Chapter - 1

INTRODUCTION
INTRODUCTION

• SUPPLY CHAIN CONCEPT

Throughout the 1970s and early 1980s, many firms were working diligently to implement integrated logistics management. The idea was to manage the movement of material throughout the firm in an integrated and systematic manner, so that both the effectiveness and efficiency of the operation could be dramatically improved. Taking the system-wide perspective allows the firm to make appropriate trade-offs between purchasing costs, transport costs, inventory and warehousing costs. Close coordination between these operations can produce high levels of service and performance while reducing the total costs incurred. While integration of the logistics process within the firm has produced dramatic improvements, most consumer and industrial products are not totally created by a single firm. Normally, several independent firms are involved in manufacturing a product and placing it in the hands of the end user. One firm might produce raw material and sell it to a second firm which uses the material to produce a component. A third firm buys the component and assembles it into a product which is sold to a fourth firm such as a wholesale distributor. The wholesaler in turn sells the product to a fifth firm, such as a retail merchant, and the fifth firm sells the product to a consumer. The set of firms which pass these materials forward can be referred to as a supply chain.

In actually practice, supply chains for technologically complex products may involve scores or hundreds of firms. Even if each individual firm in such a chain is performing integrated logistics management of its own internal operations, there still exists a great potential to increase the overall efficiency and effectiveness of the supply chain as a whole by practicing integrated logistics management on the total flow of material through the entire supply chain. We refer to the strategy of applying integrated logistics management to all the elements of a supply chain as supply chain management. Supply chain management requires both internal functional integration and external integration. Internally, supply chain management involves working to achieve a seamless integration of logistics with other functional areas to improve pipeline performance by optimizing their functioning. Basically the pipeline is a mechanism by which materials and information flow through a supply chain. As such, two elements of organizational
restructuring can be identified, the first an internal process of integration and the second the externalization of these new relationships with key suppliers to ensure that material flows are synchronized with the demands of the consumer. Both types of integration are necessary in order to improve channel-wide performance.

Most supply chains are actually networks. It may be more accurate to use the term supply network or supply web to describe the structure of most supply chains.

A typical supply chain may involve a variety of stages. These supply chain states includes:

- Customers
- Retailers
- Wholesalers/distributors
- Manufacturers
- Component/raw material suppliers

_Supply Chain Stages_
Each stage in Figure above need not be present in a supply chain. The appropriate design of the supply chain depends on both consumer's needs and the roles played by the stages involved. In some cases, such as Dell, a manufacturer may fill customer orders directly. Dell builds-to-order; that is, a customer order initiates manufacturing at Dell. Dell does not have a retailer, wholesaler or distributor in its supply chain.

**Cycle View of Supply Chain Process:**

![Cycle View of Supply Chain Process Diagram]

Given the five states of a supply chain shown in figure, all supply chain processes can be broken down into the following four process cycles, as shown in figure:

- Customer order cycle
- Replenishment cycle
- Manufacturing cycle
- Procurement cycle

Each cycle occurs at the interface between two successive stages of the supply chain. The five stages thus result in four supply chain process cycles. Not every supply chain will have all four cycles clearly separated. For example, a grocery supply chain in which a retailer stocks finished-
goods inventories and places replenishment orders with a distributor is likely to have all four cycles separated. Dell, in contrast, sells directly to customers, thus bypassing the retailer and distributors.

When customers shop online at Amazon, they are part of the customer order cycle—with the customer as the buyer and Amazon as the supplier. In contrast, when Amazon orders books from a distributor to replenish its inventory, it is part of the replenishment cycle—with Amazon as the buyer and the distributor as the supplier.

A cycle view of the supply chain is very useful when considering operational decisions because it clearly specifies the roles of each member of the supply chain. The detailed process description of a supply chain in the cycle view forces a supply chain designer to consider the infrastructure required to support these processes. The cycle view is useful, for example, when setting up information systems to support chain operations.

1.2 PUSH/PULL VIEW OF SUPPLY CHAIN PROCESSES

All processes in the customer order and manufacturing cycle at Dell are thus classified as pull processes because they are initiated by customer arrival. Dell, however, does not place component orders in response to a customer order. Inventory is replenished in anticipation of customer demand. All processes in the procurement cycle for Dell are thus classified as push processes, because they are in response to a forecast.

A push/pull view of the supply chain is very useful when considering strategic decisions relating to supply chain design. The goal is to indentify an appropriate push/pull boundary such that the supply chain can match supply and demand effectively.

1.3 OBJECTIVE OF A SUPPLY CHAIN

The objective of every supply chain should be to maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer and the costs the supply chain incurs in filling the customer's request. For most commercial
supply chains, value will be strongly correlated with supply chain profitability (also known as supply chain surplus), the difference between the revenue generated from the customer and the overall cost across the supply chain. For example, a customer purchasing a wireless router from Best Buy pays $60, which represents the revenue the supply chain receives. Best Buy and other stages of the supply chain incur costs to convey information, produce components, store them, transport them, transfer funds, and so on. The difference between the $60 that the customer paid and the sum of all costs incurred by the supply chain to produce and distribute the router represents the supply profitability or surplus. Supply chain profitability or surplus is the total profit to be shared across all supply chain stages and intermediaries. The higher the supply chain profitability, the more successful is the supply chain. Supply chain success should be measured in terms of supply chain profitability and not in terms of the profits at an individual stage.

1.4 SUPPLY CHAIN STRATEGY

The strategic concept of supply chain management has been employed with many variations and under several different names over the last ten years. Some firms refer to the practice as developing “strategic alliances”; other firms describe the activity as “partnering”, while some firms feel that they are establishing special logistic relationships with “key vendors” or “key customers”. The strategy generally involves the following elements as given out in succeeding paragraphs:

Two or more firms in a supply chain enter into a long-term understanding, although typically not a legally binding contract, to do business with each other on mutually favourable terms with closely integrated and synchronized logistics processes.

The firms work hard to develop high levels of trust and commitment to the relationship. The goal is to change the buying-selling relationship from an adversarial, winner-loser, bargaining-haggling, arms-length exchange into a cooperative, team-oriented enterprise where each party is looking out for the interests of other party as well as its own concerns.

The logistics integration activity typically involves the sharing of timely and sensitive demand and sales data, inventory data, and shipment status data.
The visibility and flexibility provided by the supply chain will often lead to changes in the locus of control of the traditional logistics processes. For example, a retailer might allow a manufacturer to “read” its demand and inventory data and launch replenishment orders automatically, merely notifying the retailer's purchasing function after the fact.

Application of the supply chain approach leads to service improvements and cost reductions to members firms at all levels in the chain, with members in the chain negotiating how the benefits will be shared. The chain as a whole becomes more competitive compared with other firms in the industry which are not members of such a chain.

1.5 DECISION PHASES IN A SUPPLY CHAIN

Supply Chain Planning:

For decisions made during this phase, the time frame considered is a quarter to year. Therefore, the supply chain's configuration determined in the strategic phase is fixed. The goal of planning is to maximize the supply chain surplus that can be generated over the planning horizon given the constraints established during the strategic or design phase. Companies start the planning phase with a forecast for the coming year (or a comparable time frame) of demand in different markets. Planning includes making decisions regarding which market will be supplied from which locations, the subcontracting of manufacturing, the inventory policies to be followed, and the timing and size of marketing and price promotions. Dell's decisions regarding markets supplied by a production facility and target production quantities at each location are classified as planning decisions. Planning establishes parameters within which a supply chain will function over a specified period of time. In the planning phase, companies must include uncertainty in demand, exchange rates, and competition over this time horizon in their decision.

1.6 SUPPLY CHAIN OPERATION

The time horizon here is weekly or daily, and during this phase companies make decisions regarding individual customer orders. At the operational level, supply chain configuration is considered fixed and planning policies are already defined. The goal of supply chain operations is
to handle incoming customer orders in the best possible manner. During this phase, firms allocate inventory or production to individual orders, set a date that an order is to be filled, generate pick lists at a warehouse, allocate an order to a particular shipping mode and shipment, set delivery schedules of trucks, and place replenishment orders. Because operational decisions are being made in the short term (minutes, hours or days), there is less uncertainty about demand information.

There is a close connection between the design and management of supply chain flows (product, information, and funds) and the success of a supply chain. Wal-Mart, Dell Computer, and Seven-Eleven Japan are examples of companies that have built their success on superior design, planning, and operation of their supply chain. In contrast, the failure of many e-businesses such as Webvan can be attributed to weaknesses in their supply chain design and planning. Wal-Mart has been a leader at using supply chain design, planning, and operation to achieve success. From its beginning, the company invested heavily in transportation and information infrastructure to facilitate the effective flow of goods and information. Wal-Mart designed its supply chain with clusters of stores around distribution centers (DCs) to facilitate frequent replenishment at its retail stores in a cost-effective manner. Frequent replenishment allows stores to match supply and demand more effectively than the competition. Wal-Mart has been a leader in sharing information and collaborating with suppliers to bring down costs and improve product availability. Dell bypasses distributors and retailers and sells directly to customers. Close contact with its customers and an understanding of customers’ needs allow Dell to develop better forecasts. To further improve the match between supply and demand, Dell makes an active effort to steer customers in real time, on the phone or via the Internet, toward PC configurations that can be built given the components available.

On the operational side, Dell centralizes manufacturing and inventories in a few locations and postpones final assembly until orders arrive. As a result, Dell is able to provide a large variety of PC configuration while keeping very low levels of inventory. In 2004, Dell carried less than five days’ worth of inventory; in contrast, the competition, selling through retailers, carries several weeks’ worth of inventory. If Intel introduces a new chip, the low level of inventory allows Dell to go to market with a PC containing the chip faster than the competition. If prices drop suddenly,
as they often do, Dell has fewer inventories that lose value relative to its competitors. For some products, such as monitors manufactured by Sony, Dell maintains no inventory. The transportation company simply picks up the appropriate number of computers from Dell's Austin, Texas, plant and monitors from Sony's factory in Mexico, matches them by customer order, and delivers them the customers.

The failure of many e-businesses such as Webvan and Kozmo can be attributed to their inability to design appropriate supply chains or manage supply chain flows effectively. Webvan designed a supply chain with large warehouses in several major cities in the United States, from which groceries were delivered to customer homes. This supply chain design could not compete with traditional supermarket supply chains in terms of cost. Traditional supermarket chains bring product to a supermarket close to the consumer using full truckloads, resulting in very low transportation costs. They run their inventory relatively fast and let the customer perform most of the picking activity in the store. In contrast, Webvan turned its inventory marginally faster than supermarkets but incurred much higher transportation costs for home delivery and high labor costs to pick customer orders. The result was a company that folded in 2001 within two years of a very successful public offering.

The supply chain should be maximizing the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer and the costs the supply chain incurs in filling the customer's request. For most commercial supply chains, value will be strongly correlated with supply chain profitability (also known as supply chain surplus), the difference between the revenue generated from the customer and the overall cost across the supply chain. Supply chain profitability or surplus is the total profit to be shared across all supply chain stages and intermediaries. The higher the supply chain profitability, the more successful is the supply chain.

Having the success of a supply chain in terms of supply chain profitability, the next logical step is to look for sources of revenue and cost. For any supply chain, there is only one source of revenue: the customer. Effective supply chain management involves the management of supply chain assets and product, information, and fund flows to maximize total supply chain profitability.
The new way of managing supply chains known as SCM (Supply Chain Management) is aimed at building trust, exchanging information on market needs, developing new products, and reducing the supplier base so as to release management resources.

Thus, supply chain management is centered on organizational restructuring and extends to the development of company-wide collaborative culture. It also embraces a strong sense of the integration of all activities which control the timing and synchronization of material flows.

1.7 SUPPLY CHAIN MANAGEMENT

The field of study known as supply chain management represents crossroads where many academic disciplines have converged. This has been synergized by the introduction of Material Resource Planning (MRP), Enterprise Resources Planning (ERP) and Distribution Resource Planning (DRP). A multitude of definitions have been proposed concerning the concept of the supply chain. The network of organizations that are involved through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer. According to Ellram and Cooper (1993), supply chain management is an integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer. The systemic and strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purpose of improving the long-term performance of the individual companies and the supply chain as a whole.

Supply Chain Management is the process of planning, implementing and controlling the operations of the supply chain with the purpose of satisfying the customer's requirement as efficiently as possible. Supply Chain spans all movement and storage of raw materials, work-in-process, inventory and finished goods from the point of origin to the point of consumption. Supply Chain Management is a network of facilities that produce raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system. The management of the supply chain and the roles of various factors involved differ from industry to industry and company to company. As a result Supply Chain Management (SCM) has become a vital issue for manufacturers, professionals and researchers.
Thus it is often felt that effective management of supply chain, the entire structure of supply chain must be understood properly.

Supply chain management is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies. It is said that the ultimate goal of any effective supply chain management system is to reduce inventory (with the assumption that products are available when needed).

Supply chain management flows can be divided into three main categories that is Product flow, the information flow and the finances flow. The product flow includes the movement of goods from a supplier to a customer, as well as any customer returns or service needs. The information flow involves transmitting orders and updating the status of delivery. The financial flow consists of credit terms, payment schedules, and consignment and title ownership arrangements. Supply Chain Management is management of material, money, men, and information within and across the supply chain to maximize customer satisfaction and to get an edge over competitors.

Supply Chain (New and Payne, 1995)

The main reason and objective of SCM is to provide a strategic weapon to build up and enhance sustainable competitive advantage by cost reduction without compromising customer satisfaction (Mentzer et al. 2001). Moreover, the ability to understand the environment pressures that drive the SCM and clearly note the barriers and implement solutions or bridges enables
supply chain performance to maintain competitive advantage (Fawcett et al, 2008, 37). The main goal and important aspect of SC is leveraging the expertise, experience, skills and capabilities of the SCP who comprise this competitive network (Mentzer et al., 2001).

The success of firm depends on supply chain decisions based on supply chain performance. One of the key attributes of a successful materials manager, in today's highly competitive marketplace is the ability to respond rapidly to the end consumer demand. To maximize competitive advantage, all members of the organization should “seamlessly” work together to serve the end consumer. Today, integrated logistics is considered to include planning, allocating, and controlling the financial and human resources committed to manufacturing support and purchasing operations as well as physical distribution. It is likely that an even broader perspective will become common place as more business place greater emphasis to integrate logistics activities. Logistics management must lead the logistics processes to ensure the following; to be efficient, flexible, reliable and resilient, to serve customers in competitive mode and make the best use of limited assets and resources.

**SCM Evolution**

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<thead>
<tr>
<th>Stage one: Baseline</th>
<th>Stage two: Functional Integration</th>
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<td>Purchasing</td>
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<td>Manufacturing Management</td>
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<td>Material Control</td>
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**SCM Process**

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The Global Supply Chain Forum identified eight key processes that make up the core of supply chain management. These are:

- Customer Relationship Management.
- Demand Management.
- Manufacturing Flow Management.
- Product Development and Commercialization.
- Customer Service Management.
- Order Fulfillment.
- Procurement.
- Returns.

While management of all firms in each supply chain should consider these eight processes, the relative importance of each process and the specific activities included may vary. The processes are however interrelated and have an individual and collective effect on the efficacy of the supply chain.

**Customer Relationship Management:** The customer relationship management process provides the structure for how the relationship with the customer is developed and maintained. Performance reports are designed to measure the profitability of individual customers as well as the firm's financial impact on those customers.

**Customer Service Management:** The customer service management process is the firm's face to the customer. It provides the single source of customers' information, such as product availability, shipping dates and order status. Real-time information is provided to the customers through interfaces with the firm's functions, such as manufacturing and logistics.

**Demand Management:** The demand management process needs to balance the customers' requirements with the firm's supply capabilities. This includes forecasting demand and synchronizing it with production, procurement, and distribution. “Demand Management coordinates all acts that place demand on manufacturing capacity”. The process is also concerned with developing and executing contingency plans when operations are interrupted. A key component to demand management is the ongoing process aimed at increasing flexibility and reducing variability (in demand, lead-times, capacity, etc). The supply chain which best succeeds in reducing uncertainty and variability is likely to be most successful.
**Order Fulfillment:** A key to effective supply chain management is to meet customer requirements in terms of order fulfillment. Effective order fulfillment requires integration of the firm’s manufacturing, logistics and marketing plans. The firm should develop partnerships with key members of the supply chain to meet customer requirements and reduce total delivered cost to customers.

**Manufacturing Flow Management:** The manufacturing flow process deals with making the products and establishing the manufacturing flexibility needed to serve the target markets. The process includes all activities necessary for managing the product flow through the manufacturing facilities and for obtaining, implementing and managing flexibility. The objective of manufacturing flow is to determine the manufacturing infrastructure needed for fulfilling the customers' needs and wants.

**Procurement and Supplier Relationship Management:** Supplier relationship management is the process that defines how a company interacts with its suppliers. As the name suggests, this is a mirror image of customer relationship management. Just as a company needs to develop relationships with its customers, it needs to foster relationships with its suppliers.

**Product Development and Commercialization:** Product development is critical to the continuing success of the firm. Developing new products quickly and getting them to the marketplace in an efficient manner is a major component of corporate success. Time to market is a critical objective of this process. Supply chain management includes integrating customers and suppliers and the product development process in order to reduce “time to market”.

**Returns Management:** The returns process is about managing the day-to-day returns activities. The process is initiated when a return request is received from a customer. This customer may be a consumer returning an item, or a retailer or distributor sending back items that did not sell. In some cases, these returns come through the customer service management process. Effective returns management is a critical part of supply chain management.

The corporate world, which has optimized operations within the four walls of their enterprises, is now looking across the supply chain as the next step in improving their logistics operations. The
The greatest benefit of SCM is accrued when all the channel members, who include suppliers, manufacturers, distributors and customers, function as if they are part of the same company. This is easier said than done. Successful supply chain management is extremely complex.

However, there are seven principles which should be followed while managing the supply chain for the corporate sector. These are:

- **Logistics** (inventory, warehousing, and transportation) should be customized to suit the customer. This can be brought about by shared information leading to ‘real time’ decisions.
- **Demand Planning** should be based on market signals and not on independent departmental necessities. Integration of departments leads to consistent forecasting and optimal resource allocation.
- **Lead-time** should be compressed across the chain for reducing inventories/avoiding stockpiling.
- **Strategic alliances** between links in the supply chain would reduce ‘owning’ of materials and services.
- **Facility for multiple decisions** making across the chain is imperative.
- **Develop performance measures** of the chain according to customer’s feedback. Should keep a track on economic performance.

### 1.8 COMPETITIVE AND SUPPLY CHAIN STRATEGIES

A company's competitive strategy defines, relative to its competitions, the set of customer needs that it seeks to satisfy through its products and services. For example, Wal-Mart aims to provide high availability of a variety of products of reasonable quality at low prices. Most products sold at Wal-Mart are common place (everything from home appliances to clothing) and can be purchased elsewhere. What Wal-Mart provides is a low price and product availability. McMaster-Carr sells maintenance, repair, and operations (MRO) products. It offers more than 400,000 different products through both a catalog and a website. Its competitive strategy is built around providing the customer with convenience, availability, and responsiveness. With this focus on responsiveness, McMaster does not compete based on low price. Clearly, the competitive strategy at Wal-Mart is different from that at McMaster.
We can also contrast Dell, with its build-to-order model, with a firm like HP selling PCs through retailers. Dell has stressed customization and variety at a reasonable cost, with customers having to wait approximately one week to get their product. In contrast, a customer can walk into a computer retailer, be helped by a sales-person, and leave the same day with a computer. The amount of variety and customization available at the retailer, however, is limited. In each case, the competitive strategy is defined based on how the customer prioritizes product cost, delivery time, variety, and quality. Thus, a firm's competitive strategy will be defined based on its customers' priorities. Competitive strategy targets one or more customer segments and aims to provide products and services that satisfy these customers' needs.

To see the relationship between competitive and supply chain strategies; we start with the value chain for a typical organization. The value chain begins with new product development, which creates specifications for the product. Marketing and sales generate demand by publicizing the customer's priorities that the products and services will satisfy. Marketing also brings customer input back to new product development. Using new product specifications, operations transform inputs to outputs to create the product. Distribution either takes the product to the customer or brings the customer to the product. Service responds to customer requests during or after the sale. These are core processes or functions that must be performed for a successful sale. Finance, accounting, information technology and human resources support and facilitate the functioning of the value chain. To execute a company's competitive strategy, all these functions play a role and each must develop its own strategy. Here, strategy refers to what each process or function will try to do particularly well.

A product development strategy specifies the portfolio of new products that a company will try to develop. It also dictates whether the development effort will be made internally or outsourced. A marketing and sales strategy specifies how the market will be segmented and how the product will be positioned, priced, and promoted. A supply chain strategy determines the nature of procurement of raw materials, transportation of materials and to and from the company, manufacture of the product or operation to provide the service, and distribution of the product to the customer, along with any follow-up service and a specification of whether these processes will be performed in-house or outsourced. Given that firms are rarely completely vertically
integrated, it is important to recognize that the supply chain strategy defines not only what processes within the firm should do well but also what the role played by each supply chain entry is. For example, Cisco's supply chain strategy calls for most component manufacturing and assembly to be outsourced. In this case, Cisco's supply chain strategy identifies not just what Cisco should do well but also the role of each third party to which supply chain tasks are outsourced. Supply chain strategy specifies what the operations, distribution and service functions, whether performed in-house or outsourced, should do particularly well. The value chain emphasizes the close relationship between the functional strategies within a company. Each function is crucial, if a company is to satisfy customer needs profitably. Thus, the various functional strategies cannot be formulated in isolation. They are closely intertwined and must fit and support each other if a company is to succeed.

Successful implementation of SCM is seen as closely dependent upon the need for breaking down barriers not only between internal departments and business processes, but also across companies within the whole supply chain (Vollman et al., 1997). Its success is also associated with the challenging development of a new culture based on empowerment and on-going and shared learning and continuous improvement. Another challenging and difficult feature of SCM is linked with the emergence of the network organization, which can lead to a complex web of linkages to be coordinated and managed. This can imply difficulties which include lack of common purpose, multiple and hidden goals, power imbalances, culture and procedures, conflict over autonomy and accountability, over-dependence and a continuing lack of openness and opportunistic behaviour.

1.9 MAJOR ISSUES IN SUPPLY CHAIN MANAGEMENT

It is found that SCM encompasses planning, manufacturing and operations management necessary to bring a product to the market place, from the sourcing of materials to the delivery of the completed product. This section would provide insights on the aspects and the issues that are to be managed in supply chain.

Information Technology and Information Management: The advent of the Internet and electronic communication has enabled companies to be more responsive to their customers than
ever. Sanchez and Perez (2003); Tarn et al. (2002); Wieder et al. (2006) examined functions, current developments and the rationale for IT integration by analyzing the problems of enterprise resource planning (ERP), electronic data interchange (EDI) and presented the solutions of SCM. The rich experience of firms with ERPs tends to deliver higher overall performance, but no evidence was found of a similar effect on supply chain performance. On the contrary EDI adopters perceived more operational benefits, more external pressure and mutual understanding, and fewer technical and organizational difficulties than non-adopters of EDI.

**Knowledge Management:** Knowledge is critical for organizations to satisfy customer needs for customized products and services, and speedier and improved service. Knowledge indicates a firm's intellectual capital: including work-related experience, expertise, know-how, and best practices, that can be acquired and shared. Knowledge Management (KM) involves individuals and groups, both within and between firms, managing tacit and explicit knowledge to make better decisions, take actions and deliver results to support the underlying business strategy. Knowledge management is the systematic and organizationally specified process of acquiring, organizing, and communicating knowledge so that employees can use it to become more effective and productive in their work.

**Customers - Supplier Relationship Issues:** Customer Satisfaction is absolute for staying abreast in competitive environment that can be achieved only by quickly responding to customer needs. Efficient consumer response (ECR) is a supply chain management strategy that attempts to address the inefficiencies in the supply chain. Hoffman and Mehra (2000); Harries et al. (1999); Sparks and Wagner (2003) discussed efficient consumer response (ECR) as a supply chain strategy by analyzing the adoption of ECR strategy in some industries.

**Customer Relations Issue:** A company's customer relations practices can affect its success in managing the supply base as well as its performance A key element of successful supply base management involves downstream integration of customers as well as the management of upstream suppliers. Each entity in the supply chain is a supplier as well as a customer. When a customer driven corporate vision is implemented simultaneously with effective TQM and supply base management practices, it can produce a competitive edge in a number of different ways. These include increase in productivity, reduction in inventory and cycle time, increased customer
satisfaction, market share and profits. However, there is little empirical evidence in the literature linking customer relations practices and performance to support the conceptual foundation of customer driven corporate policy.

**Partnership Issues:** As global markets grow increasingly efficient, competition no longer takes place between individual businesses, but between entire value chains. Therefore executives are developing supply chain partnerships/collaboration in an attempt to reduce costs, improve service and to gain competitive advantage. Collaboration through intelligent e-business networks would provide the competitive edge to all the participants in a value chain to prevail and grow. It is found that collaborative partnerships can be achieved both via trust and through electronically mediated exchange.

**Environmental issues and Supplier Relations:** Power (2005) presented a conceptual framework to investigate supplier relations, lean manufacturing, environmental management practices; and their relationship to one another. It is found that efforts to improve a supplier's environmental management practice raise critical issues of transaction costs and efficacy of approach for the buyer. It is recommended that an environmental bias is to be introduced into the decision making process which would allow more environmentally conscious decisions to be made.

**Trust and Commitment:** The two fundamental components of improving the relationship are trust and commitment. The cooperation arises directly from both relationship, trust and commitment. There are several dimensions of trust in fresh produce supply chain performance such as confidence in preferred trading partner, always keep promises, always honest, good reputation, trust in preferred trading partner, believe information provided, close personal friendship, trading partner always consider best interests. Trust is the belief that the partners will act in ways that will bring positive outcomes for the firms and does not want to take unexpected actions that may bring a negative outcome. Trust is the willingness to rely on an exchange partner in whom one has confidence. Or trust as a belief, a sentiment or an expectation about an exchange partner and results from the partner's expertise, reliability & intentionality. Trust is the extent to which the buyer believes that the supplier has the necessary expertise to perform the activity effectively and reliably.
1.10 MAJOR TRENDS IN SUPPLY CHAIN MANAGEMENT

**Co-makership:** Co-makership is the development of a long-term relationship with a limited number of suppliers on the basis of mutual confidence. The basic philosophy of co-makership is that the supplier should be treated as an extension of the customer’s factory with the emphasis on continuity and a seamless end-to-end pipeline. The principle of co-makership can be extended in both directions in the supply chain – upstream to customers and downstream to distributor retailers and even end users.

**Use of Third Party Logistics:** Outsourcing operations like storage, transportation, delivery, etc., improves service levels, enhances flexibility and reduces costs. Outsourcing also helps to reduce investments in assets like trucks and warehouses and enables organizations to access new technologies more easily and even penetrate new markets.

**Principle of Postponement:** Organizations can determine the appropriate point in the supply chain at which the product is completed in its saleable form. Delaying the final labeling, assembly or packaging until the last moment is known as principle of postponement. The objective of this principle is to minimize the risk of carrying finished product inventory at various points in the supply chain by delaying product differentiation to the least possible moment before customer purchase.

**Use of ERP/DRP Techniques:** Enterprise Resource Planning (ERP) systems are information integrators and they help to bind various business processes in an enterprise. ERP also helps in the streamlining and re-engineering of various processes. Distribution Resource Planning (DRP) is a tool which estimates inventory requirements at stocking locations, and ensures that supply sources are able to meet the demand. DRP incorporates policies on safety stocks and information as well as the relation between demand forecasts, inventory levels, manufacturing and distribution schedules.
1.11 INDIAN ARMY

The Indian Army is the land based branch and the largest component of the Indian Armed Forces. It is the world's second largest standing Army. Its primary mission is to ensure the national security and defence of the Republic of India from external aggression and threats, and maintaining peace and security within its borders. It also conducts humanitarian rescue operations during natural calamities and other disturbances. Since independence, the Army has been involved in four wars neighboring Pakistan and one with the People's Republic of China. Apart from this, the Army has also been an active participant in United Nations peace keeping missions (website of Indian Army). As a major component of national power, along with the Indian Navy and the Indian Air Force, the roles of the Indian Army are as follows:

**Primary:** Preserve national interests and safeguard sovereignty, territorial integrity and unity of India against any external threats by deterrence or by waging war.

**Secondary:** Assist Government agencies to cope with 'Proxy War' and other internal threats and provide aid to civil authority when requisitioned for the purpose.

**Structure of the Indian Army:** A broad understanding of the structure of the Indian Army may be in order. The Army operates six tactical commands, i.e., Northern, Eastern, Southern, Western, Central and South-Western. There is also one training command known as ARTRAC. The Army structurally has two components, the fighting component and the service component. The fighting component, also called Arms comprises of Infantry, Armoured, Artillery, Engineers, Signals, Air Defence, Mechanized Infantry and Aviation. The service component is comprised of the support elements in form of Dental Corps, Education Corps, Medical Corps, Ordnance Corps, Postal Service Corps, Service Corps, Electronics and Mechanical Engineers Corps, Military Police, Intelligence Corps, Judge Advocate General's Deptt, Military Farms Service, Military Nursing Service, Remount and Veterinary Corps and Pioneer Corps.

**Supply Chain Process in Indian Army:** A supply chain is an integrated manufacturing process wherein raw materials are converted into final products, then delivered to customers. At its highest level, a supply chain is comprised of two basic, integrated processes:-
(a) The production planning and inventory control process, and
(b) The distribution and logistics process.

These processes, illustrated below in figure, suitably interfaced with the process in army; provide the basic frame work for the conversion and movement of raw materials into final products. (Beamon Benita, 1998).

The Supply Chain Process

The Production Planning and Inventory Control Process: It encompasses the manufacturing and storage sub processes, and their interface(s). More specifically, production planning describes the design and management of the entire manufacturing process (including raw material scheduling and acquisition, manufacturing process design and scheduling, and material handling design and control). Inventory control describes the design and management of the storage policies and procedures for raw materials, work-in-process inventories, and usually, final products.

The Distribution and Logistics Process: It determines how products are retrieved and transported from the warehouse to retailers (troops on ground). These products may be transported to the troops directly, or may first be moved to distribution facilities, which in turn, transport products to retailers. This process includes the management of inventory retrieval, transportation, and final product delivery. These processes interact with one another to produce an integrated supply chain. The design and management of these processes determine the extent
to which the supply chain works as a unit to meet required performance objectives (Beamon Benita, 1998).

Material management in the armed forces encompasses all aspects as practiced in the civil street. The only difference is that profit orientation is replaced with operational requirements of the front line forces. The safety factor and assurance levels are also expectedly much higher in the Armed Forces for obvious reasons. Given the stringent policies and procedures which bind the functioning of the services, external integration both backward and forward in the classical sense may not be feasible. Internal integration within and between the service is an area which can, if synergized, pay rich dividends. Implementation of the SCM process in small measures is already prevalent in all the three services. What is lacking is the vision to fine tune the system to function at its peak efficiency. Use of modern management practices and introduction of E-Systems would bring in the required speed and transparency of information and material flow. The ultimate aim of a fully effective Supply Chain would be to bring in the desired Visibility, Velocity and Value to material flow in the supply chain. The initiative taken by the corporate world towards reducing inventory could be gainfully employed in the Armed Forces with certain modifications.

By effectively leveraging IT and using computer based MIS, we can successfully adapt SCM features to enhance logistic efficacy. Some of the advantages that would accrue it the Armed Forces were to implement an effective SCM are as follows:

• Reduction in lead time/reduction in inventory levels.
• Procedure simplification.
• Accountability and involvement at all levels.
• Augmentation of supply.
• Annual demand with staggered supply.
• Greater transparency.
• Real time information availability.
• Correct and accurate analysis of consumption pattern.

The activities, processes and relationships which fall under the supply chain label are central to industrial modernity. To a very large extent, the details of life are deeply affected by supply chain
phenomena. The ways in which firms deals with suppliers and customers, determine the contours of the economic terrain. The flow of goods through the supply chain is the life-blood of the modern world. It is also a key determinant in the constitution of identity and meaning for individual consumers. The international system of need creation through mass-media advertising can only operate because supply chains allow the ever-faster flow of novelties and innovations at affordable prices. Successful supply chains manage flows of product, information and funds to provide a high level of product availability to the consumer while keeping costs low.

Compared to the Corporate Sector, military supply chains are a bit different in that they are non-linear, much more complex and are, by and large, based on operational commitments and contingencies. Military supply chain management is a cross-functional approach to procuring, producing and delivering products and services. Supply can be described as the procurement, distribution, maintenance while in storage and salvage of supplies, including the determination of kind and quantity of supplies. The production phase of military supply extends from determination of production schedules to acceptance of finished supplies by the military services. The consumer phase of military supply extends from receipt of finished supplies by the military services through issue for use of consumption. The supply chain comprises linked activities associated with providing material from a raw material stage to an end user as a finished good. Supply control is the process whereby an item of supply is controlled within the supply system, including requisitioning, receipt, storage, stock control, shipment, disposition, identification and accounting. The supply point is a location where supplies, services and materials are located and issued. (J.V Singh, 2010).

**Transformation and Modernization:** The logistics system of Indian Army is well organized and has withstood the test of time during the past conflicts. There is however, always a scope for improvement in logistics practices, infrastructure through automation, restructuring organization, removing duplicity in function and other anomalies between various services responsible for providing logistics support to the entire Army. There is definite requirement to have an agile, responsive, integrated and cost effective logistics system using modern technologies and management techniques. (Brig (Retd) Lal, 2010).
Brig Das Deepak (2010), in his article has highlighted the essence of Joint Operational Logistics in the present environment of net centric operations which should aim at providing adequate and timely logistic to move and sustain the Armed Forces in real time. A Joint Operation Doctrine and willingness and readiness of each service in creating a conducive environment for sharing resources is however, a pre-requisite Joint Operational Logistic to take effect. Logistics Transformation would require internal reforms combined with inter agency working to achieve the desired impact. Joint Operational Logistics would have to evolve from supporting limited force joint operation of the present to full spectrum of conflict by slowly integrating identified elements of logistics of the three services. Similarly, Revolution in Military Logistics (RML) is a pre-requisite for revolution in Military Affairs (RMA). The need is to move from managing inventory to managing information and from managing supplies to managing suppliers, i.e., movement from Stock Based Logistics system to a Distribution Based Logistics System. Automation, asset visibility, standardization and codification and tracking technologies can be leveraged as enablers to revolutionize operational logistics in the field jointly by the three services.

**The Role of Army Ordnance Corps (AOC)**

AOC is the official logistics agency and the material manager of the Indian Army and is responsible for the provisioning, procurement, manufacture, supply of all munitions of war, clothing, equipment and all general stores except fuel and rations. The aim is to make available all kinds of stores to all units of the Army at the right time, in right quantity, at the right place and right cost. AOC is major part (i.e. distribution link) of the supply chain covering diverse producers and large number of users. Lack of their own dedicated transportation system and dependence on external agencies for providing road and rail mode of transportation is both a constraint and challenge for them. Logistics objectives of AOC are achieved through activities of provision review, ordering for procurement, receipt of stores from suppliers/producers, stocking, issue and transportation of stores to consignee premises. AOC performs its functions through a three layered structure with Central Ordnance Deports (COD) as centralized stocking areas, Ordnance Deports (OD)/Field Ordnance Deports (FOD) and Advance Base Ordnance Deport (ABOD) as multi commodities stocking agencies catering for regional requirements and
Division Ordnance Units (DOU) as the last link almost co-located with fighting formations and meeting all ordnance requirements of divisions and field formations.

The Corps procures wide range of stores mainly from Ordnance Factories and Public Sector Undertakings. However, it taps the civil industry and market for a large range of low tech general stores, clothing and automobile spare parts.

1.12 OUTSOURCING SUPPORT FUNCTIONS IN INDIAN ARMY

Outsourcing in India till now is restricted only to defence production industry, i.e., 8 Defence Public Sector Undertakings and 39 Ordnance Factories. DPSUs and OFs have their own set of ancillaries which are mainly involved in supply of raw materials, semi finished products, components, assemblies/sub assemblies and systems sub systems to these DPSUs and OFs. In the year 2005-06, DPSUs outsourced products worth approximately Rs 2077 crores out of total purchases of around Rs 8265 crores. Similarly OFs outsourced approx Rs 2529 worth (69 percent of the total) of products from the private sector.

Though service Head Quarter has individually outsourced some of the logistics functions, these efforts are on a very small scale and need to be institutionalized centrally. Non-core functions which could easily be offloaded to efficient private sector are still being performed by uniformed personnel. While it is understood that logistic services for the Army in India cannot be privatized totally, particularly in operational areas, and some aspects of logistics may not be amenable to privatization at all, it is felt that a number of logistics functions can be contracted out to private
agencies, either totally or partially. This would result in large saving and bring in efficiency, as has been experienced by western countries. Another factor which has influenced the lower attempts of outsourcing in our Army is the fact that there are not many private companies capable of providing efficient logistics support to the defence forces as these are available in the western countries.

Some of the non-core logistic functions which are amenable to be outsourced /privatized in Army mainly involve non-combat operations. (Anil Kumar, (2008)) Some of these are as follows:-

(a) Rations, messing & catering.
(b) Fuels, oils and lubricants.
(c) Clothing and Ordnance Stores.
(d) Automobile maintenance and spare support.
(e) Transportation.
(f) Construction services and maintenance of infrastructure.
(g) Military Farms.
(h) Stationery
(i) Conservancy Services
(j) Maintenance/repair support for equipment and machineries
(k) Vehicles common to civil industries.
(l) Training.
(m) Maintenance of Transport Aircraft & Helicopters.

The supply chain management is very challenging in the Army. Today the strength of Indian Army is roughly around 1.4 million personnel deployed over a vast area of our country in varying terrain and climatic zones. Again a rough estimate of the total inventory, including arms, ammunition, clothing, equipment and accessories, vehicles, etc., account to almost 5 to 6 lakh items. The nature of terrain and prevailing climatic condition would dictate the volume of respective inventories of units/ formations. The scaling of items as part of the authorization axiomatically varies depending upon terrain conditions like deserts of Rajasthan and Kutch, jungles of North – East, plains of Punjab, high altitude areas of North and North – East and of course the associated climatic conditions of these respective areas.
The existing supply chain involves utilization of various kinds of transportation system comprising of aircrafts including helicopter, ships (for Andaman and Nicobar), vehicles, mules, porters, etc. Also, the wastage rate of certain items and equipment is also very high because of extreme temperatures and weather conditions and hence these items need to be stocked in adequate quantities at various echelons. Another challenge is the number of agencies involved in procuring and provisioning these items. All this would require a detailed, deliberate and continuous planning or else there will be a drop in the morale of the fighting force. Wars are not every day to test the efficacy of the existing supply chain but surely the supply chain the most important battle winning factor.

1.13 EFFICACY OF SCM

Efficacy of SCM can be measured through various metrics and measures. The metrics and measures are discussed in the context of the following supply chain activities/ processes: (1) plan, (2) source, (3) make/assemble and (4) delivery/customer

Metrics for order planning

The order entry method: This method determines the way and extent to which customer specifications are converted into information exchanged along the supply chain.

Order lead-time: The total order cycle time, called order to delivery cycle time, refers to the time elapsed in between the receipt of customer order until the delivery of finished goods to the customer. The reduction in order cycle time leads to reduction in supply chain response time, and as such is an important performance measure and source of competitive advantage (Christopher, 1992)—it directly interacts with customer service in determining competitiveness.

The customer order path: The path that an order traverses is another important measure whereby the time spent in different channels can be determined. By analyzing the customer order path, non-value adding activities can be identified so that suitable steps can be taken to eliminate them.
**Evaluation of supply link:** Traditionally, supplier performance measures were based on price variation rejects on receipt and on time delivery. For many years, the selection of suppliers and product choice were mainly based on price competition with less attention afforded to other criteria like quality, reliability, etc. More recently, the whole approach to evaluating suppliers has undergone drastic change.

**Evaluation of suppliers:** The evaluation of suppliers in the context of the supply chain (efficiency, flow, integration, responsiveness and customer satisfaction) involves measures important at the strategic, operational and tactical level. Strategic level measures include lead time against industry norm, quality level, cost saving initiatives, and supplier pricing against market. Tactical level measures include the efficiency of purchase order cycle time, booking in procedures, cash flow, quality assurance methodology and capacity flexibility. Operational level measures include ability in day-to-day technical representation, adherence to developed schedule, ability to avoid complaints and achievement of defect free deliveries. Purchasing and supply management must analyze on a periodic basis their supplier abilities to meet the firm's long-term needs. The areas that need particular attention include the supplier's general growth plans, future design capability in relevant areas, role of purchasing and supply management in the supplier's strategic planning, potential for future production capacity and financial ability to support such growth. Supply chain partnership is a collaborative relationship between a buyer and seller which recognizes some degree of interdependence and cooperation on a specific project or for a specific purchase agreement. Such a partnership emphasizes direct, long-term association, encouraging mutual planning and problem solving efforts. Partnership maintenance is no less important. Performance evaluation of buyers or suppliers is simply not enough—relationships must be evaluated. The parameters that need to be considered in the evaluation of partnerships are the ones that promote and strengthen them. For example, the level of assistance in mutual problem solving is indicative of the strength of supplier partnerships. Partnership evaluation based on such criteria will result in win–win partnerships leading to more efficient and more thoroughly integrated supply chains.
**Measures and metrics at production level:** After the order is planned and goods sourced, the next step is to make/assemble products. This is the activity carried out by organizations that own production sites, and their performance has a major impact on product cost, quality, speed of delivery and delivery reliability, and flexibility. As it is quite an important part of the supply chain, production needs to be measured and continuously improved. Suitable metrics for the production level are as follows:

**Range of product and services:** According to Mapes et al. (1997), a plant that manufactures a broad product range is likely to introduce new products more slowly than plants with a narrow product range. Plants that can manufacture a wide range of products are likely to perform less well in the areas of value added per employee, speed and delivery reliability. This clearly suggests that product range affects supply chain performance.

**Capacity utilization:** From the above assertion, it is clear that the role-played by capacity in determining the level of activities in a supply chain is quite important. According to Slack et al. (1995), of the many aspects of production performance, capacity utilization directly affects the speed of response to customer demand through its impact on flexibility, lead-time and deliverability.

**Effectiveness of scheduling techniques:** Scheduling refers to the time or date on or by which activities are to be undertaken. Such fixing determines the manner in which resources will flow in an operating system, the effectiveness of which has an important impact on production and thus supply chain performance. For example, scheduling techniques such as JIT, MRP and ERP have implications on purchasing, throughput time and batch size. In case of the supply chain, since scheduling depends heavily on customer demands and supplier performance, the scheduling tools should be viewed in that context (Little et al., 1995).

**Evaluation of delivery link:** The link in a supply chain that directly impacts customers is delivery. It is a primary determinant of customer satisfaction; hence, measuring and improving delivery is always desirable to increase competitiveness. Delivery by its very nature takes place in a dynamic and ever-changing environment, making the study and subsequent improvement of a distribution system difficult.
**Measures for delivery performance evaluation:** According to Stewart (1995), an increase in delivery performance is possible through a reduction in lead-time attributes. Another important aspect of delivery performance is on-time delivery. On-time delivery reflects whether perfect delivery has taken place or otherwise and is also a measure of customer service level. A similar concept, on time order fill, was used by Christopher (1992), describing it as a combination of delivery reliability and order completeness. Another aspect of delivery is the percentage of finished goods in transit, which if high signifies low inventory turns, leading to unnecessary increases in tied up capital. Various factors that can influence delivery speed include vehicle speed, driver reliability, frequency of delivery, and location of depots. An increase in efficiency in these areas can lead to a decrease in the inventory levels.

**Number of faultless notes invoiced:** An invoice shows the delivery date, time and condition under which goods were received. By comparing these with the previously made agreement, it can be determined whether perfect delivery has taken place or not, and areas of discrepancy can be identified so that improvements can be made.

**Flexibility of delivery systems to meet particular customer needs:** This refers to flexibility in meeting a particular customer delivery requirement at an agreed place, agreed mode of delivery and with agreed upon customized packaging. This type of flexibility can influence the decision of customers to place orders, and thus can be regarded as important in enchanting and retaining customers (Novich, 1990).

**Total distribution cost:** Perhaps the most important research concerning logistics is going on in the area of design of efficient and cost effective distribution systems. For this, an understanding of total distribution cost is essential, so that proper trade-offs can be applied as a basis for planning and reassessment of distribution systems. The urgency of dealing with transportation cost was highlighted by Thomas and Griffin (1996), who argued that since transportation cost accounts for more than half of the total logistics cost, more active research is needed in the area. To deal with distribution costs, measuring individual cost elements together with their impact on customer service encourages tradeoffs that lead to a more effective and efficient distribution system.
Measuring customer service and satisfaction: To a world class organization, a happy and satisfied customer is of the utmost importance. In a modern supply chain, customer can reside next door or across the globe and in either case they must be well served. Without a contented customer, the supply chain strategy cannot be deemed effective. Lee and Billington (1992) and van Hoek et al. (2001) emphasized that to assess supply chain performance, supply chain metrics must centre on customer satisfaction.

Flexibility: Of the factors by which supply chains compete, flexibility can be rightly regarded as a critical one. Being flexible means having the capability to provide products/services that meet the individual demands of customers. Some flexibility measures include: (i) product development cycle time, (ii) machine/toolset up time, (iii) economies of scope (Christopher, 1992)-refers to the production of small quantities of wider range (e.g. JIT lot size)-and (iv) number of Inventory turns.

Customer query time: Customer query time relates to the time it takes for a firm to respond to a customer query with the required information. It is not unusual for a customer to enquire about the status of order, potential problems on stock availability, or delivery. A fast and accurate response to those requests is essential in keeping customers satisfied.

Post transaction measures of customer service: The function of a supply chain does not end when goods are provided to the customer. Post transaction activities play an important role in customer service and provide valuable feedback that can be used to further improve supply chain performance.

1.14 SUPPLY CHAIN AND LOGISTICS COST

The efficiency of a supply chain can be assessed using the total logistics cost—a financial measure. It is necessary to assess the financial impact of broad level strategies and practices that contribute to the flow of products in a supply chain. Since logistics cut across functional boundaries, care must be taken to assess the impact of actions to influence costs in one area in terms of their impact on costs associated with other areas (Cavinato, 1992). For example, a change in capacity has a major effect on cost associated with inventory and order processing.
Cost associated with assets and return on investment: Supply chain assets include accounts receivable, plant, property and equipment, and inventories. With increasing inflation and decreased liquidity, pressure is on firms to improve the productivity of capital-to make the assets sweat. In this regard it is essential to determine how the cost associated with each asset, combined with its turnover, affects total cash flow time. One way to address this is by expressing it as an average days required to turn cash invested in assets employed into cash collected from a customer (Stewart, 1995). Thus, total cash flow time can be regarded as a metric to determine the productivity of assets in a supply chain. Once the total cash flow time is determined, this can be readily combined with profit to provide insight into the rate of return on investment (ROI). This determines the performance by top management is terms of earnings on the total capital invested in a business. With customer service requirements constantly increasing, effective management of inventory in the supply chain is crucial (Slack et al., 1995). In a supply chain, the total cost associated with inventory can be broken down into: Opportunity cost, consisting of warehousing, capital and storage; Cost associated with inventory at the incoming stock level and work in progress; Service costs, consisting of cost associated with stock management and insurance; Cost of finished goods including those in transit; Risk costs, consisting of cost associated with pilferage, deterioration, and damage; Cost associated with scrap and rework; and Cost associated with too little inventory accounting for lost sales/lost production.

Information processing cost: This includes costs such as those associated with order entry, order follow/updating, discounts, and invoicing. On the basis of survey results from various industries, Stewart (1995) identified information processing cost as the largest contributor to total logistics cost. The role of information technology is shifting from a general passive management enabler through databases, to a highly advanced process controller that can monitor activities and decide upon an appropriate route for information. Modern information technology, through its power to provide timely, accurate, and reliable information, has led to a greater integration of modern supply chains than possible by any other means.
1.15 SCM CONCEPT ADOPTED BY ALEXANDER THE GREAT

A popular military maxim says that amateurs talk about strategy and professionals discuss logistics. Alexander’s 35,000–man army could carry no more than a 10–day supply of food when remote from sea transport. Yet, he and his troops marched over thousands of miles at a rate of 19.5 miles in any one day without problem. In the process Alexander conquered every nation and city on which he set his sights. At the most basic level, he was able to perform his legendary feats because he included logistics and supply-chain management into his strategic plans, just as any modern-day corporation should do to maintain a competitive edge. Alexander would supply forward bases by ship, then dismantle and carry the ships over land to another river enroute to the next forward base. Similarly, Alexander initiated the notion of a single point of contact on logistical issues, ensuring simplicity of military objectives. Not surprisingly, many successful business and military institutions and operations still study Alexander’s logistics as a way of thinking how they ought to tackle their own.

**Single Point of Control:** Like Alexander, most great logisticians understand that while knowledge-based decision making and empowerment can be relegated up to a point, there ultimately must be a single point of control, a place where the buck stops, a CEO, who is held accountable. Alexander made the decisions for his army. He was the central point of control, managed the logistics system, and incorporated it into the strategic plan. While modern CEOs should not personally run the logistics management functions, they should appoint someone to run this critical area. This person should think like and report to the CEO. A modern-day military example of this occurred during the recent Gulf War. Gen Colin Powell, chairman of the Joint Chiefs of Staff, was the highest ranking military officer and primarily served as liaison between the army and President George Bush. Gen Norman Schwarzkopf actually planned specific military battles and had final battlefield responsibility for the implementation of the policy developed by Powell and Bush.

**Keep it simple:** The underlying principle of Alexander the Great’s logistics system was simplicity. Where other armies of the ancient world typically carried as many followers as troops on an expedition, with the followers carrying the rations and other supplies of the troops, Alexander trained their troops to carry everything they needed themselves. This reduced the...
logistical train that went ahead or followed and also allowed the Macedonians to achieve lightning speed.

**Set up forward supply bases:** Most ancient armies and indeed most ones as well, are tethered to their supply bases. Tactical operations are often lost because the supply chain of the advancing armies don't arrive in time are cut off by the enemy. The key success factor of the multinational force's quick win over Iraq in the 1991 Gulf War was based on a principle first seen in Alexander the Great's army forward supply bases, which would be set up in anticipation of the arrival of the troops.

**Plan far in advance:** Because of the subsistence level of agricultural production in ancient times, and lack of roads and communication facilities, Alexander's army could not entirely depend on foraging from the land as Napoleon's could. So before he set out on the next stage of a campaign, Alexander always made sure that an advance team had been sent out to capture supplies from a local magistrate or ruler. Most towns and villages willingly surrendered to the advance team, but in those instances where they didn't, he arm-twisted them into surrender. In those areas where there were no towns and villages, Alexander made sure he consulted the botanists, zoologists, meteorologists and logisticians in his entourage about climate conditions, and the availability of animals, fruits and vegetables that could be garnered for the large army.

**Break into small units:** If there was no certainty of advance supply bases, Alexander split the army into smaller units, which set out on different courses to reach the same destination. Each unit was responsible for taking care of its own forage and, if any came across a large enough supply, they requisitioned it for other units. Very often, his advance intelligence team would provide him with accurate estimates of how many people a town or city ahead could sustain given the subsistence level of agricultural production, and Alexander would always take only that many troops, living the rest behind at a point where supplies were more plentiful.

**Conclusion.** Like Alexander the Great and his organization, a modern corporation cannot be fully effective and productive if bits and pieces of its infrastructure are managed by different people sharing disparate philosophies and with no shared culture or central point of contact and control. In truth, effective logistics management processes today are largely a function of having
cross-functional, shared information with a single point of control. In organizations where purchasing, shipping, receiving, traffic, production planning, forecasting and customer service do not report to one person with an overall responsibility for supply chain management, opportunities for creating increased cost and service efficiencies will fall through the cracks. Alexander the Great was so named not because of his physical stature, but because of his philosophies, strategic planning and accomplishments. His unification of much of the civilized world made the later Hellenistic period possible and provided an example for organizational excellence for millennia to follow—right up to the recent Gulf War. The Macedonian army, under Alexander the Great, stands - 2,300 years later—as one of history's most effective organizations.

1.16 PROCUREMENT IN ARMY

The principles and procedures relating to procurement of goods and services for the army are governed by the Defence Procurement Procedure 2008 and the Defence Procurement Manual 2009.

Channels of Procurement

Procurement of stores will in general be done by one of the following methods:

(a) Placing demands on the Director General of Ordnance Factories for manufacture of stores in ordnance factories.

(b) Placing demands on:

   (i) Other Ministries of the Government of India.

   (ii) State Governments, for supply from factories/ workshops/ other procurement agencies under them.

(c) Placing demands on the Industries/Factories/Statutory Corporations – whether wholly of partly financed by the state set-up for the manufacture of specific range of items in the country.
(d) Placing demands on the indigenous trade either directly or through the Director General of Supplies and Disposals including Textile Commissioner, Mumbai.

(e) Local purchase in respect of items which are not supplied by the central procurement authority/ organizations of the Services / Departments and stores emergently required.

(f) Placing demands on Defence Public Sector Undertaking and other Government Public Sector Undertaking for purchase/ repair/ manufacture/ fabrication of items/ equipment/ systems/ aircrafts etc. to meet Defence Services requirements.

Policy Guidelines

(a) **Economy:** Purchase of stores must be made in the most economical manner and in accordance with the definite requirements of the defence services. Stores should not be purchase in small quantities. Periodical indents should be prepared covering the requirement for one year or more, except where for reasons of short life or for other recorded reasons it is necessary to procure lesser quantities. Care should also be taken not to purchase stores much in advance of actual requirements, if such purchase is likely to prove unprofitable to the government, and thus locking up of capital in stock should be minimized.

(b) **Scales:** Where scales of consumption or limits of stores have been laid down by the competent authority, the officer ordering a supply should certify on the purchase order /demands that the prescribed scales or limits are not exceeded.

(c) **Splitting:** Purchase order should not be split to avoid the necessity for obtaining the sanction of the higher authority required with defence to the total amount of the orders.

(d) **Open Competitive Tendering:** When stores are purchased from contractors, the system of open competitive tender should normally be the preferred mode, except where otherwise permissible under the rules and the purchase should be made from the local tenderer.
Types of Procurement

(a) **Capital Procurement:** As per rule 90 of the General Financial Rules, 2005, significant expenditure incurred with the object of acquiring tangible assets of a permanent nature (for use in the organization and not for sale in the ordinary course of business) or enhancing the utility of the existing assets, shall broadly be defined as capital expenditure. Further, as per Rule 91 (a) of the General Financial Rules, 2005, Capital shall bear all charges for the first construction and equipment of a project as well as charges for intermediate maintenance of the work while not yet opened for service. It shall also bear charges for such further additions and improvements, which enhance the useful life of the assets. Capital procurement would, therefore, refer to procurement of all goods and services that fit the description of capital expenditure. The procedure for capital procurement is separately laid down in the Defense Procurement Procedure, 2008.

(b) **Revenue Procurement:** As per rule 91 of the General Financial Rules, 2005, revenue should bear all subsequent charges for maintenance and all working expenses, including all expenditure on working and upkeep of the project and also on such renewals and replacement and such additions, improvements or extensions, etc., as under rule made by the Government are debit able to revenue account. The revenue procurement, therefore, implies procurement of items and equipments, including replacement equipments (functionally similar) assemblies / sub assemblies and components, to maintain and operate already sanctioned assets in the services, the necessity of which has been established and accepted by the Government.

(c) **Financial powers for procurement:** For Revenue Procurement, Government has delegated financial powers under revenue heads to a number of authorities in each Services/Department. Procurements involving financial implications beyond the delegated powers of the Service HQs and Heads of the ISOs are undertaken with the approval of the ministry of Defence.

(d) **Indigenous Procurement:** Procurement from indigenous sources is called indigenous procurement. It is the policy of the Government to encourage indigenization, particularly in
the field of defence to achieve self-reliance. Hence, indigenous firms should be given all support to produce and supply quality goods conforming to specifications.

Proper loading criteria for all taxes, duties and other expense involved in procurement of an item need to be applied to provide a level playing field to the indigenous manufacturers. Payments against indigenous procurement are made in rupee terms.

(e) **Foreign Procurement (Import):** For such defence equipment and assets, which are of foreign origin, items required to maintain and operate these equipment may also need to be procured from suppliers abroad.

(f) **Central Procurement:** Central Procurement (CP) is undertaken against indents resulting from planned provisioning process like the Annual Provision Review; refit planning, obsolescence planning and planned routines. CP indents normally cover the entire requirement of the item for the duration of the provisioning period.

(g) **Local Procurement:** Local Purchase (LP) is undertaken within the LP powers of various authorities as per the delegated powers in the following circumstances:

   (i) To meet the short-term, ad-hoc or urgent requirements of units/establishments when supplies are not available through the central provisioning agency. Intimation regarding such purchases should immediately be sent to the central provisioning agency so that the latter could take the quantities procured through local purchases into account.

   (ii) To meet the normal requirements of units/establishments for stores which are not within the purview of central purchase organizations.

(h) **Procurement from Ordnance Factories and Defence Public Sector Undertakings:** The following guidelines should be followed for procurement of goods/services form the Ordnance Factories and Defence Public Sector Undertakings:
(i) After acceptance of necessity, all stores falling within the product range of the Ordnance Factories should be procured through the Ordnance Factories Board (OFB) by placing indents without issuing RPFs. In the case of emergent purchase, items falling within OFB’s product range may be produced from trade following the tendering procedure but only after obtaining a “No Objection Certificate” from the OFB. All requests for obtaining No Objection Certificate should be addressed to the Secretary, Ordnance Factories Board, 10-A, S.K Bose Road, Kolkata - 700 001 (Fax No. 033-22482927).

(ii) Goods and Services may be produced from Defence Public Sector Undertaking by following the rendering procedures. Any item developed/ manufactured by a Defence PSU specifically for the Defence Services, with transfer of technology or through design and development, should be procured from the concern Defence PSU only. Similarly, defence PSUs shall be approached for providing any service, such as repairs and overhauling, if facility for providing such services has been set up by a Defence PSU exclusively for the Defence Services.

(iii) Cases falling under (a) & (b) above, including procurement against provision review for scaled items will not be treated as STE/PAC procurements.

(iv) For induction of new equipment or procurement of new goods and services on the basis of global/open/limited tendering, RPFs should also be issued to the OFB/concerned Defence PSUs. In such cases, tender fee, EMD and PBG need not be taken from the OFB/Defence PSU.

(j) Purchase of goods and services without quotations: Purchase of goods and services up to the value of Rs 15,000/- (Rupees Fifteen Thousand) only on each occasion may be made without inviting quotations or bids on the basis of a certificate to be recorded by the Competent Financial Authority in the following format:

“I, __________________, am personally satisfied that these goods/services purchased are of the requisite quality and specification and have been purchase from a reliable supplier/service provider at a reasonable price.”
(k) **Purchase of goods by purchase committee:** Purchase of goods costing above Rs 15,000/- (Rupees Fifteen Thousand only) and up to Rs 1,00,000/- (Rupees One lakh only) on each occasion may be made on the recommendations of a duly constituted Local Purchase Committee consisting of three members of an appropriate level as decided by Competent Financial Authority. The committee will be required to survey the market to ascertain the reasonableness of rate, quality and specifications and identify the appropriate supplier. Before recommending placement of the purchase order, the members of the committee should jointly record a certificate as under:

“Certified that we, ________________, members of the local purchase committee are jointly and individually satisfied that the goods/services recommended to purchase are of the requisite specification and quality, priced at the prevailing market rate and the supplier recommended is reliable and competent to supply the goods in question.”

(l) **Obtaining of Quotations by the Local Purchase Committee:** The Competent Financial Authority may direct the local purchase committee responsible for carrying out the market survey to obtain quotations as a part of the market survey. Where no such direction has been given, it would be up to the purchase committee to decide whether or not to obtain quotations as a part of documentation of market survey. In either case, however, details of the market survey (suppliers contacted and the rates quoted by them) would be recorded by local purchase committee.

(m) **Purchase of goods directly under Rate Contract:** Goods for which Director General of Supply & Disposal (DGS&D) has rate contract can be procured directly from the suppliers. While resorting to such procurement it should be ensured that the prices to be paid for the goods do not exceed those stipulated in the rate contract and the other salient terms and conditions of the purchase are in line with those specified in the rate contract. The purchaser should also make its own arrangements for inspection and testing of such goods, where required. In the case of drugs, consumables, FOL, hygiene chemicals, etc. the inspection may be done by DGQA/NABL but any costs incurred there on should be borne by the suppliers. Payment in such cases would be made by the concerned Principal Controllers/Controllers of Defence Accounts, their subordinate offices or other paying
authorities as per the existing arrangement. Wherever Senior Accounts Officers/Imprest Holders are authorized, payment may be made by them.

(n) **Cash and Carry Procurement:** Cash and carry purchase is type of LP (local purchase) resorted to in case of extreme urgency are when the supplier is not willing to supply the required item on credit. Cash and carry powers are very limited as such procurement is made only in exceptional cases when cash payment is made from the imprest of the unit and the same is claimed from the paying authority who reimburses the amount after due audit of the transaction.

Local Purchase of Stationery and other Articles from Kendriya Bhandar, NCCF, etc.

(a) Keeping in view the avowed objectives of the co-operative movement to ensure supply of goods and services to the consumers at the most economical and competitive prices and taking note of the changed concepts of marketing, the Government of India vide DoP&T (Welfare Section) OM No. 14/12/94-Welfare (Vol II) dated 5th July 2007 has decided to adopt the following dispensation in respect of all Central Government Departments, their attached and subordinate offices and other organizations financed and/or controlled by them in making local purchases of stationery and other items from Kendriya Bhandar/National Consumer Cooperatives Federations.

(i) Purchase of goods up to Rs 15,000/- is permissible without inviting quotations or bids. A Local Purchase Committee constituted by the CFA can make purchase of goods up to Rs 1 lakh on the basis of the market survey to ascertain the reasonableness of rate, quality etc. and submission of certificate to that effect. In partial modification of these provisions, it would be permissible to make purchase, at the discretion of the CFA, of all items required for office consumption up to Rs 1 lakh on each occasion directly from Kendriya Bhandar/NCCF without calling for quotations. The responsibility for ensuring the reasonableness of rates, quality specification etc. will be equally that of the purchasing Ministry/Department and KB/NCCF. Further, the reasonableness of rates, quality specification etc. should be certified by the Local Purchase Committee as envisaged above. It is to be ensured that
supply orders are not split under any circumstances with the objective of circumventing the limit of Rs. 1 Lakh.

(ii) For procurement of all items of office consumption beyond Rs. 1 lakh up to Rs. 25 lakh, where limited tenders are to be invited as per the provision of this manual, KB and NCCF among others should also be invited to participate in such limited tenders, in case these cooperatives are functioning at the station. Other things being equal, purchase preference will be granted to KB/NCCF, if the price quoted.

(iii) By the cooperatives is within 10% of the L₁ price. No price preference over and above the L₁ price shall be given to these cooperatives. However, KB/NCCF will be exempted from furnishing bid security (Earnest Money Deposit).

(iv) Supply orders up to Rs 25 Lakh, in respect of office equipments covered under the DGS&D rate contract may also be procured from KB and NCCF provided KB/NCCF offer the items at DGS&D rate contracted prices as also fulfill all the contractual obligations which the manufacturers/suppliers of such products are required to meet under the DGS&D rate contract. The purchaser will have to make his own arrangements for inspection and testing of such goods, where required.

(v) The above dispensation shall be applicable only up to 31.3.2010.

(vi) Other Multi-State Co-operative Societies registered prior to the issued of DoP&T (Welfare Section) OM No. 14/12/94-Welfare (Vol II) dated 5th July 2007 in which the majority of the shares are held by the Central Government, are also permitted to avail of the facility of Purchase Preference in respect of limited tender enquiries up to Rs. 25 lakh.

(b) **Purchase Preference:** Purchase preference policies for Central Public Sector Enterprises has been terminated with effect from 31.3.2008 vide DPE OM No. DPE/13(15)/2007-Fin dated 21st November 2007. However, this termination does not apply to the purchase preference allowed for sector specific CPSEs for which the purchase preference policy is laid down by the Ministries concerned, as in the case of pharmacy products.
Sourcing and Quality

(a) General

(i) Identification of suitable suppliers: Proper source knowledge and identification of suitable suppliers capable of meeting the product quality required by the defence departments, particularly by the Defence Services, are vital functions for ensuring procurement of quality goods. Providing equal opportunity and ensuring fair play are also important requirements in any procurement process so as to achieve transparency. Hence, the selection and registration of firms, their performance appraisal and classification must be clearly spelt out and properly disseminated.

(b) Registration of Firms

(i) Registration by the Central Procurement Agencies: The detailed procedure for registration of firms is given in Joint Services Guide on assessment and registration of suppliers for Defence published by the Directorate of Standardization, Department of Defence Production, and Ministry of Defence. JSG is an enabling document which serves as a guide for procurement agencies to formulate guidelines for registration of vendors. The publication is available on DGQA website www.dgqadefence.gov.in. It can also be obtained on payment from the Director, Directorate of Standardization, Ministry of Defence, New Delhi-110 011.

(ii) Registration by Agencies at the Command and Other Levels: Apart from the central procurement agencies at the Service Headquarters, firms should also be registered by the Command Headquarters, Depots, Workshop and Naval Dockyards, etc.

(iii) Registration at the Unit Level: It would not be necessary to register the firms at the unit level for the purpose of carrying out local purchase. However, the reputation, capacity and credibility must be ascertained before obtaining quotations from or supply orders on a particular firm.
(iv) **Scrutiny of the Credential of the Firms:** It is essential that the credentials of the firms applying for registration, including their financial status, the manufacturing and quality control facilities, the business ethics and their market standing are thoroughly scrutinized before registering them as an approved source of supply.

(v) **Inter-Services and Inter - Departmental Acceptability of Registration:** The firm registered with any department of the Ministry of Defence, the Services or OFB or the Inter-Services organizations, may be considered as a registered firm for procurement by other department of the ministry or the other services, for the same range of products/goods/services for which the firm is registered with any of the aforesaid organizations.

(vi) **Registration of Suppliers and Service Providers:** The Joint Services Guide on assessment and registration of suppliers for Defence is applicable mainly to registration of manufacturing firm as suppliers. The guidelines and procedures laid down therein may, however, also be applied, mutatis mutandis, by the Registering Agencies to other suppliers and service providers till such time as a separate procedure is laid down by DGQA.

**Tendering**

(a) **Types of Tendering**

(i) **Procurement of goods by obtaining bids:** Except for cases covered by paragraph (purchase of goods without obtaining quotations), (purchase of goods through Purchase Committee) and (purchase of goods against Rate Contracts), goods should be procured by adopting one of the following standard methods of obtaining bids:

(aa) Advertised Tender Enquiry (also known as Open Tender Enquiry);
(ab) Limited Tender Enquiry; and
(ac) Single Tender Enquiry.
(ii) **Procurement of Services:** The above mentioned methods will also be applicable for procurement of services, subject to other instructions contained in this manual being followed.

(b) **Tendering Process**

(i) **Expression of Interest:** In those cases where specification of the desired goods or services are not cleared or the sources are not known and it is considered desirable to resort to pre-qualification of suppliers, a notice calling for expression of interest/information may be issued and pre-bid conference may be held with the firms which fulfill the criteria prescribed in the notice to firm up the Qualitative Requirements (QRs)/specifications before issuing the Request for Proposal.

(ii) **Preparation of the Request for Proposal/Tender Enquiry:** The Request for Proposal (RFP), also called Tender Enquiry (TE), is the most important document in the procurement process. The RPF should be prepared with due care and with complete details of the items are services required, terms and conditions including payment terms, and clear instructions to the bidders. The RPF should contain full and clear specifications, scope of requirement and the evaluation criteria, both for technical bids and commercial bids. RPF should be vetted by integrated finance in those cases where financial powers are to be exercised with their concurrence.

(iii) **Reference to Brand Name in the RPF:** Standards and specifications, quoted in bidding documents in generic terms shall promote broadest possible competition while assuring the critical performance or fulfillment of other requirements for the goods. Reference to the brand names, catalogue numbers, etc. in the RPF should be avoided.
(c) **Receipt of Tenders**

(i) **Tender Box:** In order to ensure that the bids are received by the purchaser in time, a tender box is to be placed in an easily accessible but secured place, duly locked and sealed, clearly indicating the name of the department. The word “Tender Box” should be written on the box in bold font.

(ii) **Delivery of Bids by Hand:** In cases where the tenders are required to be submitted by hand, it may be ensured that the names and designation of the least two officers are mentioned in the bid documents. The information about these officers should also be displayed at the entrance reception of the premises where tenders are to be deposited so as to ensure convenient approach for the bidders.

(d) **Tender Opening**

**Opening of Tenders Under Single Bid System**

The following procedure should be followed for opening of tenders:

(i) All the tenders received on time should be opened in the presence of authorized representative of the tenderers at the prescribed time, date and place by the official/Tender Opening Committee, to be nominated by the CFA in advance. The authorized representatives, who indent to attend the tender opening, would be required to bring with them letters of authority from the tenderers concerned.

(ii) The tender opening official/committee should announce the salient features of tenders like description and specification of the goods, quoted price, terms of delivery, delivery period, discount if any, whether EMD furnished or not and any other special feature of the tender for the information of the representatives attending the tender opening.

(iii) After opening, every tender should be numbered serially, initiated, and dated on the first page by the official(s) authorized to open the tenders. Each page of the price
schedule of letter attached to it shall also be initialed by them with date, particularly
the prices, delivery period etc., which should also be circled and initialed indicating
the date. Blank tenders, if any, should be marked accordingly by the tender opening
officials.

(iv) Alteration in tenders, if any, made by the tenderers, should be initialed with date
and time by the official(s) opening the tenders to make it perfectly clear that such
alterations were present on the tenders at the time of opening.

(v) Wherever any erasing or cutting is observed, the substituted words should also be
encircled and initialed with date and time to make clear that such erasing/cutting of
the original entry was present on the tender at the time of opening.

(vi) The tender opening official(s) should prepare a list of the representatives attending the
tender opening and obtain their signatures on the list. The list should contain the
representatives’ names and the corresponding tenderers’ names and addresses. The
authority letters brought by the representatives should be attached with this list. The
list should be signed by both the tender opening official(s) with date and time.

(vii) An on-the-spot report containing the names of the tenderers (serial number wise) salient
features of the tenders, as read out during public opening of tenders should be prepared
by the tender opening official(s) duly signed by them with date and time.

(viii) The tenders, which have been opened, the list of the representatives attending the
tender opening and the on-the-spot report should be handed over to the nominated
officer of the procuring agency and acknowledgement obtained for the same.

1.17. INDIAN ARMY – GENERAL INFORMATION, SCM CONCEPTS AND
PROCEDURES

The Indian Army is the land based branch and the largest component of the Indian Armed Forces.
With about 1,129,900 soldiers in active service and 960,000 reserve personnel, the Indian Army
the world's second largest standing army. Its primary mission is to ensure the national security and defence of the Republic of India from external aggression and threats, and maintaining peace and security within its borders. It also conducts humanitarian rescue operations during natural calamities and other disturbances. The President of India serves as the Commander-in-Chief of the Army. The Chief of Army Staff (COAS), a General, is a four star commander and commands the army. There is never more than one serving general at any given time in the Army. Two officers have been conferred the rank of field marshal, a 5-star rank and the officer serves as the ceremonial chief.

The Indian Army came into being when India gained independence in 1947, and inherited most of the infrastructure of the British Indian Army that were located in post-partition India. It is a voluntary service and although a provision for military conscription exists in the Indian constitution, it has never been imposed. Since independence, the army has been involved in four wars with neighbouring Pakistan and one with the People's Republic of China. Other major operations undertaken by the army include Operation Vijay, Operation Meghdoot and Operation Cactus. Apart from conflicts, the army has also been an active participant in United Nations peacekeeping missions.

**Role:** The Indian Army doctrine defines it as "The Indian Army is the land component of the Indian Armed Forces which exist to uphold the ideals of the Constitution of India.” As a major component of national power, along with the Indian Navy and the Indian Air Force, the roles of the Indian Army are as follows:

(a) **Primary:** Preserve national interests and safeguard sovereignty, territorial integrity and unity of India against any external threats by deterrence or by waging war.

(b) **Secondary:** Assist Government agencies to cope with 'proxy war' and other internal threats and provide aid to civil authority when requisitioned for the purpose."
Organization

Commands: The army operates 6 operational commands. Each command is headed by General Officer Commanding-in-Chief with the rank of Lieutenant General. Each command is directly affiliated to the Army HQ in New Delhi. There is also one Training Command known as ARTRAC. The staff in each Command HQ is headed by Chief Of Staff (COS) who is also an officer of Lieutenant General Rank.

Corps: A corps is an army field formation responsible for a zone within a command theatre. There are three types of corps in the Indian Army: Strike, Holding and Mixed. A command generally consists of two or more corps. A corps has Army divisions under its command. The Corps HQ is the highest field formation in the army.

Division: An Army Division is an intermediate between a Corps and a Brigade. It is the largest striking force in the army. Each Division is headed by [General Officer Commanding] (GOC) in the rank of Major General. It usually consists of 15,000 combat troops and 8,000 support elements. Currently, the Indian Army has 34 Divisions including 4 RAPID (Re-organized Army Plains Infantry Divisions) Action Divisions, 18 Infantry Divisions, 10 Mountain Divisions, 3 Armoured Divisions and 2 Artillery Divisions. Each Division composes of several Brigades.

Brigade: A Brigade generally consists of around 3,000 combat troops with supporting elements. An Infantry Brigade usually has 3 Infantry Battalions along with various Supporting Arms & Services. It is headed by a Brigadier, equivalent to a Brigadier General in some armies. In addition to the Brigades in various Army Divisions, the Indian Army also has 5 Independent Armoured Brigades, 15 Independent Artillery Brigades, 7 Independent Infantry Brigades, 1 Independent Parachute Brigade,3 Independent Air Defence Brigades, 2 Independent Air Defence Groups and 4 Independent Engineer Brigades. These Independent Brigades operate directly under the Corps Commander (GOC Corps).

Battalion: A Battalion is commanded by a Colonel and is the Infantry's main fighting unit. It consists of more than 900 combat personnel.
Infantry

“The least spectacular arm, yet without them you cannot win a battle

— Indeed without them you can do nothing – nothing at all”

-Field Marshal Bernard Montgomery

Introduction

In the ultimate analysis, defeat of the enemy implies the destruction of his fighting forces and the physical occupation of his territory and fortifications. The destruction of the enemy is achieved by the co-ordinate effort of the land, sea and air forces but ultimately it is the infantry that captures and occupies the ground and destroys the enemy in his fortifications.

Modern developments may make the task of destroying the enemy easier, however, it is the infantryman who is eventually required to capture and hold ground physically and bear the brunt of fighting. The difficulty with the training of infantry is that one deals with very few concrete elements. To train dynamic minded infantry is to exercise an art whereas to train the man in other arms is to apply a science to execute a concrete task in a definite manner. But the infantryman's use of his tools is only complementary to the use he makes of ground. His training depends on an eye for the ground, knowledge of human nature, imagination and a trained sense of what is and what is not possible under modern war conditions. In infantry, there is a greater need for leadership, physical and mental toughness and above all, sheer grit, determination and cold courage. This was amply displayed in all wars fought by the Indian Army including Kargil conflict.

The supreme importance of infantry, in no way, militates against the importance of the supporting arms and services. Without their assistance and their support the task of infantry in modern warfare becomes almost impossible.
In countries where there is a shortage of industrial capacity and hence of supporting arms, the significance of the infantry is further enhanced. This applies also to operations in which geographical factors limit fire power, as in jungle and mountainous terrain.

**Mission of Infantry**

To defeat the enemy through close combat.

**Role of Infantry**

The roles of infantry are as under:

(a) In Offensive Operations, to close in with the enemy and destroy him independently or in concert with other arms.

(b) In defensive Operations, to hold ground against all forms of attack by the enemy and carry the battle into his territory by closing in and destroying him.

(c) In proxy War Scenario, to conduct focused and relentless Counter Proxy war Operations with a humane touch to facilitate governance and early return to normalcy.

**Characteristics of Infantry**

**Self-Reliance:** This is the basic and most important characteristics of the infantry. Although maximum support by other arms will normally be available, there will be numerous occasions when infantry will have to close in with the enemy without any outside support.

**Ability to hold Ground:** Infantry is the arm best suited for this task. The more support it can be given, the more efficient and economical it would be to carry out this task.

**Adaptability:** Infantry is highly adaptable and can operate over any type of ground, by day, or by night, and under almost any climatic conditions. The infantry Soldier and his equipment are readily transported by land, sea, or air to the battlefield.
**Mobility:** Infantry mobility should not be measured in terms of marching speeds over easy country. The characteristic of the infantry in this respect is that, unlike other arms, it has a degree of mobility over almost any kind of country and given appropriate transport it can travel as fast as other arms.

**Vulnerability:** Infantry is responsible for its own protection at all times. It is vulnerable to the following:

(a) **Ground Action.** To tank, artillery and small arms fire especially machine guns. Protection against artillery and small arms fire is obtained by careful sitting, concealment, dispersion, digging, skillful use of ground, obscuration by smoke, optimizing periods of poor visibility and darkness and by neutralizing fire including smoke. When dug-in, infantry is capable of defending itself against tanks with its integral anti-tanks weapons. When on the move and during initial reorganization, it will normally require the support of armour against a tank treat.

(b) **Air Attack.** Infantry in the open is vulnerable to air attack. Causalities can, however be reduced by dispersion, concealment and digging. If adequate measures are taken, infantry is less vulnerable than other arms, for example, armour and artillery.

(c) **Anti-personnel Mines.** A minefield with a density of three blast type of anti-personnel mines will cause about 10 percent causalities, and a minefield of similar density consisting of blast and fragmentation type of mines laid in the ratio 3:1 will cause approximately 25 percent causalities. Though infantry will normally be provided engineer resources, when anti-personnel mines are encountered in large numbers, it should be trained to negotiate a minefield either by rushing through it or after creating a lane by its own effort.

**Infantry Battalion**

**General:** The Infantry battalion is designed, with the support of other arms and services, to close with and destroy or capture the enemy and to hold ground. To do this, the infantry battalion contains two essential elements-men, whose fighting spirit is the most decisive factor in battle.
and weapons. It is on the skillful and determined use of weapons in conjunction with skillful use of ground and movement, both by the individual infantry man and those who lead him that will contribute towards success of a battalion.

**Organization:** The rifle companies provide the assault and fire support elements, the support company provides surveillance and additional fire support, the headquarters company is responsible for administrative backing while the battalion headquarters provides the command and control elements.

### Outline Organizations of An Infantry Battalion

![Outline Organization Diagram]

**Main Support Services to Infantry Battalions:**

- Army Service Corps - (ASC)
- Army Ordnance Corps - (AOC)
- Military Engineer Service - (MES)
- Army Medical Corps - (AMC)
- Electronic and Mechanical Engineer - (EME)
- Engineers - (Engrs)
Army Service Corps

Scales of Rations and Supplies (SRS) Reprint 1967: This is published by the Quartermaster General. It gives the scales of rations (peace and field) animal rations, hospital diets and extra diet. Medical comforts, oil for lamps and lanterns, fuel for warming and drying purposes.

Functions of Supply Depot: A Supply Depot has the following functions to perform:

(a) To receive all articles of Army Service Corps supplies. The main sources of receipt may be central purchased articles, local purchase or transfers from other depots.
(b) To hold the stock as may be laid down from time to time.
(c) To operate local contracts.
(d) To maintain and turn over stock which may involve correct demands, timely submission of reports and returns, a watch estimated storage, life submission of samples and to issue substitutes for turnover of stocks.
(e) To issue or dispatch items of Army Service Corps supplies units, troops in transit or other depots.

Functions of ASC in peace: The supply branch's function is to provide the following:

(a) Food stuff.
(b) Hospital suppliers.
(c) Grain and Fodder.
(d) Hygiene and Chemical stores.
(e) Fuel for cooking, warming and drying purposes.
(f) Fuel comprising of Aviation spirit, Motor spirit, Diesel and fuel oil, Kerosene, Aero and motor lubricants and Greases.

Function of ASC in War:

(a) All ammunition demands must be met immediately.
(b) To fulfill ammunition demands. Only 2\textsuperscript{nd} line scale of ammunition is normally carried by ASC.
(c) Scale of 2\textsuperscript{nd} line ammunition is worked out by the Staff.
(d) The same considerations apply to supply of petrol. 2\textsuperscript{nd} line of petrol is worked at open country, 50 miles per vehicle and closed country – 11 miles per vehicle.

(e) Demand for supplies should be constant and transport for this purpose may be allotted permanently.

(f) Fresh vegetable and meat shall be delivered without loss of time at the earliest.

**Functions of Transport Branch:** Provision and administration of animal and mechanical transport and air supply.

**Provision and issue of Dry Ration:**

(a) Original copy of IAFZ-2098 ration issue on which will be received in the unit from Supply Depot with the particulars of quantity sanctioned and details of packing Material.

(b) Unit will sign the indent in advance for receipt of stores i.e. received voucher number will be allotted.

(c) Quartermaster or his representative will report to packing material group of the supply depot along with packing material, transport, original copy of IAFZ-2098 and working party.

(d) Packing material deposited deficient will be recorded on the indent on reverse.

(e) Packing material will be deposited deficient in packing material group and signatures of In-charge PM group will be obtained on the indent.

(f) From PM group, quartermaster or his representative will report to R & D Section and will check the quantity as per voucher, condition of the articles and date of expiry in case of tinned stuff.

(g) After surrendering original copy of the indent, ration will be collected along with another copy of the indent.

(h) Ration will be accounted for on IAFS-1673 and IAFS-1519. Indent will be filled along with the IAFS-1519.

**Provision and Issue of Fresh Ration:**

(a) For collection of fresh ration, unit representative will report to the Perishable Group.
(b) While receiving the article he will check the following with dispatch roll of IAFS-1555 (Rev).

(c) Quantity as per IAFS-1555 (Rev), ASC ration invoice.

(d) Quality of the articles.

(e) Specification.

(f) He will give receipt on acknowledgment roll and give demand for next day on the demand roll.

(g) Articles along with dispatch Roll of IAFS-1555 (Rev) will be collected and signature of both unit representative /fresh group In-charge will be endorsed on dispatch roll.

(h) At the end of each month, supply depot will forward two copies voucher IAFZ-2096 for the entire fresh issued during the month.

(j) After verifying the voucher against the dispatch roll of IAFS-1555 (Rev) one copy of the issue voucher will be receipted back to supply depot and other will be along with RR (Ration Return) (IAFS-1519).

**Army Ordnance Corps**

**Function of Army Ordnance Corps:** The main function of the Army Ordnance Corps both in peace & war is to supply troops with ammunition, vehicles and ordnance stores. This entails:-

(a) Foresight, planning, corrects anticipation of wastage, efficient provision, a constant process of reviewing and calculating requirements, and timely replenishing of stocks.

(b) Systematic and methodical store keeping in both static and mobile holding units requires the systematic arrangement of stocks to enable store to be maintained in serviceable condition, to facilitate rapid stocktaking, case of access and accurate identification and accounting system which will enable unit indents to be met promptly and correctly.

(c) Apart from the supply of ammunition, vehicles and ordnance stores, the AOC is also responsible for various ancillary services such as the inspection & repair of ammunition, operation of dry cleaning plants, the operation of cinema units and supply of Officer's kit requirements through Cash Purchase Issue Section.

(d) The AOC is also representative for receipt and disposal of salvage, irrespective of the value, and disposal of surplus stores.
**Provision of Ordnance Store for Infantry Battalion:** It is the process of calculating and obtaining the quantities of store required by the unit.

**Authorized Proportion (AP):** The quantity of each item of ordnance stores which the unit is entitled to hold as per various authorities less war equipment table/peace equipment table is known as AP. This is variable and to be calculated on the units auth/posted strength.

**Unit Entitlement (UE):** The stores, which the unit is entitled to hold as per Part II of WET/PET (War Equipment Table/Peace Equipment Table) is known as UE and is fixed.

**Categories of Units for calculation of Authorized Proportion (AP):** The units are divided into the following categories for calculation of AP and the formula are appended below:-

(a) **For RRU Units (Recruit Receiving Units):** AP = Maintenance Stock + Safety Stock + (Annual Intake of Recruits x Scale).

(b) **For NRRU Units (Non-Recruit Receiving Units):** AP = Maintenance Stock + Safety Stock.

(c) **Division of Ordnance Stores of calculation AP/UE:-**

   (i) Unit Clothing and Necessaries (Authority: AI 22/83)
   (ii) Special Items of clothing (Authority 22/83, 22/87)
   (iii) Personal equipment (Authority: concerned ETS (Equipment Table Schedule))
   (iv) Expendable stores (Authority: AO 20/84).

(d) **Maintenance Stock (for unit clothing and necessaries):** Maintenance Stock will be calculated on the basis of average posted strength of JCOs/OR for 1 month only. The formula for working out Maintenance Stock is as under:-

   Example:-
   
   Posted strength of unit = 480
   Items – Shirt polyester cotton
   Life – 36 months
(e) **Safety Stock**: Units will hold safety stock for 1 month on the basis of authorized strength of JCOs/ORs to clear the unforeseen eventualities such as issues due to losses, unfair wear and tear, fluctuation in strength, bottle necks in supply, increased wastage due to operational situations. The formula for working out SS is as under:-

Example:-

Auth strength of the unit = 530  
Items – Shirt polyester cotton  
Life – 36 months  
SS = $\frac{530 \times 12 \times 1}{36 \times 12}$  
Safety Stock = 15

(f) **Intake Recruits**: The requirements for initial issues by the Regimental Training Centre’s will be worked out on the basis of the following formula:-

IR = Annual Intake of Recruit x Scale per man.

(g) **Provisioning of special Clothing**: The special clothing for cooks, barbers etc, and those authorized AI 22/83 do not have any pre-determined life lay down. The replacement by the periodical condemnation board. The formula for calculating AP of these items is:-

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP</td>
<td>EPS + IR for RRU Unit</td>
</tr>
<tr>
<td>AP</td>
<td>EPS + 3MMS for NRRU</td>
</tr>
<tr>
<td>EPS</td>
<td>Posted str Scale of items – (EPS: Entitlement of posted str).</td>
</tr>
<tr>
<td>3MMS</td>
<td>3months maint stock vide clothing Regs 66 calculated on the wastage</td>
</tr>
<tr>
<td></td>
<td>= Past 12 months wastage $\times 3$</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td>IR</td>
<td>Annual Intake of Recruits X Scale.</td>
</tr>
</tbody>
</table>
(h) **Provisioning of Expendable Stores (AO 20/84)**

(i) Consumable/Expendable stores of ordnance supply are authorized to units in the relevant equipment table (PE/WET, CES and ETS) at scales representing one month requirement unless specified otherwise. In case, where the actual consumption is less than the scales, further demands will be based on the actual consumption recorded.

(ii) All units static and non-static will hold three months requirement of consumable/expendable stores like soap, blanco, paint, oil and lubricants of ordnance origin and demands for these will be placed quarterly covering three months requirement. In the cases of stores pertaining to COS section H6/H7 items (Lab chemical and apparatus) units will demand on the basis of yearly requirement instead of three month requirement. In order to ensure timely supply, indents for quarterly requirement of consumable/ expendable stores indicating the period to which the demand pertains should be forward to ordnance depot/units concerned at least 3 months in advance.

**Type of Ordnance Stores:**

(a) Ordnance Store other than ammunition and vehicles, cover an enormous and diverse range of stores amounting to nearly half a million different items. They need different method of maintenance and supply and are accordingly grouped into two or three main categories namely.

(b) Warlike stores consisting of 'A' and 'B' Vehicles and their spares, armaments and small arms and their spares, signal stores, stores, engineers stores, radar and workshop machinery.

(c) General stores consisting of barrack and camp stores, accoutrements, tools, firefighting equipment, anti gas stores, harness and saddler, iron monger and expendable stores such as oils, paints and acids.

(d) Clothing and necessaries.

(e) The type of ordnance establishment/unit in the chain of supply of ammunition, vehicles and Ordnance Stores during operations.

(f) The type of logistics planning is to ensure that a force is at all times capable of carrying out
the task allotted to it has the right equipment and sufficient stores immediately available for its maint and replacement.

**Procedure and Preparation of Indents**

(a) Indents will be prepared in duplicate on IAFO-2705 along with schedule of indent IAFO-1286 (in original only).

(b) Must be typed, written in ink or in pencil and should be legible (Equipment Regulation Para-30).

(c) Separate indents will be prepared for each category section/sub-section.

(d) Not more than 12 items pertaining to one sub-section will be demanded on any one indent. Items should be entered in part/cat no order.

(e) Full designation of unit and nearest railway station or (Military Farm School) MFS/Mov Det/RTO/Transit Agency quoted at the right hand top corner.

(f) Relevant authority for demand should be shown in the authority column. Principal authorities for demanding stores are:-

   (i) Regulations for the Army (Rev – 1987)
   (ii) Equipment Regulations – 1981
   (iii) Clothing Regulations – 1996/AI 22/83
   (iv) Tentage Regulations – 1967
   (v) WETs/PETs
   (vi) EMER (Electrical and Mechanical Engineering Regulations)
   (vii) O/H and Maint Scales
   (viii) Army Instruction/Army Orders
   (ix) CES/ETS (Complete Equipment Schedule/Equipment Table Schedule)

**Receipt of Ordnance Stores in a Unit:**

(a) The object of this paragraph is to explain how the receipt of ordnance stores in a unit should be dealt with by the Quarter Master.

(b) In order to get a clear picture of receipt procedure in unit, Quartermaster should have some knowledge of the issue procedure adopted in Ordnance Depot. For the purpose of
convenience this section has been divided into two sections; Issue of stores from Ordnance Depots and receipt of stores in units.

(i) Issue of Ordnance Stores from Ordnance Depots

aa) Control Branch: On receipt of original copy of the indent (IAFO – 2705) and supporting documents, control branch checks the indent as per supporting documents and forwards to computer section. The demands are feeded in computer and processed. After processing the voucher along with schedule of indent duly controlled is printed by computer. The set of issue voucher is forwarded to Sub Depot for issue action and schedule of indent is returned back to unit concerned for information. The unit QM will link this control number on office copy of the indent and file the indent in indent acknowledge and awaiting stores pad.

ab) Stock Group: After going through various stages the set of issue vouchers comes to selectors, who select the stores as per voucher and then stores are packed in the packing and marking section.

ac) Two copies of Packing Note (IAFZ-3031) will be prepared for each package. One copy of packing note is inserted in every package.

ad) Details of packing materials used are shown on the reverse of copies number 1, 2, 5 & 6 of issue voucher.

ae) No. 2 copy of issue voucher is kept in package No. 1 of the consignment.

af) Packed stores along with copies of issue voucher No. 1, 5 & 6 are handed over to Traffic Branch.

ag) Traffic Branch: On receipt of packed stores, traffic branch arranges for dispatch of consignments to unit.

Mode of Dispatch

(i) By Rail (Full wagon, Distr/Economy/Mixed wagon and Piece goods/small consignments).

(ii) By road.
(iii) By Post.
(iv) Local collection.

**Full Wagon Dispatch**: Packages comprising full wagon load meant for a unit is known as full wagon dispatch. The following action will be taken:

a) Ordnance Convoy Note (IAFO-2648) will be prepared in quadruplicate. Two copies of IAFO-2647 Schedule of Ordinance Convoy Note will be prepared in case of more than one wagon and Military Credit Note (IAFT-1711) is also prepared.

b) Two copies of Ordnance Convoy Note are placed inside the wagon, one near each door.

c) MCN is handed over to the railway authority and in exchange of Military Credit Note, Railway Receipt/Parcel Way Bill (RR/PWB) is obtained.

d) Column of the counter foil of Military Credit Note will be completed with the help of Railway Receipt/Parcel Way Bill (RR/PWB).

e) The documents will be dispatched to the consignee Railway Receipt/Parcel Way Bill (RR/PWB). No. 1 copy of issue voucher, one copy of Ordnance Convoy Note.

f) (IAFO-2648) and one copy of Schedule of Ordnance Convoy Note, in case of more than one wagon.

**Life Cycle Clothing Concept**

**Procedure for Issue to Troops**

(a) Implication of due Date

(b) Replacement will be made on a particular date

© Details of oldest ever issue of an item to a soldier reckoned for determining due date
Blankets will be replaced on expiry of 60 months of life of each blanket.

(d) Unit which made the issue/supposed to make the issue does not matter

(e) All replacement issue restricted to quantity one

(f) OC Unit to decide dates of issue in unit

(g) While fixing such a date ensure issues made nearest to due date after expiry of fair life

**Initial Issues**

(a) Initial issues will be made as per scales.

(b) For issue, nominal roll of the individuals will be prepared and signature of the individuals shall be obtained in nominal roll against their name.

(c) Items issued to the individuals shall be entered in both the copies of ICC (Individual Clothing card) in ink and signature of the QM obtained.

(d) A certificate regarding entry in ICC will be endorsed on the nominal roll.

(e) CIV will be prepared and certificate that issues are made as first issue will be endorsed on it.

**Issue of Clothing in case of FWT (Fear Wear & Tear)**

(a) Items will be issued on due date:-

   (i) On the completion of the fair life, 41 items issued to the individual will not be taken back from the individual.
   (ii) Only 9 items as per S. No. 18 will be taken back from the individual as replacement.

(b) Nominal roll for the items issued to the individual, will be prepared and signed by the individual.
(c) Issue and next due date will be entered in the ICC (Individual Clothing Card).

(d) Entry will be done in unit Clothing Record Register.

(e) CIV as per the total items in the nominal roll will be prepared and to be written off from the ledger.

(i) The 9 items, received from the individual will be taken on ledger charge by means of CRV and returned to salvage in a normal manner.

(ii) OC unit may fix two or three days a month for replacement issue.

(f) Issue of clothing in case individual proceeding on leave, course, and temporary duty up to 90 days.

(i) In case a due date falls within a month of the date of leaving the unit, advance issue made without affecting the actual due date.

(ii) Balance items if due for during the period of absence will be issued only on return to unit.

Principles of Ammunition Supply

(a) Ammunition is commodity of sporadic requirement which varies with the type of operations and intensity of battle. Ammunition is a vital commodity without which no war can be fought successfully. In a modern war, the expenditure of ammunition is very heavy. The success of an operation depends among other things upon supply of correct type and quantity of ammunition at the right time and the right place.

(b) The basic consideration for demand, collection and delivery of ammunition are as under:-

(i) Ammunition must be passed smoothly and systematically from rear to front to replace that expended in battle.

(ii) All expensed immediately.

(iii) Vehicles detailed for carrying ammunition should not be diverted from their legitimate function of ammunition supply.
Responsible for Supply of Ammunition

(a) It is the responsibility of the 'G' Branch to decide requirements and to lay down the locations and priorities. 'G' Branch also lays down quantities of ammunition to be held at various places as required. It also controls the expenditure of ammunition by units.

(b) Q Branch is responsible for providing transport for the move of ammunition. AOC is responsible for maintaining stocks at authorized levels at the ammunition stock holding echelons. ASC is responsible for carrying ammunition from the AMA/CMA (Area Maintenance Area/Corps Maintenance Area) to Ammunition Points/Div Administrative/Maint Area and in certain circumstances up to unit lines.

(c) Units demand on a field message form as and when required. The requirement is given in number of rounds and not in boxes for each type of ammunition. With an automatic replenishment from the rear, the types and quantities of ammunition to be held at ammunition points and time for opening and closing of ammunition points will be decided by Divisional/Brigade Staff and will be laid down in the Administrative Orders. Ammunition is normally held on wheels and the vehicles are well dispersed under cover.

(d) Unit representatives report with the first line transport at the report intimated by the staff. The vehicles are guided to the Ammunition point and the unit demand is presented to the in charge of the Ammunition Point who directs the unit representative to collect the ammunition from the vehicle concerned. The unit gives receipt on the back of the unit demand.

System of Supply: Units demand ammunition on a field message form as and when required. The requirement is given in number of rounds and not in boxes for each type of ammunition. With an automatic replenishment from the rear, the types and quantities of ammunition to be held at ammunition points and time for opening and closing of ammunition points will be decided by Divisional/Brigade Staff and will be laid down in the Administrative Orders. Ammunition is normally held on wheels and the vehicles are well dispersed under cover.
Replenishment of Ammunition Point System (APS): Composite Platoons ASC will replenish the Second Line Ammunition as and when issued to units from AP/ARP (Ammunition Point/Ammunition Replenishment Point) in the CMA. The replenishment of Ammunition Point is carried out in two ways as under:-

**Cab System:** As soon as ammunition vehicles become empty at an Ammunition Point, they proceed and report at the check point near the ASC Coy Harbour. A vehicle loaded with required ammunition is dispatched immediately from there to the Ammunition Point. The empty vehicle proceeds to Ammunition Replenishment Point and after refilling returns to the company harbour. This system is adopted when the rate of ammunition expenditure is very heavy.

**Chain System:** An empty second line vehicle from Ammunition Point reports at the check point and proceeds to ammunition replenishment Point for refilling. The same vehicle after refilling returns direct to the ammunition point. This system is adopted when the tempo of operation is slow and demand for ammunition is not heavy.
Repair of Individual Clothing and Necessaries Care and Preservation

(a) There are following points of repair of individual clothing and necessaries as under:

(i) Petty repairs should be carried out by the individuals.

(ii) Major repairs should be carried out by the unit tailors on Repair Book (IAFZ – 2102).

(iii) Materials for repair of clothing items will be demanded from salvage as per Equipment Regulations paragraph 92 and Equipment Regulations paragraph 156.

(b) Materials for other items will be demanded from Ordnance Depot:

(i) Three months Maintenance Stock should be held by the units especially for boot repair materials.

(ii) An expense voucher (IAFZ-2096) will be prepared monthly for the repair materials expended, based on the Repair Book (IAFZ-2102) and written off the ledger charge.

(iii) Repair should be done free of cost (Authority: Army HQ letter No 07703/V/OS-1913 dated 20 July 83).

(c) Repair of unit clothing and Extreme Cold Climate clothing: There are following points of repair of unit clothing and Extreme Cold Climate clothing as given below:-

(i) Petty repairs by individuals.

(ii) Major repairs by unit tailors on (IAFZ-2102).

(iii) Material required will be demanded from salvage and Ordnance Depot.

(iv) Three month Maintenance Stock of repair materials should be held by the unit.

(v) An expense voucher will be prepared at the end of the month for the expended material based on (IAFZ-2102) Repair Book and will be written off from the ledger charge.

(d) Washing of Extra Issue and Extreme Cold Climate Clothing: Washing of Extra Issue Clothing and Great Coats in possession of troops when the following manners, in the order of preference.
(e) Wherever it is considered desirable and practicable, washing and repair of Extra Issue Clothing and Great in possession of troops. Civilian personnel of ASC Copy (Civ GT) and other civilian personnel when mobilized and proceeding to a theatre of operation will be done by the appropriate ordnance depots, and in such cases no stores/allowances will be issued/granted. MGs AOC at command HQ will decide where this could be done and will instruct units accordingly.

SCM IN THE INFANTRY BRANCH OF INDIAN ARMY

SUPPLY 'B' VEHS & TOWED GUNS

-69-
SYSTEM OF REPLENISHMENT OF AMN

FIRST LINE TPT

AMN POINT

ARTY GUN AREA

UNIT

UNIT

UNIT

UNIT

AMN DUMP

AMN POINT

ASC HARBOUR

SECOND LINE TPT

TPT SUPPLEMENTED BY CORPS ARP TPT WHERE NEEDED

FAD (AMA/CMA/FMA)

SYSTEM OF REPLENISHMENT OF AMN

CHAIN SYSTEM

AMN POINT

CHECK PT

ARP

CAB SYSTEM

AMN POINT

ASC HARBOUR

ARP
SUPPLY CHAIN MANAGEMENT: ARMY INITIATIVES

Army initiatives towards SCM are based on development of computerized inventory control programme of ASC and a similar effort under development by ASC. Computerized inventory Control Project (CICP) was tasked to design, develop and install an online inventory (inv) Management (mgt) System (sys) for the Army Ordnance Corps (AOC). The AOC caters for an inventory of approx five lakh items spread at approx 200 locations and of value exceeding Rs 50,000 crores.

Aims of Computerized Inventory Control Project

The major aims of computerized inventory Control Project are:

(a) Total asset visibility i.e. assets at all echelons will be transparent.
(b) Reduced Inventory Carrying Cost through optimal & balanced stockholdings.
(c) Instant reaction to operational requirements.
(d) Fast response thus reducing vehicle off road/equipment out of action downtime.
(e) Reduced inventory thorough prompt identification & disposal of obsolete and surplus inventory.
(f) Optimum logistics support in line with changing times.

(g) Better utilization of manpower & resources.

(h) Online Management information System for effective and efficient management.

**Protected System:** Case is initiated to notify the computerized inventory Control Project system as protected one through appropriate gazette notification, under the provisions of IT (Information Technology) Act 2000.

**Pilot Project:** Tata InfoTech Ltd was to design, develop and implement the Pilot Project with assistance and domain knowledge of computerized inventory Control Project officers at a cost of approx Rs. 12 Crores including the cost of one year warranty and three years AMC on implementation of the system.

**Networking**

(a) *Local Area Network:* Fully switched network with fiber optic backbone (12 Km) and UTP Cat-V cables (7Km) both at COD Delhi Cantt and Army HQ/ MOD. Local Area Network connectivity has been extended to Army Base Workshop for processing demands on line to meet user aspirations.

(b) *Wide Area Network:* Computerized inventory Control Project application program is a multi-user; online transaction processing system based on distributed data bases. Wide Area Network connectivity for pilot project is being developed over Delhi Zone Access Network (DZAN). The connectivity for subsequent phases of computerized inventory Control Project will be provided by signals employing a combination of LVSAT (Low Version Satellite) and AWAN (Army Wide Area Network) backbone network.

**Present Status:** The pilot project of computerized inventory Control Project is successfully implemented and tested. Work is in progress for next phase. ASC is also embarking on a separate IT (Information Technology) enabled programme to meet its requirements.
OUTLINE ORGANIZATIONS OF AN INFANTRY DIVISION

DIVISIONAL HQ

DEF AND EMP COY

INF BDE (3) ARM RARTY ARMY AVN ENGRS SIGS ASC MED ORD

BDE HQ ARMD REGT HQ ARTY BDE R & O FLT INF DIV ENGR REGT DIV SIG REGT INDEP TK TPTR PL FD AMBS

DEF & EMP PL-BDE SIG COY RHQ

INF BNS (3)