Chapter 1

General Introduction to Logistics

Learning points

To know the origin of logistics

To understand the definition of logistics

To discuss the importance of logistics

To list different activities of logistics and understand the relationships between them

Text A What is Logistics

Figure 1-1 shows the classfication of logistics.

The scope of the logistics (物流的范围)	The nature of the logistics system (物流系统的性质)	The functions of the logistics (物流的作用)	The objectives of its main body (主体方的目的)
Macro logistics (宏观物流)	Societal logistics (社会物流)	Supply logistics (供应物流)	First party logistics (第一方物流)
Micro logistics (微观物流)		Production logistics (生产物流)	Second party logistics (第二方物流)
		Sales logistics (销售物流)	
International logistics (国际物流)	Enterprise logistics (企业物流)	Recycling logistics (回收物流)	Third party logistics (第三方物流)
Domestic logistics (国内物流)		Disposal logistics (废弃物物流)	Fourth party logistics (第四方物流)

Figure 1-1 The classification of logistics

Optional terms

physical distribution 实体配送
Procurement logistics 采购物流
Distribution logistics 配送物流
After-sales logistics 售后物流
Disposal logistics 废弃物物流
Reverse logistics 逆向物流
Green logistics 绿色物流
Global logistics 全球物流
RAM logistics (logistic engineering) 物流工程
Domestic logistics 国内物流
Emergency logistics 应急物流
Construction logistics 工程建设物流
Production logistics 生产物流
Digital logistics 数字化物流

Main passage

1. Origin of logistics

The prevalent view is that the term "logistics" comes from the late 19th century: from French and was first used by Baron de Jomini, who had served in Napoleon's army before joining the Russian's and who later founded the Military Academy of St. Petersburg. So in a military sense, the term "logistics" involves transport organization, army replenishments and material maintenance. Military physical distribution was done to enable the soldiers to move from their base position to a new forward position efficiently, which could be a crucial factor in determining the outcome of wars. This also give birth to several military logistics techniques which are still in use in a more advances form.

In the business aspect, logistics has evolved since the 1960's due to the increasing complexity of supplying businesses with materials and shipping out products in an increasingly globalized supply chain. 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. Therefore, the extension of concept to company is a relatively new one and the earliest dates back to the 1950's in USA.

2. The definition of logistics

There are various definitions of different edition. But in general, there are mainly two types of definition in practice.

In Chinese logistics terms, logistics means the physical movement of goods from the supplier point to the receive point. Based on practical need, integrated organically the variety of the basic functional activities including transportation, storage, loading and unloading, handling, package, distribution and information management, etc.

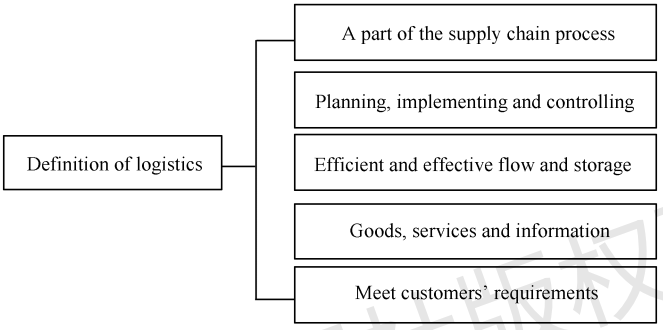

Figure 1-2 Definition of logistics

The names of the Council of Logistics Management have changed many times, which are as followed:

- 1963, Council of Physical Distribution Management (CPDM).
- 1986, Council of Logistics Management (CLM).
- 1998, definition of logistics (CLM) is revised and used today: *"Logistics is that part of the supply chain process 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 customers' requirements.*"[1](see figure 1-2).
- 2005, Council of Supply Chain Management Professionals (CSCMP),see figure 1-3.

CSCMP Council of Supply Chain Management Professionals

Figure 1-3 Logo of CSCMP

3. Aims of logistics

- Logistics is the time-related positioning of resources, or the strategic management

of the total supply chain.

- The supply chain is a sequence of events intended to satisfy a customer.
- The overall aim of logistics is to achieve high customer satisfaction. It must provide a high quality service with low-or acceptable costs.

4. The importance of logistics

Since the beginning of human civilization, there has been the "move" of the goods. Logistics is essential for every organization and has always been a central and essential feature of all economic activity. Not only is logistics essential, but it is also expensive. Organizations may reduce their overheads as much as possible, but they are often left with surprisingly high logistics costs. Therefore, when it comes to modern logistics, most professionals in the business consider it one of the most competitive and exciting jobs, invisible as it is.[2]

Logistics management has evolved over the last three decades from the narrowly defined distribution management to the integrated management and to the global supply chains. The mission of logistics management is to plan and coordinate all activities to achieve desired levels of delivered service and quality at the lowest possible cost. In order to succeed in today's global market; companies must be ever cognizant of these trends and develop a logistics management strategy that capitalizes on the best-of-breed technology solution available today, so that they can meet the demands of the customers today and he well prepared for the future.

5. Logistics fields

Inbound logistics is one of the primary processes of logistics concentrating on purchasing and arranging the inbound movement of materials, parts, or finished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores. [3]

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. [4]

Given the services performed by logisticians, the main fields of logistics can be broken down as follows:

Procurement logistics: It consists of activities such as market research, requirements planning, make or buy decisions, supplier management, ordering, and other controlling.

Production logistics: It connects procurement to distribution logistics. The main function of production logistics is to use the available production capacities to produce the products needed in distribution logistics.

Distribution logistics: It has, as main tasks, the delivery of the finished products to

the customers. It consists of order processing, warehousing and transportation.

After-sales logistics: Its services cover support for products sold to customers, the refurbishment of returned items, and disposal of end-of-life goods.

Disposal logistics: Its main function is to reduce logistics costs, enhance services, related to the disposal of waste produced during the operation of a business. [5]

Reverse logistics: It stands for all operations related to the reuse of products and materials. The reverse logistics includes the management and the sale of surplus as well as returned items of products.

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.

Engineering 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. [6]

Emergency 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.

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. [7]

Construction logistics is known to mankind since ancient times. 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.

Term station

logistics center　物流中心
logistics channel　物流渠道
logistics cost　物流成本
logistics outsourcing　物流外包
logistics fees　物流费用
logistics department　物流部门
logistics document　物流单证
logistics functional integration　物流功能一体化
logistics industry　物流产业
logistics infrastructure　物流基础设施
logistics network　物流网络
logistics operation　物流运作
logistics enterprise　物流企业
logistics of manufacturing　生产企业物流
logistics of retail enterprise　零售业物流
logistics of wholesale enterprise　批发企业物流
logistics enterprise of transport (of warehouse)　运输型（仓储型）物流企业
logistics scale　物流规模
logistics expenditure　物流支出
logistics synchronization　物流同步

Role Play 1　Introduction to Logistics Company

(Leo, the sales representative of Zhongji Shipping Company, is talking with Erik, a potential customer.)

Leo：Welcome to our company, Mr. Erik. Nice to meet you.

Erik：Me too.

Leo：Mr. Erik, my name is Leo. Here is my card. I'm willing to introduce my company.

Erik：Thank you for a lot of care.

Leo：Our business covers import and export container transportation and agency, door to door pickup and delivery, custom clearance, warehousing and consolidation.

Erik: I see.

Leo：Zhongji has become one of the market leaders in China's freight forwarding and logistics industry today.

Erik：Right.

Leo：We have helped Ford to substantially reduce logistics costs.

Erik：Please explain in detail.

Leo：Of course, that was one of the best results achieved in the beginning of the 2000's.

Erik：One of the best results? In what way?

Leo：We improved their management by optimizing their plans of demonstration before plunging into action. As a result, the overall utilization was raised considerably.

Erik：It's amazing.

Leo：If you are concerned about logistics questions, you can ask anyone. We have a reputation for top service.

Erik：I hope so.

Leo：If you have a moment, I'm hoping to visit you.

Erik：Well, you are welcome. I'd like to hear your suggestion.

New words and phrases

military ['milit(ə)ri] *adj.* 军事的
maintenance ['meintənəns] *n.* 维护，维修
prevalent ['prev(ə)l(ə)nt] *adj.* 普遍的
napoleon [nə'pəuliən] *n.* 拿破仑
replenishment [ri'pleniʃmənt] *n.* 补充，补给
efficient [i'fiʃ(ə)nt] *adj.* 有效率的
complexity [kəm'pleksəti] *n.* 复杂性
effective [i'fektiv] *adj.* 起作用的
professional [prə'feʃ(ə)n(ə)l] *adj.* 专业的
evolve [i'vɔlv] *vt. / vi.* 发展，进化
narrowly ['nærəuli] *adv.* 勉强地；狭窄地
coordinate [kəu'ɔ:dineit] *vt.* 调整；协调
disposal [di'spəuz(ə)l] *n.* 处理；清理
logistician [ˌləudʒi'stiʃən] *n.* 物流师
inbound ['inbaund] *adj.* 入站的；内部的
outbound ['autbaund] *adj.* 出站的；外部的
implement ['implim(ə)nt] *vt.* 实施，执行
consumption [kən'sʌm(p)ʃ(ə)n] *n.* 消费

Notes

1. This book will adapt what CLM (Council of Logistics Management) has defined it as follows: "*Logistics is that part of the supply chain process 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 customers' requirements.*"

本书将采用美国供应链管理专业委员会给出的定义进行分析："物流是供应链中计划、实施和控制商品的快速、高效流动和储存，以及从源头到消费的服务和信息的全过程，用以满足客户的需求。"

2. Therefore, when it comes to modern logistics, most professionals in the business consider it one of the most competitive and exciting jobs, invisible as it is.

因此，当谈到现代物流时，大多数业内人士认为它是最具竞争力、最令人兴奋的工作之一，尽管它是无形的。

3. Inbound logistics is one of the primary processes of logistics concentrating on purchasing and arranging the inbound movement of materials, parts, or finished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores.

内部物流是物流的主要过程之一，主要集中在采购和安排从供应商到制造或装配工厂、仓库或零售店的材料、零部件或成品的内部移动。

4. 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.

外部物流是涉及从生产线末端到终端用户这段过程中的最终产品和相关信息流的储存和移动的过程。

5. Disposal logistics: Its main function is to reduce logistics costs, enhance services, related to the disposal of waste produced during the operation of a business.

废弃物物流：其主要作用是降低物流成本、提高服务质量，以及在企业经营过程中废弃物的处理。

6. Engineering 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.

工程物流结合了商业物流和军事物流，因为它涉及高度复杂的技术系统，其中可靠性、可用性和可维护性是必不可少的，如武器系统和军事超级计算机。

7. 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.

生产物流旨在确保每台机器和工作站都能在适当的时间以适当的数量和质量接收到合适的产品。它所关注的是生产、测试、运输、储存和供应。生产物流既可以在现有的工厂中运行，也可以在新的工厂中运行：由于在现有的工厂中生产是一个不断变化的过程，所以要更换机器和增加新机器，从而有可能相应地改进生产物流系统。

Text B　Activities of in Logistics System

Figure 1-4 shows logistics system.

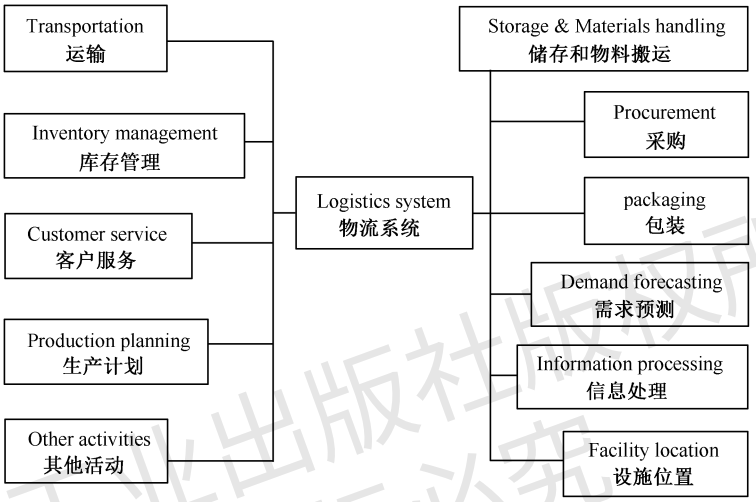

Figure 1-4　Logistics system

Optional terms

transportation　运输
warehousing　仓储
packaging　包装
material handling　物料搬运
inventory management　库存控制
demand forecasting　需求预测
return goods handling　退货处理
loading & unloading　装卸
forward logistics & reverse logistics　正向物流和逆向物流
customer services　客户服务
purchasing / procurement　采购
strategic planning　策略规划

information system 信息系统
order processing 订购处理

Main passage

The logistics system consists of the following components: transportation, warehousing, inventory management, packaging, materials handling, information management, demand forecasting, procurement, customer service, production planning, facility location and other activities.

Other activities for a specific organization could include tasks such as after-sales parts and service support, maintenance functions, return goods handling and recycling operations.

Clearly any one organization is unlikely to require all these specific tasks to be accomplished. For example, a service firm such as an airline might combine elements from the information processing, maintenance, demand forecasting, customer service, and purchasing functions into a logistics system designed to reach its customers. [1] On the other hand, a manufacturer of consumer goods may draw from transportation, inventory management, storage, materials handling and packaging in addition to customer service, purchasing and demand forecasting for their logistics support.

1. Transportation

Transportation refers to the physical movement of goods from one point to another point. It includes specific activities such as selecting the transport mode, choosing the particular route, selecting the right carrier, complying with various local transportation regulations. Transportation is usually the most costly logistics activity. It may account for 40% - 60% of a company's total logistics cost.

2. Warehousing

Warehousing is an integral part of every logistics system. It plays an important role in providing a desired level of customer service at the lowest possible total cost. It refers to places where goods can be stored for a particular period of time. Generally, the greater the time lags between production and consumption, the larger the level of warehousing required.

3. Material handling

Material handling is any kind of methods for short-distance movements of raw materials, work in process, or finished goods within a factory or warehouse. Materials can be moved directly by people lifting the items or using hand carts, sling, and other handling

accessories (manual lifting and handling). Materials can be also moved by people using machines such as cranes, forklift trucks, and other lifting fixtures (mechanical lifting). [2]

4. Inventory management

Inventory management deals with balancing the cost of maintaining additional products on hand against the risk of not having those items when the customer wants them. This task has become more complex as firms have gradually lowered inventory levels.[3]

5. Packaging

Industrial packaging focuses on protecting the product while it is being transported and stored. It conveys important information to inform clients and provide protection during storage and transport. Consumer packaging plays a role of protection or advertising whose size, weight, color, and printed information to attract customers and convey knowledge about the product.

6. Procurement

Procurement is the purchase of materials and services from outside to support the firm's operations from production to marketing, sales and logistics. It includes the selection of supply source location, timing of purchases, price determination, quality control and many other factors. [4]

7. Information management

Information management concerns a cycle of organizational activity: the acquisition of information from one or more sources, the management and the distribution of that information to those who need it, and its ultimate disposition through archiving or deletion.

Information management embraces all the generic concepts of management, including: planning, organizing, structuring, processing, controlling, evaluation and reporting of information activities, all of which is needed in order to meet the needs of those with organizational roles or functions that depend on information.

8. Demand forecasting

Demand forecasting refers to the prediction of probable demand for a product or a service on the basis of the past events and prevailing trends in the present. Demand forecasting may be used in production planning, inventory management, and at times in assessing future capacity requirements, or in making decisions on whether to enter a new market. It is predicting future demand for the product.

9. Customer services

Customer service is the provision of service to customers before, during and after a

purchase. Customer service concerns the priority an organization assigns to customer service relative to components such as product innovation and pricing. In this sense, an organization that values good customer service may spend more money in training employees than the average organization or may proactively interview customers for feedback.

10. Other logistics activities

Other activities such as waste disposal, return goods handling, etc. are also important. Logistics managers have to consider the social costs associated with waste disposal. The handling of returned goods, often referred to as reverse distribution, is an important part of the logistics process.

Role Play 2 Making a Complaint

(Judy, a clerk in a North Beauty Import and Export Co. Ltd. is complaining about the cargo to Sandy, a logistics company clerk.)

Judy: Hello, may I speak to Sandy?

Sandy: Yes, speaking please.

Judy: This is from Judy in North Beauty Import and Export Co. Ltd.

Sandy: How are you? I think the cargo have already reached you. Is there anything else I can do for you?

Judy: Yes. We regret tell you that the goods you sent us are not in conformity with the terms of the contract. On examination, we find a shortage in the delivery.

Sandy: Oh? Please explain in detail.

Judy: As soon as the consignment arrived at our port we had it inspected. To our disappointment, we found a shortage of 2 cartons.

Sandy: 2 cartons?

Judy: Yes. We ordered 20 cartons of garments, but we only received 18 cartons.

Sandy: Did you contact the exporter for the matter?

Judy: Yes. They showed the onboard bill of lading to us. We all consider the carrier should be liable for the shortage. Therefore, we have to raise a claim against your company as the liability with you.

Sandy: We'd like to have your present proof.

Judy: Here is our onboard bill of lading to claim a settlement.

Sandy: Sorry, the evidence you provided is inadequate.

Judy: Wait a moment, here's a survey report issued by the Commodity Inspection Bureau.

Sandy: Have you any other evidence?

Judy: Not yet.

Sandy: Sorry, we regret being unable to accept your claim because the goods were in perfect condition when the goods were loaded.

Judy: What should we do now?

Sandy: We suggest that you approach the insurance company for settlement as the shortage occurred in transit.

Judy: Which evidence do we provide?

Sandy: The full original set of ocean bill of lading, original policy and the original commercial invoice.

Judy: Thanks a lot, bye.

Sandy: Bye.

New words and phrases

facility [fə'siləti] *n.* 设施；设备

recycling [ri：'saikliŋ] *n.* (资源、垃圾的) 回收利用

accomplish [ə'kʌmpliʃ;ə'kɒm-] vt. 完成；实现

storage ['stɔ：ridʒ] *n.* 存储；仓库

comply with 照做，遵守

account for 占据

lag [læg] *n.* 落后，延迟

accessory [ək'ses(ə)ri] *n.* 配件；附件

manual ['mænjʊ(ə)l] *adj.* 手工的

crane [krein] *n.* 起重机

forklift ['fɔ：klift] *n.* 叉车

fixture ['fikstʃə; -tjə] *n.* 设备；固定装置

mechanical [mi'kænik(ə)l] *adj.* 机械的

ultimate ['ʌltimət] *adj.* 最终的

prediction [pri'dikʃ(ə)n] *n.* 预报

assess [ə'ses] *vt.* 评定；评估

feedback ['fi：dbæk] *n.* 反馈

associated with 与……相联系

Notes

1. Clearly any one organization is unlikely to require all these specific tasks to be accomplished. For example, a service firm such as an airline might combine elements from the information processing, maintenance, demand forecasting, customer service, and purchasing functions into a logistics system designed to reach its customers.

显然，任何一个公司都不可能要求完成所有这些具体任务。例如，像航空公司这样的服务公司可以将信息处理、维护、需求预测、客户服务和采购功能等要素整合到一个物流系统中，以满足其客户。

2. Materials can be moved directly by people lifting the items or using hand carts, sling, and other handling accessories (manual lifting and handling). Materials can be also moved by people using machines such as cranes, forklift trucks, and other lifting fixtures (mechanical lifting).

人们可以直接搬运物品，或者使用手推车、吊索或其他搬运配件（手提或手操作）。人们也可以使用起重机、叉车和其他起重装置（机械起重）来移动物资。

3. Inventory management deals with balancing the cost of maintaining additional products on hand against the risk of not having those items when the customer wants them. This task has become more complex as firms have gradually lowered inventory levels.

库存管理是指在客户需要的时候，平衡维护额外产品的成本，以避免这些产品的风险。随着企业逐渐降低库存水平，这项任务变得更加复杂。

4. Procurement is the purchase of materials and services from outside to support the firm's operations from production to marketing, sales and logistics. It includes the selection of supply source location, timing of purchases, price determination, quality control and many other factors.

采购是指从外部购买材料和服务，以支持公司从生产到营销、销售和物流的运作。它包括供应地位置的选择、采购时间、定价、质量控制和其他许多因素。

Exercises

Ⅰ. Match the words in column A with the ones in column B.

A	B
（　）运输	1. strategic planning
（　）仓储	2. purchasing
（　）库存管理	3. information management

（　　）包装
（　　）采购
（　　）物料搬运
（　　）信息管理
（　　）装卸
（　　）需求预测
（　　）客户服务
（　　）售后服务
（　　）实体配送
（　　）战略规划
（　　）逆向物流
（　　）退货处理

4. after-sales services
5. physical distribution
6. reverse logistics
7. loading & unloading
8. warehousing
9. return goods handling
10. transportation
11. inventory control
12. packaging
13. materials handling
14. information management
15. customer service

Ⅱ. Answer the following questions according to the text.

1. What is logistics?
2. When is the birth of logistics?
3. Which can be related to the current system of logistics management?
4. How many sectors of economic activities are involved in logistics? What are they?
5. What do the logistics managers' duty based on?

Ⅲ. Fill in the blanks with the phrases in the box. Change the form where necessary.

requirement	/	control	/	achieve	/	financial
minimum	/	refer	/	combination	/	inventory

Logistics _____ to the responsibility to design and administer systems to _____ movement and geographical positioning of raw materials, work-in-process and finished _____ at the lowest total cost. To achieve lowest total cost means that _____ financial and human assets committed to logistics must be held to an absolute _____. It is also necessary to hold operational expenditures as low as possible. The _____ of resources, skills, and systems required to achieve lean logistics are challenging to integrate, but once _____, such integrated competency is difficult for competitors to replicate.

The goal of logistics is to support procurement, manufacturing, and customer accommodation operation _____.

Ⅳ. Choose the best answer from the four choices.

1. —Do you hear that _____ has become a hot occupation?
   —It's amazing!
   A. logical B. logistics C. logic D. logistic
2. Which element should logistics management focus on?
   A. transportation B. costs C. customers D. warehousing
3. Which of the following functions does a logistics system include?
   A. whole sales B. cash management C. storage D. Internet
4. Why is customer service an important factor?
   A. To retain and keep customers.
   B. To gather information about competitors.
   C. To develop new market.
   D. To strengthen business partner relationships.
5. Why is transportation so important to the current business environment?
   A. It can link and integrate all logistics functions.
   B. It can gather new information.
   C. It can eliminate incorrect data.
   D. It can make all data public for future use.
6. What is strategic planning to be failed to achieve?
   A. Providing realistic guidelines to guide the actions to achieve results.
   B. Designing a goal that everyone agrees on.
   C. Pointing out a good goal.
   D. Implementing effectively.
7. If the vessel had sailed along designated _____, it would have been able to avoid the bad weather.
   A. road B. way C. route D. rout
8. Logistics is called previously _____.
   A. transportation B. logistic
   C. movement D. physical distribution
9. Pleasing _____ can attract customers' eyes.
   A. packaging B. warehouse C. inventory D. truck
10. Managers must establish and implement inventory plan on the basis of _____ considerations.
   A. strategy B. logistics C. strategic D. logical

Ⅴ. Translate the following sentences into Chinese.

1. The prevalent view is that the term "logistics" comes from the late 19th century: from French and was first used by Baron de Jomini, who had served in Napoleon's army before joining the Russian's and who later founded the Military Academy of St. Petersburg.

2. Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements.

3. A service firm such as an airline might combine elements from the information processing, maintenance, demand forecasting, customer service, and purchasing functions into a logistics system designed to reach its customers.

4. Warehousing is an integral part of every logistics system. It plays an important role in providing a desired level of customer service at the lowest possible total cost.

5. Materials can be moved directly by people lifting the items or using hand carts, sling, and other handling accessories (manual lifting and handling).

Ⅵ. Translate the following sentences into English.

1. 物流过程的重要部分是货物从产地到消费地的流动。

2. 现代物流采用集装箱化（containerization）技术。

3. 很多公司雇用具有相应知识的人来对供应链领域不断加强管理。

Supplementary reading

Development of Logistics

Logistics is by no means a new subject area. Historically, the concept of logistics stems from specific facets of military and industrial management. In many military sense, logistics is concerned with the various aspects of maintenance and system / product support, particularly from the point in time when systems are in operational use. In the industrial or commercial sector, logistics has been defined to include such activities as material flow, product distribution, transportation, warehousing, and the like. In both situations, however, logistics has been considered as a "downstream" effort, and the requirements for logistics have not been very week defined or integrated.

In recent years, systems and products have become more complex as technology advances, and logistics requirements have increased in general. Not only have the costs associated with system / product acquisition increased significantly in the past decade, but the costs of logistics support have also been increasing at an alarming rate. At the same

time, the current economic dilemma of decreasing budgets combined with upward inflationary trends results in less money available for both the procurement of new systems and for the maintenance and support of those items already in use.

Logistics automation is the application of computer software or automated machinery to improve the efficiency of logistics operations. Typically this refers to operations within a warehouse or distribution center with broader tasks undertaken by supply chain management systems and enterprise resource planning systems.

Industrial machinery can typically identify products through either bar code or RFID technologies. Information in traditional bar code is stored as a sequence of black and white bars varying in width, which when read by laser is translated into a digital sequence, which according to fixed rules can be converted into a decimal number or other data. Sometimes information in a bar code can be transmitted through radio frequency, more typically radio transmission is used in RFID tags. An RFID tag is card containing a memory chip and an antenna which transmits signals to a reader. RFID may be found on merchandise, animals, vehicles and people as well.