All courses are prepared using many books and websites. "*knowledge is found to be shared, but with respecting its sources*"

COURSE I: INTRODUCTION TO LOGISTICS

1- Origins and definition

The prevalent view is that the term *logistics* comes from the late 19th century: from French *logistique* (*loger*means *to lodge*) and was first used by Baron de Jomini. Others attribute a Greek origin to the word: λόγος, meaning reason or speech; λογιστικός, meaning accountant or responsible for counting.

According to the Council of Supply Chain Management Professionals (previously the Council of Logistics Management) logistics is the process of planning, implementing and controlling procedures for the efficient and effective transportation and storage of goods including services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements and includes inbound, outbound, internal and external movements.

In military science, logistics is concerned with maintaining army supply lines while disrupting those of the enemy, since an armed force without resources and transportation is defenseless. Military logistics was already practiced in the ancient world and as modern military have a significant need for logistics solutions, advanced implementations have been developed. In military logistics, logistics officers manage how and when to move resources to the places they are needed.

***"Logistics** is generally the detailed organization and implementation of a complex operation. In a general business sense, logistics is the management of the flow of things between the point of origin and the point of consumption in order to meet requirements of customers or corporations. The resources managed in logistics can include physical items such as food, materials, animals, equipment, and liquids; as well as abstract items, such as time and information. The logistics of physical items usually involves the integration of information flow, **materials handling**, **production**, **packaging**, **inventory**, **transportation**, **warehousing**, **and often security**:*

& Materials management can deal with campus planning and building design for the movement of materials, or with logistics that deal with the tangible components of a supply chain. Specifically, this covers the acquisition of spare parts and replacements, quality control of purchasing and ordering such parts, and the standards involved in ordering, shipping, and warehousing the said parts. Materials management is

the function responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an optimum manner in order to provide a pre decided service to the customer at a minimum cost.

&- Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sell, and use. Packaging also refers to the process of designing, evaluating, and producing packages. Packaging can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sellsIn many countries it is fully integrated into government, business, institutional, industrial, and personal use

&- Inventory (American English) or **stock** (British English) is the goods and materials that a business holds for the ultimate goals to have a purpose of resale (or repair).

Inventory management is a discipline primarily about specifying the shape and placement of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials.

The concept of inventory, stock or work-in-process has been extended from manufacturing systems to service businesses and projects, by generalizing the definition to be "all work within the process of production- all work that is or has occurred prior to the completion of production." In the context of a manufacturing production system, inventory refers to all work that has occurred - raw materials, partially finished products, finished products prior to sale and departure from the manufacturing system. In the context of services, inventory refers to all work done prior to sale, including partially process information.

&- Transport or **transportation** is the movement of humans, animals and goods from one location to another. Modes of transport include air, land (rail and road), water,cable, pipeline and space. The field can be divided into infrastructure, vehicles and operations. Transport is important because it enables trade between people, which is essential for the development of civilizations.

Transport infrastructure consists of the fixed installations including roads, railways,airways, waterways, canals and pipelines and terminals such as airports, railway stations, bus stations, warehouses, trucking terminals, refueling depots (including fueling docks and fuel stations) and seaports. Terminals may be used both for interchange of passengers and cargo and for maintenance.

&- A **warehouse** is a commercial building for storage of goods. Warehouses are used by manufacturers, importers, exporters,wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial areas of cities, towns and villages.

Logistics management is the part of supply chain management that plans, implements, and controls the efficient, effective forward, and

reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer's requirements. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in all logistics fields. A professional working in the field of logistics management is called a logistician.

2- Logistics activities and fields

- **Inbound logistics** is one of the primary processes of logistics concentrating on purchasing and arranging the inbound movement of materials, parts, or unfinished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores.
- **Outbound logistics** is the process related to the storage and movement of the final product and the related information flows from the end of the production line to the end user.

Given the services performed by logisticians, the main fields of logistics can be broken down as follows: --Procurement logistics -Distribution logistics -After-sales logistics -Disposal logistics -Reverse logistics- Green logistics -Global logistics- Domestics logistics- Concierge Service- RAM logistics -Asset Control Logistics- POS Material Logistics- Emergency Logistics- Production Logistics- Construction Logistics- Capital Project Logistics -Digital Logistics

- **Procurement logistics** consists of activities such as market research, requirements planning, make-or-buy decisions, supplier management, ordering, and order controlling. The targets in procurement logistics might be contradictory: maximizing efficiency by concentrating on core competences, outsourcing while maintaining the autonomy of the company, or minimizing procurement costs while maximizing security within the supply process.
- **Advance Logistics** consists of the activities required to set up or establish a plan for logistics activities to occur.
- **Distribution logistics** has, as main tasks, the delivery of the finished products to the customer. It consists of order processing, warehousing, and transportation. Distribution logistics is necessary because the time, place, and quantity of production differs with the time, place, and quantity of consumption.

- **Disposal logistics** has as its main function to reduce logistics cost(s) and enhance service(s) related to the disposal of waste produced during the operation of a business.
- **Reverse logistics** denotes all those operations related to the reuse of products and materials. The reverse logistics process includes the management and the sale of surpluses, as well as products being returned to vendors from buyers. Reverse logistics stands for all operations related to the reuse of products and materials. It is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. The opposite of reverse logistics is **forward logistics**."
- **Green Logistics** describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of the forward and reverse flows. This can be achieved through intermodal freight transport, path optimization, vehicle saturation and city logistics.
- **RAM Logistics** combines both **business logistics** and **military logistics** since it is concerned with highly complicated technological systems for which Reliability, Availability and Maintainability are essential, ex: weapon systems and military supercomputers.
- **Asset Control Logistics**: companies in the retail channels, both organized retailers and suppliers, often deploy assets required for the display, preservation, promotion of their products. Some examples are refrigerators, stands, display monitors, seasonal equipment, poster stands & frames.
- **Emergency logistics** (or **Humanitarian Logistics**) is a term used by the logistics, supply chain, and manufacturing industries to denote specific time-critical modes of transport used to move goods or objects rapidly in the event of an emergency. The reason for enlisting emergency logistics services could be a production delay or anticipated production delay, or an urgent need for specialized equipment to prevent events such as aircraft being grounded (also known as "aircraft on ground"—AOG), ships being delayed, or telecommunications failure. Humanitarian logistics involves governments, the military, aid agencies, donors, non-governmental organizations and emergency logistics services are typically sourced from a specialist provider.

The term **production logistics** describes logistic processes within a value adding system (ex: factory or a mine). Production logistics aims to ensure that each machine and workstation receives the right product in the right quantity and quality at the right time. The concern is with production, testing, transportation, storage and supply. Production

logistics can operate in existing as well as new plants: since manufacturing in an existing plant is a constantly changing process, machines are exchanged and new ones added, which gives the opportunity to improve the production logistics system accordingly. Production logistics provides the means to achieve customer response and capital efficiency. Production logistics becomes more important with decreasing batch sizes. In many industries (e.g. mobile phones), the short-term goal is a batch size of one, allowing even a single customer's demand to be fulfilled efficiently.Track and tracing, which is an essential part of production logistics due to product safety and reliability issues, is also gaining importance, especially in the automotive and medical industries.

- **Construction Logistics** is known to mankind since ancient times. As the various human civilizations tried to build the best possible works of construction for living and protection. Now the construction logistics emerged as vital part of construction. In the past few years construction logistics has emerged as a different field of knowledge and study within the subject of supply chain management and logistics.
- **Digital logistics** is driven by a new generation of web-based, enterprise logistics applications that enable collaboration and optimization, leveraging a central logistics information backbone that provides visibility across the enterprise and extended supply chain.

3- Business logistics

A forklift stacking a logistics provider's warehouse of goods on pallets

One definition of business logistics speaks of "having the right item in the right quantity at the right time at the right place for the right price in the right condition to the right customer".Business logistics incorporates all industry sectors and aims to manage the fruition of project life cycles, supply chains, and resultant efficiencies.

The term **"business logistics"** has evolved since the 1960sdue to the increasing complexity of supplying businesses with materials and shipping out products in an

increasingly globalized supply chain, leading to a call for professionals called "supply chain logisticians".

In business, logistics may have either an internal focus (inbound logistics) or an external focus (outbound logistics), covering the flow and storage of materials from point of origin to point of consumption (see supply-chain management). The main functions of a qualified logistician include inventory management, purchasing, transportation, warehousing, consultation, and the organizing and planning of these activities. Logisticians combine a professional knowledge of each of these functions to coordinate resources in an organization.

There are two fundamentally different forms of logistics: one optimizes a steady flow of material through a network of transport links and storage nodes, while the other coordinates a sequence of resources to carry out some project (e.g., restructuring a warehouse).

4- Nodes of a distribution network

The nodes of a distribution network include:

- **Factories** where products are manufactured or assembled
- A depot or deposit is a standard type of warehouse thought for storing merchandise (high level of inventory).
- **Distribution centers** are for order processing and order fulfillment (lower level of inventory) and also for receiving returning items from clients.
- **Transit points** are built for cross docking activities, which consist in reassembling cargo units based on deliveries scheduled (only moving merchandise).
- **Traditional retail stores** of the Mom and Pop variety, modern supermarkets, hypermarkets, discount stores or also voluntary chains, consumers' co-operative, groups of consumer with collective buying power. Note that subsidiaries will be mostly owned by another company and franchisers, although using other company brands, actually own the point of sale.

There may be some intermediaries operating for representative matters between nodes such as sales agents or brokers.

5- Logistic families and metrics

A logistic family is a set of products which share a common characteristic: weight and volumetric characteristics, physical storing needs (temperature, radiation,...), handling needs, order frequency, package size, etc. The following metrics may be used by the company to organize its products in different families:

- **Physical metrics** used to evaluate inventory systems include stocking capacity, selectivity, superficial utilization, volumetric utilization, transport capacity, transport capacity utilization.

- **Monetary metrics** used include space holding costs (building, shelving and services) and handling costs (people, handling machinery, energy and maintenance).

Other metrics may present themselves in both physical or monetary form, such as the standard Inventory turnover.

We should mention that companies sometimes hire other parties to manage their logistic tasks in form of" CONTRACT LOGISITICS"

Contract logistics is the outsourcing of resource management tasks to a third-party company. Contract logistics companies handle activities such as designing and planning supply chains, designing facilities, warehousing, transporting and distributing goods, processing orders and collecting payments, managing inventory and even providing certain aspects of customer service..

Logistics management is an important component of many companies' profitability and overall success. While some companies manage their logistics, others find it more efficient to hire specialized contract logistics companies to manage their logistics for them. Contract logistics companies often need to develop a deep understanding of how different industries work to best manage the logistics of a variety of companies.