDOM (OEF) AND OPERATION IRAQI FREEDOM (OIF)

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Ah! But a man's reach should exceed his grasp
or what's a heaven for.

— Robert Browning

Fighting the Dervishes was primarily a matter of transport.
The Khalifa was conquered on the railway.

— Winston Churchill, 1902

The 9/11 terror attacks on the World Trade Tower, New York, have been a watershed in the conduct of wars. The global war on terror essentially is a form of asymmetric conflict of state versus non-state warfare which has seen a wholly new paradigm of war-fighting peculiar to the 21st century. The challenges for conventional armed forces have increased manifold. A key test is of force projection in areas which have not formed a part of traditional military planning, whether it is for preemptive operations or peace-keeping. The current dilemma of an international peace-keeping force in Lebanon is perhaps a significant example of the emerging dynamics of expeditionary engagements. The harsh reality of the logistics of mustering and movement of forces overrules other considerations like the need for rapid deployment.

A similar predicament was faced by the forces of the Western world immediately after 9/11, as the need to check the spread of influence of Al Qaeda,

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safely ensconced in the shelter provided by the Taliban in Afghanistan, entailed rapid deployment of force in a hostile, underdeveloped country devoid of resources. The challenge, therefore, was primarily of logistics, of mobilisation, movement, readiness and sustainment of force thousands of kilometres away from the home base. This was followed by Operation Iraqi Freedom approximately a year and a half later where a different set of logistics challenges faced the planners. Without indulging in the diplomatic, political or operational nuances of these actions, a review of the logistics best practices during OEF and OIF is, thus, considered immensely valuable.

AIM

The aim of this paper is to analyse logistics management during Operation Enduring Freedom and Operation Iraqi Freedom with a view to cull the best practices.

SCOPE

The scope of the paper is restricted to the opening phase of the operations in Afghanistan and Iraq, the stage of conduct of conventional military operations. The stabilisation operations conducted later and which are still going on have not been included as the logistics problems during this phase are felt to be easily manageable. However, some of the relevant common issues have been included in the paper. The focus is more on best practices and, thus, only those details which relate to this issue have been covered in the following parts:

(a) Part I – General Aspects.
(b) Part II – Mobilisation and Movement of Forces.
(c) Part III – Supporting the Forces.
(d) Part IV – Conceptual Issues.

PART I – GENERAL ASPECTS

MILITARY LOGISTICS

"Military logistics" includes a large number of activities which are involved in movement, maintenance and provisioning of forces, which include the

deployment of forces, the acquisition of material, and the sustainment of forces. Logistics had a major impact on the planning of operations as is evident from the change in plan for OIF where the Northern option had to be foreclosed once Turkey denied bases for operations in Iraq. The other important issue of modern logistics is the acquisition process, particularly to meet emergent equipment requirements during ongoing operations. For example, at present, the US armed forces are looking for high quality ear drum plugs in Iraq. It is a logistician's task to look for such an item off the shelf and supply it to troops in real-time, not just to enhance their operational efficiency but also to enhance soldier safety and survival.

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CONSIDERATIONS: POWER PROJECTION

Apart from political and diplomatic considerations, power projection capabilities are primarily based on logistics capabilities. Some essential logistics considerations which will limit power projection are as follows:

(a) The overall strategic response is based on an ability to move sufficient combat power executing a wide spectrum of abilities over a wide area of responsibility.

(b) Logistics limitations could dictate the level of forces employed.

(c) Reducing deployment timings is a key parameter. Nothing could highlight this better in our context than Operation Parakram. Some norms established by the US armed forces for deployment indicate readiness levels of 96 hours for a brigade combat team (BCT), 120 hours for a division, and 30 days for five divisions along with the requisite support elements.

(d) Economy is a key parameter of logistics while maintaining war-fighting capability. But it should not become an end in itself.

OPERATION ENDURING FREEDOM

The combat operations in Afghanistan commenced on October 7, 2001, with a massive bombardment on selected targets by the US Air Force and Navy carrier-based bombers, deftly supported by special operations forces of the army based in Uzbekistan and other areas of northern Afghanistan. Kabul was occupied on November 16, 2001, and stabilisation operations were in progress thereafter. Principally, the Allied forces had limited ground engagements but provided massive air and combat support as well as logistics support in the southward drive of the Northern Alliance

The logistics challenges during Operation Enduring Freedom were enormous. As the secretary of the air force brought out on April 11, 2002, "For the first time in the history of war, this country has fought in a landlocked area where every single thing going in and coming out has gone by air. Food, water, ammunition, troops were all transported by air, and that's really incredible." The issues generally relate to the geography and the state of underdevelopment in Afghanistan and are summarised as logistics and management challenges as follows:

- *The Logistics Challenges*
  - Landlocked geography.
  - "Compelling" distances.
  - Extended lines of communication.
  - Poor infrastructure. No railway and poor road network.
- *The Management Challenges*
  - Diplomatic clearances – overflight, sea and airport access.
  - Lack of preliminary operational plans.
- No aerial threat – the biggest boon for logistics planners and executors.
- Limited threat from ground disruption – sneak attacks.
- Total dependence on the air force for support and supply of the forces.

The logistics dimension of OEF is evident by the following facts[1]:

(a) Distance – 7,000 plus miles (11, 200 km).

(b) Missions – 11,000 plus.

1. Daniel L. Haulman, "Intertheater Airlift Challenges of Operation Enduring Freedom," downloaded from afhra.maxwell.af.mil/short_studies/IntertheaterAirliftOEF.pdf on August 16, 2006.

(c) Passengers – 158,000.

(d) Short Tons – 222,460.

(e) Aircraft used – C-5, C-17, and civil airlines.

(f) Staging Areas – Staging areas were located in many countries across Europe, Japan and the Indian Ocean to include Moron AB, Spain, Ramstein AB, Germany, Incirlik AB, Turkey, Sigonella NAS, Italy, Andersen, AFB, Kadena Okinawa and Diego Garcia.

(g) Theatre Air Bases – Kandahar and Bagram.

OPERATION IRAQI FREEDOM

The combat operations for Iraqi Freedom commenced on March 20, 2003, and the rapid advance by a corps sized plus force saw Baghdad falling to Allied control by April 8, and Mosul in the north by April 24. Thus, in a brief period of over a month, all of Iraq was brought under control. The advance took place on a narrow front from Kuwait, northwestwards to the capital Baghdad and on through Kurdish territory to the border with Turkey. An initial plan of a two-pronged thrust was negated with Turkey opting out of provision of a base for operations. While increasing the likelihood of operational difficulties, it considerably eased the problems of supporting ground operations. Political and diplomatic considerations precluded a long air campaign before the ground offensive which reduced the length of support required by the air force, though considerably enhancing the problems of maintaining daily readiness levels. The logistics experience curve which had commenced with the opening of OEF, peaked during OIF, thereby, facilitating support. However, the scale of operations was much larger and, hence, a number of significant logistics lessons were to emerge.

OIF is said to be the largest support effort that the US military has ever undertaken in modern times. Of the $28.1 billion that the Department of Defence (DoD) allotted for OIF, the Services and the Defence Logistics Agency (DLA) reported that $14.2 billion was for operating support costs and $4.9 billion for transportation costs, thus, impinging upon two-thirds of the allotment.[2] The

2. VADM Keith Lippert. SC, USN director, Defence Logistics Agency, Briefing; downloaded from www.dtic.mil/ndia/2004log/wed/nevada.ppt on August 18, 2006.

dimensions of logistics during OIF is indicated by the US per capita logistics demand, expressed in the weight of support and its transportation, for an operation like Iraqi Freedom being three times what it was in World War II and nearly 15 times what it was in World War I.

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PRINCIPLES OF LOGISTICS

The key principles of logistics which emerged in application during OEF and OIF were as follows:

(a) Foresight.

(b) Advance preparation, planning and placement through anticipation.

(c) Flexibility.

(d) Economy of effort.

(e) Military–Civil Interface. This is an emerging principle of logistics which perhaps is relevant for developed nations with a large private sector which has understood the art of doing business with the forces, thereby creating an effective military–civil interface. As Jeff Jones, the DLA administrator indicated, "DLA's primary value is military-civil integration, 'anyone' can buy or sell stuff."

American logistics is based on a fully integrated logistics organisation which starts from the DLA and has an effective blending of joint as well as Service specific components down to the lowest level.

(f) Dedicated ICT Interface. This is also an emerging principle of logistics which greatly contributed to the support of the operational forces.

(g) Integrated Organisation. American logistics is based on a fully integrated logistics organisation which starts from the DLA and has an effective blending of joint as well as Service specific components down to the lowest level.

PART II - MOBILISATION AND MOVEMENT OF TROOPS AND STORES

STRATEGIC AIRLIFT

OEF, especially the initial phase, was a nightmare for strategic airlift as no contingency planning had been carried out. This apart, the lack of infrastructure, the hostile fire and lack of diplomatic clearances were major problems which had to be overcome. The theatre level issues included lack of bases, overloading at the few existing bases, and poor mission reliability of older versions of transport aircraft and overdependence on airlift without attempting to exploit other means of transportation. Deployment timings were considerably improved by expanding the lift capacity of new as well as old platforms, enhancing the infrastructure at base locations as well as intermediate bases and also adopting efficient processes.

EARLY WARNING TO THE DLA

For OIF, the DLA was informed well in advance, in July 2002, and given that the operations were launched in March 2003, there were approximately eight months to move forward the logistics requirements. However the scale of needs was very vast.[3] A large number of items had to be procured such as chemical protection suits, since there was threat of a chemical strike, meals ready-to-eat (MREs), construction material, and so on. The DLA has a budget of $ 24 billion and manages the same with 22,000 civilian employees and just about 500 military staff. There are 4.6 million items to be managed, including all requirements of the Services' fuel, food, and so on, less 10 per cent of the repair parts. It processes an average 30,000 requisitions for material each day and awards 4,000 contracts per day.[4] Thus, it is a massive enterprise. This model of centralised logistics under a nodal agency needs greater examination for implementation if deemed appropriate in our Services.

3. Rudi Williams, "Logistics Agency Lines Out Its Support to Forces in Iraq-American Forces Press Service," downloaded from http://www.defenselink.mil/news/Jun2003/n06062003_200306063.html. August 14, 2006.
4. Lippert, n. 2.

OPERATIONAL FLEXIBILITY THROUGH LOGISTICS CAPABILITIES – MOVEMENT OF CARGO

Military Traffic Management Command (MTMC), the army component of Transportation Command, for example, delivered large quantities of supplies to US troops in record speed and with fewer vessels than it used for Desert Storm. In the initial months, it delivered 42.2 million meals to Iraq. This amount of food can feed the entire New Delhi for three days. It loaded cargo covering 15 million square feet in 60 days and transported 1.5 million tons of equipment and cargo, about the total air load of 300,000 747 jetliners. It moved 98,890 containers, which lined up would cover a span of 375 miles, a distance from Delhi to Lucknow.[5] This was undertaken by adopting the following innovative measures:

(a) *Unit-Based Loading of Ships.* Ships were loaded based on unit loads and not commodity or composite loads as is normally done for ease of initial loading and facilitating dispatch. MTMC suggested that it was delivering combat power which was indicated by the short period of 12 days in which 101st Airborne Division rolled out on five vessels and arrived in Kuwait. This also facilitated combat flexibility, dispersion and maintenance of surprise as formations could be moved to deployment areas at the last minute.[6]

(b) *High Capacity Transportation Vessels.* The large medium speed roll on/roll off vessels enabled a brigade combat team of 101 Airborne Division to be moved on just two ships, as compared to four ships earlier.

(c) *Containerisation of Loads.* Containerisation of loads into ships facilitated reduction in loading times from 14 days to 6 days for an ammunition container ship.

(d) *Focus on the Combat Unit.* MTMC focus is on the combat unit and how to deliver logistics to enhance its capabilities. This ensures that the units receive their loads in combat lots and do not have to undertake bulk breaking, thereby saving time in the launch pads.

5. Katrina Arabe. "Logistics Lessons from the Military," downloaded from http://news.thomasnet.com/IMT/archives/2003/06/logistics_lesso.html?t=archive on August 18, 2006.
6. Ibid.

VERSATILITY OF TRANSPORT AIRCRAFT

The need for maintaining a versatile fleet of transport aircraft was well brought out during OEF. The C-17 proved to be a highly valuable transporter to lift critical loads from the US mainland directly on to the sparsely surfaced and badly damaged airfields of Afghanistan. Airlifters like C-5 and C-130, on the other hand, were extremely useful for carriage of oversized cargo and landing on shorter runways respectively.[7] The employment of the C-17, however, provided the greatest flexibility and economy as supplies, including Apache helicopters, could be carried on the rough and ready airfields of Afghanistan. Crew fatigue was critical as the C-17 crew faced immense pressure with long working hours, limited rest, refuelling and even combat fire. These difficulties were quickly overcome through innovative measures such as additional loadmasters, a third pilot and stops en route.

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CREATION AND ESTABLISHMENT OF BASES

Preparation of forward operating locations was a key requirement for operations by the air force. These had to be prepared post-haste and given the global nature of the requirement, a complex set of factors needed attention such as country clearance, real estate accessibility, contract support available, and so on.[8] Advance knowledge enabled prior selection of these bases. Area specialists were flown in to support the embassy staff. The lack of infrastructure in the form of bases implied that these such as at Al Udeid had to be established from scratch which was carried out by the civil engineers rapidly. Forward placement of heavy loads such as ammunition was also considered critical as Diego Garcia, which had been developed as a forward base over the years, did not have adequate ammunition and it took a number of airlifts to preposition stocks until the criticality was overcome and these could be moved by sea.

7. Michael R. Shanahan. C-17A: "Operation Enduring Freedom Employment/Deployment: Lessons Observed (This Ain't Your Daddy's Airlifter)," Air War College, Air University," December 9, 2002.
8. Haulman, n. 1.

IN-TRANSIT VISIBILITY (ITV)

The improvement in visibility of assets is said to be of an order of eight during OIF rather than three which was obtained during the Gulf War.[9] The radio frequency identification tags were used extensively in OEF as well as OIF, which were the key to providing better ITV. RF tags were placed on all items of supply such as food, spare parts, vehicles, ammunition, medical supplies and construction material. This is a satellite enabled tracking system providing high level of visibility. The "Pure Pallet" initiative, with RFID application, greatly reduces distribution process time-lines and significantly enhances in-transit visibility. The scale of operations can be seen from the number of such tags used each month as follows:

The use of civil agencies such as Fed Ex also proved highly effective, though it had its disadvantages.

(a) 50,000-60,000 US/UK tagged pallets/containers tracked monthly.

(b) 500+ US/UK read/write sites.[10]

In India ,VI eTrans is already providing such a system to major cargo movers such as Maruti, Tata Steel and Nestle in a modified form wherein the truck drivers have to swipe their cards at Bharat Petroleum outlets.[11]

FED EX

The use of civil agencies such as Fed Ex also proved highly effective, though it had its disadvantages such as lack of information of assets creating a visibility gap and was also expensive. However, it is believed that it has far greater speed and velocity, the principal requirements of a force undertaking rapid operations in underdeveloped terrain. A cost analysis of the civil courier route vis-a-vis organic airlift options needs to be carried out before the system is implemented effectively.

9. Adam J. Herbert, "Supply Chain Visibility:United States Air Force Adapts To War In Afghanistan And Learns Logistics Lessons," *Armed Force Journal International*, April 2002.
10. The Joint Staff Joint Staff Directorate of Logistics (J4) Directorate of Logistics (J4), Operation Iraqi Freedom Logistics Experiences and Lessons Identified, September 2003.
11. Hindustan Times Report, *Hindustan Times* (New Delhi), December 16, 2005.

PART III – SUPPORTING THE FORCES

DISTRIBUTION-BASED LOGISTICS

Support of forces in the field during OIF was based on the concept of distribution-based logistics (DBL), which aims at providing equal or better combat service support with fewer unit resources and stocks through better distribution rather than stockpiles of supplies held and carried around by units.[12] It exchanges "warehousing" capacity for frequent, consistent flows. DBL entailed maintenance of low levels of inventory to cover the disruptions that were anticipated during operations. Thus, just one to two days of supply stocks were maintained in the logistics support areas, with the rest at the intermediate support base in Kuwait. This system was, however, found to be under strain during the critical period when a sandstorm occurred and resulted in disruption of about two days at the end of which troops had reached a very low level of stocks. This would, thus, need careful analysis and would depend on a number of factors such as in-transit visibility of supplies, communications and the anticipated disruption due to weather as well as enemy action.

SUPPLY PUSH MODEL

The supply push model was to provide effective logistics cover to the forces during OIF and OEF. Logisticians making decisions on what and where to push material forward were able to tap into logistics alerts as a part of battle space awareness that existed for combat units.[13] A commonly fused picture and greater interaction facilitated by improved communications eliminated the differential that normally exists between the operational and logistics staff. The basic issues were as follows:

(a) "Supply push" envisaged meeting real-time demand signals and the extensive use of "cross-service, electronic order, asset and inventory visibility [and] decision support tools," by pushing forward supplies based on

12. Eric Peltz, Marc L. Robbins, Kenneth J. Girardini, Rick Eden, John M. Halliday, Jeffrey Angers, *Sustainment of Army Forces in OperationIraqi Freedom Major Findings and Recommendations* (RAND Corporation, USA, 2005).

13. Ibid.

anticipated demands of all commodities, including ammunition.[14] It involved moving material forward to the troops without waiting for specific requests.

(b) High Level of Visibility of in-Transit Stores. This greatly facilitated supply push.

(c) Cross-Service Support. Cross-Service support to bare basing, implying meeting air force requirements being fulfilled by army units in a self-synchronous manner was another important facet of supply push.

SUPPLY OF FUEL

Modern armed forces, particularly the air force, are increasingly in need of supply of high grade fuel in large quantities to sustain 24/7 operations. The importance of fuel can well be recognised by the diverse grades of special fuel which would be required not only by aircraft but also ships, unmanned aerial vehicles (UAVs), and vehicles, many operating from remote locations in Afghanistan. Aviation gas was also essential at a number of locations across the globe for induction of men and material into the theatre.[15] Very few private companies can provide the high grade and large quantity of fuel required for aviation. An efficient fuel supply was one of the key achievements of both OIF and OEF. This was achieved by the following measures:

Modern armed forces, particularly the air force, are increasingly in need of supply of high grade fuel in large quantities to sustain 24/7 operations.

(a) A preparatory analysis of availability of air bases and of suitable contractors on the routes of induction was carried out. Provision of fuel was then made by contracting it from national oil carriers and private players. Flexibility was of the essence as indicated by the last minute cancellation of contracts in Turkey when the government did not accede to provide base facilities for OIF.[16]

14. Keith J. Costa, "New Study Looks For Evidence Of Network-Centric Logistics In Iraq ... The work will be tested in a number of upcoming experiments," downloaded from www.oft.osd.mil/library/library_files/article_231_Inside%20The%20Pentagon.doc, August 14, 2006.
15. Capt Stu Funk and Col Jack Vance, "Operation Enduring Freedom Fuel Support," downloaded from www.desc.dla.mil/DCM/Files/B-OEF%20Lessons%20Learned.ppt on August 16, 2006.
16. Funk, Ibid.

(b) Innovative contract management procedures were followed as contracts had to be executed in areas devoid of such processes as in Afghanistan, such as the air bases at Kandahar and Bagram.
(c) Additives are an important issue which was not fully appreciated.
(d) The lessons learnt are being implemented through a fuel automation system employing enterprise resource planning software.[17]
(e) The Hose Reel System. The Americans designed a fuel pipeline which supported the forces advancing through Iraq over a distance of 150 km from Kuwait to the Forward Operating Base System at Jallibah, Iraq, to enable transportation of 8 million gallons of fuel, thereby, reducing the load on fuel trucks. However, the efficacy of such a pipeline where there is a parity of air situation needs consideration.[18]

MAINTENANCE ISSUES

Easy availability of spare parts is said to have eased the problems of maintenance turnaround of aircraft considerably. Though in the beginning of 2001 there was a deficiency of 610,000 parts, it was brought down to 150,000 parts within a period of one and half years, which was also a function of funding. Reduction in cannibalisation is said to have gone down to 11 and a half per 100 sorties from the 15 to 20 per cent instances observed in 1997 and 1998. This increased the overall serviceability of aircraft.

Maintenance of aircraft was also eased by the high rate of retention of technical airmen after their first term which ensured that a better skilled and more experienced person was available to ensure correct diagnosis which also reduced the number of cannibalisations required.

THE VERSATILE MRE (MEALS READY TO EAT)

The MRE is one innovation which the Indian armed forces have already adapted, though the meal provided is not very palatable. Essentially being a prepackaged ration to be consumed during operations, this was an innovation of the Gulf War

17. Ibid.
18. Williams, n. 3.

1991 but greatly improved after a decade of use in varied conditions; it has a calorific value which can sustain a person for six to eight hours, while, at the same time, it is lightweight and can be eaten immediately or after heating. Special types of MRE, including vegetarian and *halal* were also catered for by the Americans. Reportedly, 350,000 MREs are being consumed by American troops in all theatres even to this day.[19]

Logistics Support During Operations

The Marine Expeditionary Force had advanced from Kuwait to Tikrit, a distance of 720 km. To support such an advance there was a need to establish 8 support areas, 18 resupply and replenishment points which were within 48 hours turnaround of the 1 Marine Division.[20] The Combat Service Support Battalion in support of the division is said to have moved 21 times in 3 weeks or a virtual move every day, leapfrogging its resupply points.

Forward Resuscitative Surgical Support (FRSS)

These were small, mobile surgical support teams which were formed from the surgical companies of Medical Battalions mounted on two HMMWVs with trailers and could provide surgical assistance requiring the attention of trauma surgeons within the "Golden Hour". They had the distinction of avoiding a single death of any casualty brought to them for surgery.[21]

Effective and Efficient Contracting System

The Americans used electronic end-to-end combat contracting tools based on technology which enabled two contingency contracting teams to deploy quickly and it is claimed that these acted as "force multipliers", contracting transportation, food service, and maintenance support globally. From September 2002 to November 2003, Combat Contracting Marines awarded over 2,000

19. Williams, Ibid.
20. Testimony of Brigadier General Edward G. Usher III, Director Logistics Plans, Policies and Strategic Mobility, United States Marine Corps Before the House Armed Services Committee Subcommittee on Readiness, United States House of Representatives Regarding Logistics. Downloaded from http://www.global security.org/military/library/congress/2004_hr/04-03-30usher.htm on August 20, 2006.
21. Ibid.

contracts totalling over $700 million from the operational area. This was achieved by use of the Battle Ready Contingency Contracting System which enabled automated contract writing. Adoption of such a system of active contracting may need some consideration to meet varied contingencies.[22]

Innovations During Operations

A reverse osmosis system was innovated by soldiers at a forward base rather than drinking bottled water, which resulted in producing adequate water for sanitation, cooking, and cleaning for the entire population located on the base.

DLA Representatives – Forward Units

Embedding representatives with combat units from the DLA proved highly successful. DLA had representatives at 71 different locations before the operations began and also provided 72 logistics experts within the theatre who communicated directly back to the DLA for early warning and speedy processing of requests.[23]

PART IV - CONCEPTUAL ISSUES

FOCUSSED LOGISTICS

The overall concept of logistics in the US armed forces is said to be focussed logistics, designed to seamlessly integrate information, logistics and transportation through a technological process that can envisage a crisis developing through a full system perspective provided on a visible interface. It enables flexibility in shifting the logistics requirements from non-crisis to crisis areas and delivers the packages directly at every level, be it strategic, operational or tactical. The speed in support is said to be provided in hours rather than weeks. The key issues include networked provision rather than the linear approach, modular and tailored support packages and integration of best practices from the civilian sector. The various processes under focussed logistics are, however, still under development.

22. Ibid.
23. Williams, n. 3.

VELOCITY MANAGEMENT: PROCESS OF IMPROVING LOGISTICS SUPPORT

The logistics legacy has been ruled by the primary consideration of avoiding a breakdown at all costs. This has resulted in focussing attention on creating vast surpluses of supplies, spare parts, ammunition and vehicles. It may have been relevant for the times for which it was evolved; however, with greater production capabilities and large stocks now available with the trade, there is scope for reducing actual inventories and relying on just-in-time logistics to provide the forces their logistics needs.[24] Velocity management is a new model which has been developed to replace the old and time-worn concepts of mass logistics. Thus, this is seen to be the transformation from "just-in-case" to "just-in-time" logistics.

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Velocity management ensures greater responsiveness, efficiency and economy. The process involves three steps: Define, Measure and Improve (DMI). The define phase attempts to understand the customer, including all his needs and deliverables. The entire process is then broken into sub-processes. The process of measurement aims at evolving the activity metrics in terms of time, quality and cost, and the final phase to improve the delivery based on the knowledge developed thus far. This is undertaken in a cycle which enables improvements taking place at each rotation of the DMI process. Special teams such as Process and Site Improvement Teams conduct the actual improvement which are army-wide as well as location specific.[25]

STRATEGIC DISTRIBUTION (SD)

US strategic reach encompasses global operations. To provide logistics support, a strategic distribution system is under development, again partially fielded during OIF and OEF, based on the 3 S of stock positioning, scheduled movements and synchronisation. Stock positioning has been achieved by placing the inventory in

24. John Dumond et al., *Velocity Management: The Business Paradigm That Has Transformed US Army Logistics* (Santa Monica, CA: RAND Corporation, MR-1108-A, 2001).

25. Ibid.

the right place in the Continental US (CONUS) implying at two points each on the east and west coasts.[26] Scheduling movements implies cargo leaving these two points at the same time each day and arriving at the destination again at a set time and finally synchronising these movements to avoid queuing. This is also explained with examples relevant to the three Services thus:

(a) During OEF, the supply of cargo to the air force base at Diego Garcia, from where 18 B-1 and B-52 bombers operated and whose operational readiness was extremely significant to the outcome of the operations was achieved through a process of SD. The first step was to evolve a joint procedure between numerous agencies such as the Transport Command and Air Mobility Command to provide commercial charters to move the loads to Diego Garcia. Thereafter, synchronisation was carried out to reduce the timing to Diego Garcia from 14 days to 9 days, which is said to compare favourably with comparative services by professional courier companies such as Worldwide Express.

(b) The navy had its carrier battle groups in the theatre going up from one to four. It had less problems as it has been operating in the Persian Gulf; however, the level of support had increased four-fold, for which commercial charters flying within the military air system were used. The large capacity Boeing 747s were effectively utilised for a logistics surge. The surge capability of civilian charters within the military air system can be seen from the increase in deliverables from 463 tons in June-August 2001 to over 2,000 tons in October- December, while the supply by military aircraft increased from 333 to a meagre 727 tons.

(c) For the army deploying in Karshi Khanabad in Uzbekistan, support was provided from October-December 2001 in a timeframe of request to receipt of 16 days.

PRIME VENDOR PROGRAMME

The US Defence Logistics Agency has a prime vendor programme which enables commercial providers to supply their products and services to the armed forces

26. Peltz, n. 12.

units in the designated area within a given time of placement of order.[27] This is provided at the cost that is pre-fixed with the prime vendor. These commercial products are designated branded products of high quality, the inventory of which is maintained by the vendor and not the Services' supply agencies. A system probably closely related to the CSD (I) system in the Indian armed forces, where the vendor is supplying items to various regional CSD depots. The estimated reduction in inventory costs in medical items alone was said to be $ 177 million between 1993 to FY 1997. The total value of the prime vendor programme in 2003 is said to be $ 7 billion or roughly one-fourth of the procurements. The success of the programme is evident with the kitting up of USNS *Comfort*, a 1,000-bed hospital ship, to support Operation Iraqi Freedom in 2003 within a period of 3½ working days to 80 per cent of the level of readiness, with the balance being promised to be delivered either in the theatre or en route.

The US Defence Logistics Agency has a prime vendor programme which enables commercial providers to supply their products and services to the armed forces units in the designated area within a given time of placement of order.

LOGISTICS – COMMUNICATIONS

Provision of the communications network for logistics organisations was an immediate advantage that provided great flexibility.[28] A secure Internet is seemingly the best means of communications used by the staff and provided real-time inputs, independent of mediators, from the signal men to the user. The difference between e-mail and snail mail which is not frequently recognised is that it cuts out a minimum of six and maximum of eight intermediaries between the originator of a message and its receipt.

27. Testimony of Vice Admiral Keith W. Lippert, Director, Defence Logistics Agency, before the United States House of Representatives House Armed Services Committee, November 9, 2005. Downloaded from www.house.gov/hasc/11-9-05LippertTestimony.pdf on August 18, 2006.
28. "Lesson Learned: Team Effort.09/08/2003, downloaded from http://www.ausa.org/webpub/DeptHome.nsf/byid/KGRG-6DSQD8 on August 16, 2006.

SENSE AND RESPOND LOGISTICS: NETWORK-CENTRIC LOGISTICS

To support network-centric warfare, a logistics system which is termed as sense and response logistics (SRLC) is under development in the USA, based on the lessons learnt in OIF and OEF.[29] This will overcome some of the problems encountered by specialised units operating in joint teams which found that their logistics needs were not catered for by the parent unit as well as the supported unit. SRLC is, thus, being designed to provide a networked logistics chain based on a high degree of communications capability to logistics providers. Once it is fully operational, it would envisage stimulating logistics procurement inputs, based on sensor monitors which, having sensed the operational needs and deficiencies, automatically trigger warnings for inducting the flow of critical supplies.[30] It is operation-centric rather than plan-centric logistics which has better capability to react to the changing ground situations, based on sensed inputs rather than demands, thereby, the authority to supply is of the lowest logistics commander, based on automated, systemic inputs. It is also designed to remove the tactical surpluses at certain points and shortages at others.

CONCLUSION

Frederick the Great, in Instructions for his Generals, II, stated in 1747, "In order to make assured conquests, it is necessary to proceed within the rules; to advance, to establish yourself solidly, to advance and establish yourself again, and always prepare to have within reach of your army, your resources and your requirements." The Allied forces in OEF and OIF followed the basic principles enunciated by the warrior king of the 18th century, transposing the same to the 21st century to ensure that the tip of the sword was not blunted for the lack of gumption of an empty stomach.

29. Costa, n. 14.
30. Ibid.