ABSTRACT

CRITICAL STUDY OF INTEGRATED LOGISTICS MANAGEMENT WITH SPECIAL REFERENCE TO INDIAN ARMED FORCES

Separate ground, sea and air warfare is gone forever. If ever again we should be involved in war, we will fight it in all elements, with all services, as one single, concentrated effort.”

- President Dwight D. Eisenhower
Special Message to Congress, 3 April 1958

Introduction

War is a National effort. While it is easy to raise and maintain huge armies, supporting and supplying forces in combat, and sustaining them in conflicts and confrontations have often proved the greater challenges. This necessitates the creation of Efficient and responsive Integrated and joint logistics to meet the needs of operations in multifarious scenarios. Advanced Armies like the US and UK have ensured formalization and implementation of these concepts while those like China and Pakistan are addressing these aspects vigorously.

History is replete with examples where logistics has dictated the outcome of war. The famous Afrika Corps of Rommel had to suffer defeat at the hands of Allies in World War II due to lack of logistics support from mainland Germany. Similarly in Operation Barbarossa Germany suffered defeat due to short sightedness of Hitler and overlooking the key aspect of logistics support, the successful Allied anti-submarine campaign and the failure of the German Navy to sink enough cargo in the Second Battle of the Atlantic allowed Britain to stay in the war, and the successful U.S. submarine campaign against Japanese maritime shipping across Asian waters effectively crippled its economy and its military by production capabilities.

Geopolitical realities of the region may demand readiness for multifaceted commitments on more than one front. India has to maintain large armed forces, with
each of the three services having diverse spectrum of contingencies and wide ranging options from conventional wars to internal security and disaster management. The service oriented logistics support has exhibited shortcomings when viewed in a perspective of our historical experiences.

Every nation approaches War as a national effort, but in India’s context, War is still a fragmented effort with the joint strategy for war still in the evolution stage and till the logistics can match in concept, efficiency and organization, actualization of the Joint Strategy and capability for future challenges and roles of at the domestic levels and the regional level may be unachievable.

Need of the Study.

With the current focus on India’s increasing role in national and regional obligations in the emerging security environment, and emphasis on ‘Capability Based Planning’, there is a definite requirement of integrating military logistics with resources of the Nation as also between the three services, not just in areas where commonality exists but in the larger perspective of capacity building towards highly responsive logistics. In analysis of modern day military operations the world over, Joint war fighting emerges as the keyword for military planners.

Future wars would be short, sharp and technology intensive conflicts, conducted at lightening pace simultaneously across multiple areas within the same theatre or across boundaries of more than one geographic combatant command. An efficient and integrated logistics system to meet the Challenges of Joint operations in any theatre of our land frontiers, the Indian Ocean Region or other ‘Out of Area’ contingencies is imperative.

Research Methodology

Objective of the study. The Objective of the Study is to evolve an efficient and integrated logistics system based on resources presently employed by and between the three Services, integrating them with the civil industry, modern techniques of management, business practices and raising an organization that can address the logistics’
challenges for prosecuting war fighting strategies in the present and emerging security environment.

Assumption. An integrated and joint logistic system will enable the Services to support the Operational environment for the emerging threat scenarios.

The proposed system will facilitate Modernisation, budget utilisation, timely acquisitions and procurements, prevention of kickbacks and related misuse of funds, development in Industry and indigenisation, and technology infusion towards the desired response capability across the entire spectrum of conflict.

Research Design

This research is based on Case Studies of all major Conflicts in India’s context, reports of CAG and other Institutions on our system of procurements and acquisitions, experiences and impact on combat and outcomes of war, as also selected International conflicts in the last twenty years or so to draw lessons in context of logistics and combat support. The case studies identified and analysed for this study are restricted to reports and reviews in the open and public domain.

Ironically, coverage on logistics’ perspectives in context of Military conflicts available in the open domain in India is extremely limited. Lessons during wars and conflict situations are confined to war books and confidential records. There are hardly any reviews of efficacy of our concepts, doctrines and strategies by any office or body of reckoning. Recommendations of national level committees on such studies like the Kelkar committee are openly disregarded. The country has no logicians of fame, no institutes teaching these subjects and worse still, no specialists in the Services as a corps of logicians. The domain of logistics is therefore left to be researched by those who require it and in the context they need to.

The researcher’s experience of more than forty years in the Army with diverse exposures to combat environment, from conflict of 1971, insurgencies in Nagaland, Manipur, J&K and Sri Lanka to the more recent conflict situations of 2001, combined with his tenures in command and staff positions at the tactical, operational and strategic levels enabled a realistic analysis.
The researcher has drawn the most from all the above resources, and evolved an efficient model that would make the Nation’s Logistics a potent part of the overall strategic response.

**Qualitative Analysis.** The research having been based on case studies, the Researcher planned to test the hypothesis qualitatively by validating recommendations against inferences drawn and lessons learnt from the case studies, reviews of modern Armies and their experiences, and the emerging security environment.

**Case Studies.**

**1962 Indo-China War.** The Indo-China War was of historic importance in terms of learning lessons that led to the mutilation of the Indian image and capability. Lack of basic equipment in virtually every aspect of equipment and supplies, shortage in tentage and rations, coming to the Himalayas (to altitudes above 15,000 feet) in cotton, summer uniforms was unlike a professional organization moving into combat. Infrastructure was poor, the Army had significant personnel shortages, and were often outnumbered by the Chinese by 5:1.

**1965 Indo-Pak War.** According to The Official history of the 1965 War, drafted by the Ministry of Defence in 1992, Intelligence failure in assessment of the then COAS Gen. Chaudhuri, that most of India's frontline ammunition had been used up and the Indian Army had suffered considerable tank losses led to the strategic error of accepting cease fire. It was determined later that only 14% of India's frontline ammunition had been fired and India held twice the number of tanks as Pakistan. By this time, the Pakistani Army had expended close to 80% of its ammunition. Reports of Chinese troop movements on the Indian border to support Pakistan compelled India to agree to the UN mandate to avoid a war on both borders.

**1971 Indo-Pak War.** While this war is considered one of the major victories in our history, logistics proved the major challenge as was evident in the initial decision to delay operations in East Pakistan from April to beyond October. Lessons learnt included India’s air drop capability that was limited to a battalion group, for the Navy, considering the many islands off the East and West coast, we should have had greater
amphibious capabilities for assault on the beaches with a Brigade group complemented by air lift instead of the fiasco of the landings near Cox’s Bazaar in 1971 (Ukhia).

**International Relations and Responses During Conflict.** The biggest lesson ever learnt was in the field of international relations. The United States supported Pakistan both politically and materially fearing Soviet expansion into South and Southeast Asia. In order to demonstrate to China the bona fides of the United States as an ally, Nixon sent military supplies to Pakistan, routing them through Jordan and Iran, countries whom Nixon requested to dispatch fighter Jet to help Pakistan. The entry of carrier battle group led by the aircraft carrier USS Enterprise into the Bay of Bengal on 11th Dec 1971 was an indicator of the magnitude of turbulence in international relations.

**Indian Peace Keeping Operations In Sri lanka 1987 – 1990 (Operation PAWAN).** IPKF was the first test in joint planning and development of inter service understanding. **Operational plans were still service centric,** but as the time progressed, there was much coordination and exchange of inputs at execution stage. It took some time to sort out coordination mechanism and proper chain of command that was so lengthy that any quick decision became impossible. Notwithstanding that, **transportation and maintenance of the Indian Peace Keeping Force by the Navy supported by Maritime fleet to the order of 200,000 men ferried in either direction, 100,000 tonnes of stores, 8,000 vehicles was a remarkable achievement.**

**Operation VIJAY (Kargil).** The Kargil Operation of 1999 with Pakistan highlights the imperatives of constant war preparedness as in today’s security environment. **When Kargil War broke out, the inventories of the Indian Army were once again very low as in the 1990s as the annual Defence Budget allocations stood constantly limited.** If the war had enlarged to a modern conventional war across the International Border, India’s military operations would have stood curtailed.

**Operation PARAKRAM 2001.** Assessment of Operation PARAKRAM in its outcome within India has been mixed. **Senior government officials, have all claimed that the mobilization was a successful exercise in coercive diplomacy** as it pressured Washington and Islamabad to take action against Islamic militant groups based in Pakistan. In contrast, **former COAS Shankar Roy Choudhry called the mass**
mobilization a “pointless gesture” that had harmed India’s credibility while journalist Praveen Swami went further in denouncing this Operation as “arguably the most ill-conceived manoeuvre in Indian military history,” which “ended as an ignominious retreat after having failed to secure even its minimum objectives.” Further, delay in military operations created a gap which allowed India’s political leadership to lose its nerve.

Existing Logistics Organisation/Structure of the Armed Forces.

Joint Warfare. The concept of joint warfare is still under evolution and the implementation of recommendation of the Group of Ministers to integrate the three Services under a combined defence staff (CDS) is still not a reality.

The present organization indicates a serious disconnect between the combat arm leadership and the logisticians in the field. The absence of a credible institutional mechanism for interactive, operational logistics process, specially, at strategic and operational levels remains a crucial void.

Acquisitions

With 15% of the equipment being ‘state-of-the-art’ and nearly 50% suffering from obsolescence, India’s Equipment Profile is behind time, the army field’s tanks T90 and T72, which are licensed manufactured, the navy continuing to depend on the French and Russian designs for submarines such as the Scorpion, and India’s self reliance index (SRI) estimated at .3 (or 30 per cent) despite the government intent of raising the same to .7 (or 70 per cent) by 2005 are indicators of our readiness.. Defence Research and Development Organization (DRDO) has not been able to meet expectations of indigenizing defence technology and combat support technologies.

Arms Exports and Imports. SIPRI has in its analysis of arms transfer data base for 2011 led India to a position of being the largest importing nation of the world with more than US $4000 Million. China’s declining imports are a consequence of its digenisation of its arms production of adapted versions of different fighter aircrafts and other low cost military equipment, in particular for least developed nations of Asia. If not corrected, this imbalance will have major ramifications for India.
India’s cumulative defence budget (including both-capital and revenue expenditure) grew at 13.4% CAGR during the financial years 2006-2007 (Rs. 89,000 crore/ US $ 20.11 billion) to 2010-11 (Rs. 147,344 crore/ US $ 31.9 billion). Approximately, 40% of this is capital expenditure. According to estimates, nearly 70% of our defence requirements are met through imports, with only 30% being met through domestic production through the Ordnance Factories or the Defence PSUs that too with a large component of imported sub-systems.

Procedural Issues. The existing system is a confederation of agencies that work to put in place matters from procurement and modernization to infrastructure and defence production across the spectrum from policy issues to implementation. While this may be possible within any service, the synergy and outcome at national level is slower and compartmentalized.

The Absence of a Central Executive Authority for Major Programmes. In the US and the UK, the programme expenditure on new product development and procurement programmes are controlled by serving General rank officers, in case of UK, he implements the country’s Defence Industrial Strategy having a budget of 15 billion pounds ($23.6 billion). Our Organisation as represented by the military and civilian bureaucracy, can be divided in military perceptions and priorities and complicate procedures and systems leading to inordinate delays and other ramifications.

Our DRDO functions more as a canalizing agency for foreign firms to do transfer of technology deals for their previous generation models, than like an Original Equipment Maker which can sweep foreign markets with relevant technology products at lesser than Western or Eastern manufacturers’ costs.

CAG Reports on Acquisitions In recent years, CAG reports pointed out considerable losses in acquisition process of Russian SU-30 and MiG-29K fighters, Israeli Aerostat radars and other air defence equipment for the Indian Armed Forces. Excessive delays and cost escalation in Project 15A involving the Kolkata-class guided missile destroyers, Project 17 involving the Shivalik-class stealth frigates and Project 28 involving the Kamorta-class Anti-Submarine Warfare (ASW) corvettes, and India’s Indigenous Warship Programmes plagued by constant cost and time overruns. In
Procurement for Operation Vijay (Army), supplies valued at Rs.2150 crore were received after the end of the hostilities.

**Review of Recent International Conflicts.**

**Desert Storm.** Although the US mission was completed in only a hundred hours, the strategic deployment and logistics of forces took over 200 days to move the necessary forces and their sustainment into Kuwait.

**Operation Iraqi Freedom 2003.** While U.S. forces and its coalition partners swiftly defeated Iraqi forces, the desired logistics success from transformation still had capability shortfalls. In 2003, Lieutenant General Claude V. Christianson, then Army G4 (Deputy Chief of Staff, Logistics), outlined essentials in Delivering Material Readiness to the Army i.e. **integrate Army logistics** with the military’s joint, satellite-based, network communications system, **improve timely, flexible supply delivery** to the battlefield, improve logistical **support for forces first entering a theater of operations** and integrate the supply chain to **improve communication with commands** and distribution of supplies.”

**Operation Enduring Freedom.** Joint Forces recommended the need to identify **trained logistics teams to replace individual augmentation positions**, develop **alternative methods to resource joint logistics teams** executing core capabilities. In order to reduce the uncertainty and workload of individual augmentation deployments in support of joint operations, a need was felt to develop and train **modular logistics teams with appropriate automation tools, and develop organizational and operational concepts for military-civilian teams** to execute core logistics capabilities.

**Kelkar Committee Report On Defence Acquisitions.**

Consequent to the Kargil war, Kelkar Committee was set up by the Government to examine and recommend changes in the acquisition procedures and enabling a greater participation of private sector in defence production “Towards strengthening self-reliance in Defence Preparedness”. Despite this committee evolving a strategy to maximize self reliance in defence production, higher growth in GDP, benefits in R&D, higher exports and cost savings, the outcomes have being less than...
desired. The state of indigenization to less than 30%, and India’s status as the largest importer of Defence equipment by SIPRI summarizes the status of progress on these recommendations.

Analysis of Case Studies.

Strategic Capability. In the light of our past experiences and tardy responses to contingencies, we still lack the desired capability to meet challenges on our borders as also out of area contingencies in the regional context.

Organization/ Structure. The structure for logistics has remained service centric, with few areas of integration and jointness. Despite repeated failures and setbacks unlike evolving armies of the world, absence of National level authority for guidance and control, and lack of synergized and focused objectives remain major shortcomings.

Integration and Jointness. There are no clear and comprehensive Doctrines/Concepts for Joint War fighting that enable logistics formulations. With Service Specific Cultures in vogue and diverse and wide ranging commitments with separate logistic systems, logistic decisions taken are not always in joint interests of the services, therefore Individual service interests can often dominate such decisions.

Structures and Approach to Logistic Management.

• At National Level. No single organization exists to handle logistics at the national level during a conflict. This leads to sub-optimal utilization of all available national assets and resources at the private sector, the industry, management practices and development in IT.

• Joint Services Structures. HQ Integrated Defence Staff at New Delhi is presently working on joint logistic concepts but has little or no executive control or authority to steer service HQ towards a joint effective organisation or structure.
• **Policy Issues.** Major issues requiring attention logistics infrastructure, non-inclusion of public corporations and distribution system for formulating an integrated national effort.

• **Capacity Building.** In the nation’s ‘Capability Based’ approach, domestic capacities have yet to be created and integrated in the logistic plan.

• **Involvement of Private Sector.** The giant strides in capabilities and potential of private sector have not been tapped to the full nor **Outsourcing** become fully part of the system.

• **Financial Powers.** Centralisation of financial powers leads to inflexibility in logistics support.

• **Vintage Concepts of Stocking and Transportation.** Our concepts and systems have yet to evolve from the old **stock piles of materials**, catering for ‘**just in case**’ scenarios in different theatres to be moved by traditional modes leading to additional costs of holding, storage, distribution and losses.

**At Operational Level.**

• **Concept of Operational Logistics.** Operational logistics has not evolved over the last 50 years as a dynamic part of the system of planning or preparation at the National or Ministry level. The efforts at service levels, with studies repeatedly ordered and presented, have never reached finality.

• **Logistic Intelligence.** Working on a concept of **“Just in Case”** approach, logistics has never been a key consideration for planning of operations.

• **Import of Arms and Indigenization.** Indigenization and Self Reliance in existing weapon systems and ammunition have remained critically slow leading to our Nation becoming the largest Arms Importer in the world as on date.

• **Force Mobilization.** Our mobilization to conflict situations, particularly in PARAKRAM have been viewed inadequate. Capability To Transport Special Forces, Air Borne Lift for Special Forces and amphibious capability needs to be considerably enhanced.
Teeth to Tail Ratio. The existing “Just in Case” approach to logistics demands a series of links in the supply chain to be established for various levels of reserves, stocks and front line needs as first and second lines. This was spread across the spectrum of services i.e. ASC, AOC and in particular the EME. One of the key areas of concern is the Directorate General of Electrical and Mechanical Engineers (EME) which is 11% in manpower holdings of the entire Army i.e. every 9th Other Ranks (OR) is from EME, which is far higher than personnel from other services. In a recent study, more than 20000 ranks from EME have been recommended for optimisation towards cost reduction.

Infrastructure Development. Constraints of terrain conditions and hostile weather have preempted developing road axes in our forward areas while China’s impetus to this aspect in Tibet has been exponential, and also to India’s disadvantage by compressing mobilization timings vis a vis India’s readiness. With additional focus of China in Indian Ocean Region (IOR), infrastructure will require a new dimension to cater for this threat.

Modern Business Practices And Developments In Information Technology

The challenge of moving forces, deploying them over vast theatres, ensuring inbuilt mobility for contingencies and sustenance in combat support from mobilisation to the outcomes, require extensive integration of strategic and operational deployment and distribution efforts with Industry's changing view of logistics, electronic commerce, automated identification technology and other practices.

Modern Business Practices.

Internet-Based Commerce. Computer-based purchasing represents the ultimate "democratization" of the acquisition process buying decisions are made by the people who need the products.

Paper-free Weapons Systems Support. As information technologies have revolutionized the business world, corporate activities and functions have become paper-free. The Joint Strike Fighter Program Office now operates in a paperless environment and all business with that office now takes place digitally using reducing
time lines for contracting from 18 months to 4 months and time to review drawings has been reduced from 2 to 3 weeks to 3 to 12 minutes.

Supply Chain Management. An efficient supply chain would address activities of sourcing, procurement, collaboration with channel partners and third party service providers. Such models are top driven from the strategic level where it would involve the national or international private sector and industry, civil infrastructure as also central procurement agencies and depots, down to unit/forward troops.

Military Supply Chain At Strategic Level. For any transformation, the strategic level must witness a sea change from the existing legacy systems which are archaic in organization and self-defeating in execution. Strategic partnerships with not only customers but also suppliers and distributors will facilitate efficient channels for executing operational improvements, life cycle management, information flow, decisions for purchase and production and finally a commitment for long term relationships.

Enterprise Resource Planning (ERP). ERP equips the organization with necessary capabilities to integrate and synchronise isolated functions into a streamlined business process. It facilitates information sharing across organizations and enables decision makers to have an organization wide view of the information they need in a timely, reliable and consistent fashion. enabling diverse functions like planning, purchasing, inventory management, asset visibility, demanding, supplying, replenishment (i.e. tracking of entire chain of replenishment), finance management human resource management, auditing etc.

Performance Based Logistics (PBL). This model draws focus to specific goals to evaluate success, and would involve purchases not only of weapon system or a product from a big vendor like TATA or L&T but also a supporting maintenance arrangement throughout the system’s life time. The essence is thus on performance outcomes and not purchase of weapons systems/products, their parts and maintenance.

Sense and Respond Concept. Sense and Respond Logistics is a transformational network-centric concept that enables effects-based operations and provides precise, agile support. It predicts, anticipates and coordinates actions that
provide competitive advantage spanning the full range of military operations. Sense and Respond Logistics provides an end-to-end, point-of-effect to source-of-support network of logistics resources and capabilities. It delivers flexibility, robustness, and scalability for warfare through adaptive, responsive, real-time, demand and support networks.

Outsourcing. Armies around the world are adopting outsourcing as a strategic management tool with a view to optimize teeth to tail ratio. PW Senger, author of Corporate Warriors in his book “The Rise of Private Military Industry” explains companies that cover functions of warfare at every level from tactical combat to mundane logistics that was once limited to State militaries. The Privatization revolution has called for a new thinking that they can provide combatants and special forces, advice-combat and logistics management, support military functions and contribute significantly.

Developments in Information Technology & Applications.

Decision Support System. Advances in IT have made it possible for supply chains to quickly adapt and respond to security environment and conflict scenarios. Automation of logistics stakeholders and their networking, end-to-end, inventory management, and network of shared situational awareness will support rapid and confident decision-making and unified action at all levels.

Automated Warehousing and Maintainability. Modern warehouse technology with Automated storage and Retrieval Systems (ASRS), Nano technology and automotive technology are in vogue to assist in diagnostics and Prognostics.

Robotics in Logistics Survivability. Robotics assist improved logistics and increase logistics survivability in context of automated warehousing, unmanned logistics platform to carry equipment and ammunition, unmanned vehicles standoff IED detection, neutralisation, destruction and detonation, Carrying out proof of ammunition, Remotely clear dangerous areas.


“Logistics transformation is critical as the Army adapts to the new realities”.

-General Peter J. Schoomaker, Chief of Staff of the Army, 2003-07
With increased deployability and strategic agility, the armies world over are seeking a transformation in their systems to meet exponential enhancements in capacity, capability and reach, virtually revolutionising Military logistics.

**Defence Logistics Agency (US).**

**Organisation.** As America’s combat logistics support agency, the Defense Logistics Agency, a global enterprise, headquartered at Fort Belvoir, Va. provides the Army, Navy, Air Force, Marine Corps, other federal agencies, and combined and allied forces with the full spectrum of logistics, acquisition and technical services.

**Initiatives By DLA.** Major initiatives by DLA are Concept of Sense & Respond Logistics (S&RL), eLog21 Campaign to chart the course of transformation, Integrated Data Environment (IDE) and Global Combat Support System (GCSS) which provide a single, end-to-end capability from mobilization through deployment, employment, sustainment, redeployment, and demobilization.

**Army Material Command** operates the research, development and engineering centers; Army Research Laboratory; depots; arsenals; ammunition plants; and other facilities; and maintains the Army’s prepositioned stocks, both on land and afloat.

**Army Contracting Command (ACC).** ACC ensures contracting support as mission requirements emerge and as the Army transforms and moves within the Continental United States and throughout the globe.

**Defence Equipment and Support (DE&S) UK.**

**Organization.** Defence Equipment and Support (DE&S) Organisation is the name of the merged procurement and support organization within the UK Ministry of Defence. It came into being on 2 April 2007, bringing together the MoD's Defence Procurement Agency and the Defence Logistics Agency. The organization had a civilian and military workforce of around 29,000 (77 per cent civilian and 23 per cent military), in the UK and abroad. DE&S operates as a single Top Level Budget.

**Evolution of Change.** Beginning with computerized logistics management, the British Army has evolved through Integration of all intra-service activities on
conventional logistics, Corporatizations of repair infrastructure, Privatization of repair infrastructure, Integration of all inter-service logistics from Defence Logistics Organisation (DLO) and Defence Procurement Agency (DPA) to their Merger of DPA + DLO + Defence Commercial Service Agency (DCSA) into Defence Equipment & Support Agency (DE&SA) – with the Chief of Defence Material (CDM) in charge, is indeed a great lesson for Indian Military.

China’s Military

With the aim of turning the PLA into an Advance Military Power, the People’s Liberation Army’s new five-year plan is to put in place a joint warfare command structure, increased focus on defence modernization, increased role of civilian experts in the defence science and technology and Privatization towards procurement, and transportation to turn it into a more integrated tri-service force, commensurate with the needs of china’s growing global presence.

A unified joint military command is envisaged for tighter integration between the PLA and internal security forces that the national five-year plan envisions for ensuring domestic stability as also “winning local wars under conditions of high technology and informationisation.

Research and Development areas include Public Private Partnerships (PPP) with Defense companies who have more expertise and experience than the PLA and technologies with joint military civilian applications. Nearly $1.5 trillion is being earmarked under the national five-year plan to expand several strategic industrial sectors.

Transportation. To keep pace with the U.S. military, the PLA is purchasing heavy lift assets from Russia to move their heavy brigade combat teams (HBCTs) to outlying provinces, including Fuzhou. In turn, the Chinese defense industry complex is building cargo planes and ships that will replace foreign-purchased ships and aircraft by 2012.

China in our security context has elevated logistics to the National level as early as 1960, and has the entire nation involved from mobilisation to R&D under one potent logistics authority. PLA’s capability building targets the capacity for a tactical lift of
approx 2 to 3 Brigades to a strategic lift of 3 Airborne Corps by 2017. **Indian military is perhaps the only modern armed forces in the world, which lacks an operationally efficient joint logistics organization.**

The logistics organization of modern armies worldwide are in a state of transformation in step with the emerging threats and challenges. While the US and UK have extremely dedicated, integrated and efficient logistics not only across their services but also their industry, private production agencies and institutions that address R&D and technology, China is giving its Logistics, a strategic and global overhaul with capabilities of transcontinental reach.

**Recommendations**

“You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics.”

*General Dwight D. Eisenhower*

**Integration**

In the perspective that integrating logistics has been viewed for this study, the change must begin at the National Level and be top driven through to the service levels. The salient components of Integration addressed in this study are enunciated in succeeding paras.

**Approach to Analysis and Recommendations.**

Any transformation towards responsive logistics must begin with a vision, a mission, be backed by authority and a comprehensive strategy. Recommendations for this change are based on these fundamental imperatives with an integrated organization given below.
Approach to Analysis and Recommendations

**National Logistics Strategy.** To prosecute Joint Operations effectively, any strategy must demonstrate national level commitment and pursuit for logistics transformation, and for that, the organization/department must create the change for both the joint vision and reform. **Complete Integration of Logistics** is imperative to meet the emerging challenges of the Nation and to build a responsive, agile and cost effective combat support towards ensuring readiness and sustainability of our forces across the full spectrum of operations by 2020.

**Strategic Objectives for Integration**

The **National Strategy** must focus on strategic objectives for this change, each of them linking strategy and operations to Logistic Support and management. The areas of focus identified for this study were:-
• National Logistics Authority.
• Strategic Guidance and Objectives:-
  Force Mobilization and Resource Management
  Combat Logistics Readiness
  Logistics and Material Readiness
  Acquisition, Defence Production, PPP and Budget.
• R & D
• Infrastructure development.

**National Logistics Authority.** A National Level Organisation has been recommended to must evolve Clear Guidelines and Strategic Objectives as part of its Mission Accomplishment Strategy. Issues critical to this organization are Centralized Control and Strategic guidance at National level, effective decision making mechanism, integration of acquisitions, defence Industry and inter service resources under single command authority.

The Model recommended in this thesis reflects Centralized Control and Strategic guidance at National level. The components of out of area contingencies are co-opted appropriately to evolve operational and functional linkages. National resources as the defence industry and confederation of Indian Industry (CII) are co-opted closely for a synergized approach. While Equipment, Acquisition and Induction are linked with Production and Indegenisation, the Material Readiness function has been segregated to enable being addressed comprehensively. Research and Development group has a distinct identity and authority for collaboration with foreign industry for induction of advanced technology and processes including Information Technology to prepare for transformation.

This National Organisation Is forward looking and consolidates the contours and shapes of integrated organization addressing strategic, operational aspects and Support aspects to meet the vast and varied spectrum of contingencies in the domestic, regional and extra regional perspectives.
While similar organizations in UK and China are effective and functional, this model may have functional problems in its evolution through stabilization, centralized control and decision making, but is perhaps the best way to transformation ahead.

**Material Readiness.** Material readiness has been established on the triad of Ammunition, Fuel and Combat Engineering Stores, as key areas in this consideration.

**Integrating Defence Production and Acquisitions.** The other major Areas of integration are Defence Industrialization and Acquisition Process, Improvement in Defence Production/Indigenous Capability Development, Relationship with the Private Sector (PPP), Joint ventures and collaborations between Indian and Foreign firms/manufacturers and Budgeting have been addressed.

**Research and Development.** To be in consonance with developments and operational imperatives, Transportation Systems as large aircraft, Alternative Energy Solutions, Precision Weapons and Ammunition Systems, and Forward Storage of Ammunition ,supplies and fuels using Tunnel Magazines/ Underground Ammunition Storage are key areas of focus.

**Nano Technology.** Important applications of Nanotechnology in terms of lightweight materials, integrated robotic systems with autonomous logistic handling, on-board power for electronic means and weapon systems have been recommended.

**Infrastructure Development.** The exponential enhancement in infrastructure by the PLA in TAR, as also towards Pakistan and other neighboring countries, accentuate the existing differential in Indian’s response capability. Strategic road, rail and airlift facilities for transportation of men and material, fuels, ammunition and other warlike stores facilitate inter theatre and intra theatre force deployment.

**Military storage for fuels, ammunition and other consumables** are very limited in our forward areas adding to the burden during mobilization as compared to those of China running into millions of tons and tankerages.

**Road Engineering.** Forward Area infrastructure in terms of roads, railway lines and airfields are seriously impacted by terrain and extreme weather, which can add to our
difficulties in terms of deploy ability and speed of response vis-à-vis our adversaries. Newer techniques of road engineering and hassle free maintenance will minimize these disruptions in our mobilization and forward deployment.

**Jointness in Logistics.**

This part identifies Specific Recommendations towards enhancing Jointness and Joint Logistics at the Inter Services level from Doctrinal to Functional aspects.

**Joint Logistics Doctrine.** Doctrinal flexibility, strategic mobility, joint, multinational, and interagency connectivity, and versatility in war and military operations other than war are characteristics of the 21st century force. For this, a Unified Logistics Command HQ with mandate to set out strategies, monitor and manage logistics readiness as part of the strategic response, Contingencies for deployment, capability for Joint Force Employment and deployment, Networked Logistics structure and ability to undertake large scale Joint Logistics exercises to review operational readiness of our Joint Forces.

**Joint Staff must be capable of addressing** defence forces’ capability to conduct prompt, sustained, and synchronized operations with combinations of forces tailored to specific situations and with access to and freedom to operate in all domains – space, sea, land, air, and information. The shift must therefore be a part of a specialised Logistics Corps that can strategise, conceptualise and implement Joint Logistics.

**Joint Force Mobility and Response Capability.** The emerging Security environment may necessitate expeditious deployment, critical to prosecution of which are a credible Air Lift, Roads and Railways, Naval Transportation Fleet, Unified Transportation Agency and Joint Force Package Delivery of integrated combat unit systems.

**Joint Warfare Command.**

**Joint Warfare Command.** To address the escalating security challenges at the national and regional level, in particular those emanating developments in Tibet closer to our Northern and Eastern border as also in the Indian Ocean Region (IOR), a Joint Warfare Command under the CDS/IDS staff capable of Full Force Generation
by a division level force or combat segments thereof, appropriately supported by a Joint Logistics Division emerges a dominant necessity. Key components as mobility, material readiness, contracting, outsourcing, infrastructure and theaterised logistics are now under the CDS/CISC for functions from strategy, equipment and war material, through Strategic and operational readiness to prosecution.

Conclusion.

India’s Logistics Structure and organization at the National level is not fully integrated with Logistics of the Armed Forces of the country, while that within the Services themselves is hierarchical, compartmentalized, norm bound, with inadequate integration at various levels. Logistics must be comprehensive, integrated with a “Will to Resolve” than an escapist “Will to Absolve” approach. India’s logistics organization and capability is short of its aspirations for meeting its role in the 21st century. Any slippages in our readiness to rise to geopolitical contingencies would be a costly mistake and embarrassment No Nation can afford.