LOGISTICS MANAGEMENT FOR A TRADING COMPANY

by

Ms. Narumon Assawasoontorn

A Final Report of the Six-Credit Course
CE 6998 - CE 6999 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
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The Graduate School of Assumption University has approved this final report of the six-credit course, CE 6998 — CE 6999 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

Many people will consider sales as the priority to increase their net income or profit to the company. But, in this project, you could find another idea to increase your profits by simply studying logistic factors. The Logistics Management for a trading company is a suitable sample to deal with the situation of lack of profits. In a trading company, there are only transaction business and logistics. The most important to the company is to deliver product on time as customer's requirement. The customer's logistic policy in this project is JIT; Just In Time System. Therefore, the customer could not keep inventory. So, the trading company needs to support for any stock upon their purchase order. Hence, the trading company rent one warehouse to keep and supply products to the customer.

In this project, the author applies the idea of logistics management into a case study of a trading company in order to reduce the transaction cost and lead-time, improve forecast order and customer's satisfaction. In conclusion, the Logistic Management could help trading company to reduce cost of transportation, inventory, ordering process and etc. There are several ideas regarding the conduct of the improvement activities. However, all of them will finally derive with cost reduction, service improvement and differentiated distribution. These advantages are able to give success in business competitiveness in this era.

ACKNOWLEDGEMENTS

The author is indebted to the following people. Without them, this project would not have been possible.

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Without the support of her family, the task of writing this project would be impossible. The author wishes to thank her mother who has always been a source of love and encouragement. Appreciation is also given to her father who during his life, had testimonies of hardworking and a concern for others.

To all those persons who provided assistance, the author is indeed grateful. Of course, the responsibility for any errors or omissions rests with the author.

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I. INTRODUCTION

1.1 Background of the Project

After I graduated, I started working in a trading company. And now I have been working there for 5 years. Generally, the concept of trading company is to provide products or service in order to satisfy the steadily diversifying needs of any customers. The basic function is to source the required products or services and allocate them to the customers at the requested period. The main purpose is to make the customers satisfied with our services. And the major revenue of the trading company comes from the commissions from customers.

In the past, the trading company could make a huge volume of profits from the commissions. But after the collapse of Thai economy continuously for 5 years, the global marketplace faces the pressure on organization to find new methods to create and deliver values to customers stronger. The trading company has also confronted with difficulties in running the business as smoothly or easily like in the past because of the high and rapid competitiveness in doing business under such an economic crisis or the influence of globalization or even new information hi-technology. These are the reasons why a trading company needs to improve and prepare more value to their tasks and services which will help the company to maximize the profit with the lowest cost.

In order to fulfill those needs, I would like to provide the useful information to help and support the trading company in order to survive in this kind of economy. I "Logistics Management" is a good solution for a trading company. "Logistics Management" is defined as the process of strategically managing the procurement, planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, movement and storage of materials, in-process inventory, parts and

finished goods inventory through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements. And effective logistics management can provide a major source of competitive advantage. The source of competitive advantage is found firstly in the ability of the organization to differentiate itself in the eyes of the customers, from its competition and secondly by operating at a lower cost and hence at greater profit. The bases of success in any competitive context, as its most elemental, commercial success, derive either from a cost advantage or a value advantage or ideally, both. Organizations have directed considerably toward working more closely with other channel members, including customers, suppliers and with various types of logistics suppliers.

In this project, I would like to apply the concept of logistics management to the process of tasks and services in a trading company. In this way, I believe that it can improve the tasks and services of the staff in a trading company. And also, the efficient logistics management is very vital to increase the opportunities and chances to get more projects and be able to survive in the current situation.

1.2 Objectives

The objectives of the project are to study and understand of the concepts of logistics management and to apply its concept to the trading company. Also, it can help the trading company for following purposes:

(1) To reduce the transaction costs.

(2) To make better forecasts for demand.

(3) To coordinate between manufacturing and distribution systems.

(4) To reduce lead-time.

(5) To improve the customers' satisfaction.

1.3 Scope of This Project

This project would discuss the area of "Logistics Management" in a trading company. The activities to be managed include the transportation, inventory maintenance, warehousing, material handling, customer service standards, and product scheduling. The result is to provide the goods and services to customers at the right time, right place, and in the desired condition, while making the greatest contribution to the firm.

1.4 Deliverables

(1) Guidelines to apply "Logistics Management" to a trading company.

(2) Project report

II. LITERATURE REVIEW

2.1 Definition of Logistics Management

Since logistics is a significant component of a country's economy, it is very important to define specially what the term means. In the past, the trade and academic press has given logistics a variety of names: physical distribution, distribution, distribution engineering, business logistics, marketing logistics, distribution logistics, materials management, materials logistics management, logistics, quick-response systems, supply chain management, Industrial logistics. At one time or another, all of these terms have referred to essentially the same this: the management of the flow of goods from point-of-origin to point-of-consumption. But logistics management is the most widely accepted term among logistics professionals (Lambert 1999). z

U.S. Air Force Institute of Technology (1981) defined logistics as the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, logistics pertains to those aspects of military operations which deal with **(1)** design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of material; (2) movement, evacuation, and hospitalization of personnel; (3) acquisition or construction, maintenance, operation, disposition of facilities; and (4) acquisition or furnishing of services.

In the military sense, logistics is concerned with the various aspects of distribution 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, the physical distribution of products, transportation, warehousing and inventory control, and the like (Blanchard 1992).

CLM (Council of Logistics Management, 1986), a professional organization of logistics managers, educators, and practitioners formed in 1962 for the purposes of continuing education and fostering the interchange of ideas, defined the definition as: "logistics is the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-to-consumption for the purpose of conforming to customer requirements".

Lambert (1999) said that he agreed with the definition provided by CLM but he would like to include customer service, traffic and transportation, warehousing and storage, plan and warehouse site selection, inventory control, order processing distribution communications, procurement, material handling, parts and service support, salvage and scrap disposal, packaging, return goods handling, and demand forecast within it.

Christopher (1998) defines logistics management as "logistics is the process of strategically managing the procurement, movement and storage of material, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders". /

Ballou (1999) provides a more comprehensive definition of the concept of logistics as "Business logistics deals with all movement and storage activities that facilitate product flow, from the point of raw material acquisition to the point of final consumption, as well as the information flows that set the product in motion, for the purpose of providing adequate levels of customer service at a reasonable cost".

Even though there are many definitions from many people from many sectors, the mission of logistics management is still the same. That is to get the right goods/services

to the right place, at the right time, and in the desired condition, while making the greatest contribution to the firm.

2.2 Logistics Role in the Economy

The bases of success in the marketplace are numerous, but a simple model is based around the triangular linkage of the company, its customers, and its competitors — the "Three C's". The "Three C's" are the customer, the competition and the company. Figure 2.1 illustrates the three-way relationship.

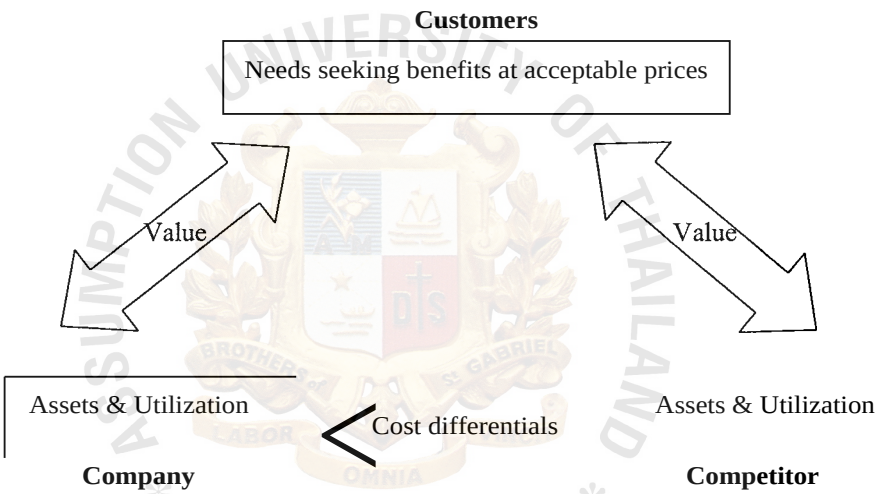

Figure 2.1. Three C's Relationship (Christopher 1998).

The source of competitive advantage is found firstly in the ability of the organization to differentiate itself, in the eyes of the customers, from its competition and secondly by operating at a lower cost and hence a greater profit.

But some have argued that logistics is only important to manufacturing firms. However, logistics is an important component of the operation of all companies, including retailers, wholesalers, and other service providers. Logistics costs are included in lawn care, financial services, and diaper delivery. Efficient management of the flow

of goods from point-of-origin to point-of-consumption at the macro (society) or micro (firm) levels requires successfully planning, implementation, and control of a multitude of logistics activities. The activities shown in Figure 2.2 involve raw materials (subassemblies, manufactured parts, packing materials, basic commodities); in-process inventory (product partially completed and not yet ready for sale); and finished goods (completed products ready for sales to intermediate or final customers).

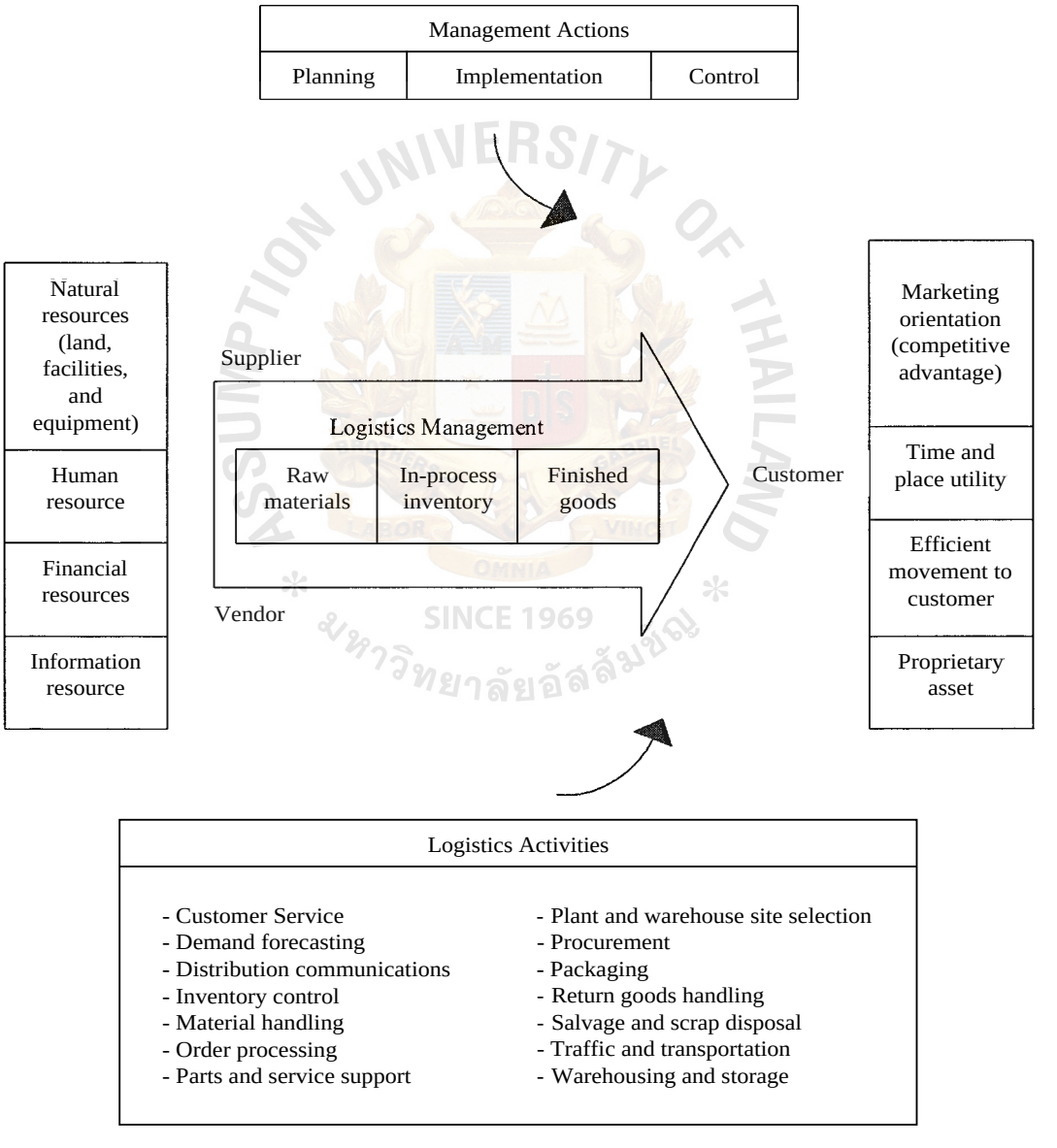

Figure 2.2. Components of Logistics Management (Lambert and Stock 1999).

It has been the tradition in many firms to organize around marketing and production functions. Typically, marketing means selling something, and production means making something. Although few business people would agree that their organization is so simple, the fact remains that many businesses emphasize these functions while treating other activities such as traffic, purchasing, accounting and engineering, as support areas. Such an attitude is justified to a degree, because if a firm's products cannot be produced and sold, little else matters. However, such a pattern is dangerously simple for many firms to follow in that it fails to recognize the importance of the activities that must take place between points and times of production or purchase and the points and times of demand. These are the logistics activities, and they affect the efficiency and effectiveness of both marketing and production. People in both marketing and production have not neglected the importance of logistics. In fact, each area considers logistics within its scope of action.

The role of logistics in the economy is another one that should be considered. The rising affluence of consumers has led to increase national and international markets for goods and services. Thousands of new products and services have been introduced in this century and are sold and distributed to customers in every corner of the world. Business firms have increased in size and complexity to meet the challenges of expanded markets and the proliferation of new products and services. Multiple-plant operations have replaced single-plant production. The distribution of products from point-of-origin to point-of-consumption has become an enormously important component of the gross national product (GNP) of industrialized nations. Logistics also affects the rate of inflation, interest rates, productivity, energy costs and availability, and other aspects of the economy. Improvements in a nation's productivity have positive effects on the price paid for goods and services, the balance of national payments,

currency valuation, the ability to compete more effectively in global markets, industry profits (higher productivity implies lower costs of operation to product and distribution equivalent amount of product), the availability of investment capital, and economic growth-leading to a higher level of employment.

More recently, logistics has been viewed on a much broader scale and the field of logistics has been growing at a rapid pace, stimulated primarily by the technological, sociological, and economic trends in the world today. Systems and products have become more complex as technology advances, and logistics requirements have increased in general. Not only have 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 result in less money available for the acquisition of new systems and/or for the maintenance and support of those items already in use (Blanchard 1992).

2.3 Logistics Role in the Firm

Effective logistics management enhances the marketing effort of the firm (which can create differential advantage in the marketplace) by providing efficient movement of products to customers and time and place utility to products. It can be treated, in accounting terms, as a proprietary asset of the company.

It is generally recognized that business creates four type of value in products or services. These are (1) form, (2) time, (3) place, and (4) possession. Logistics creates two out of these four values. Form value is created by manufacturing as inputs are concerted to outputs, that is, raw materials are transfonned into finished goods. Logistics controls the time and place values in products, mainly through transportation, information flows, and inventories. Possession value is often considered the

responsibility of marketing, engineering, and finance, where the value is created by helping customers acquire the product through such mechanisms as advertising (information), technical support, and terms of sale (pricing and credit availability). The value, or utility, of making materials available in a completed state is called form utility. To the consumer, however, the product not only must have form utility, but it also must be the in the right place, at the right time, and be available to purchase. The value added to products beyond that added by manufacturing (form utility), is called place, time, and possession utility. The logistics activity provides place and time utility, while marketing provides possession utility. Management is quite concerned with the "value added" by logistics, become improvements in place and time utility are ultimately reflected in the firm's profits. Cost savings in logistics or a stronger marketing position because an improved logistics system can both cause improved bottom line performances. In firms where logistics contributes a significant portion of the "value added" to a product, logistics management is particularly important. Place utility is the value created or added to a product by making it available for purchase or consumption in the right place. Logistics is directly responsible for adding place utility to products as it efficiently moves raw materials, in-process inventory, and finished goods from point-of-origin to point-of-consumption. Time utility is the value created by making something available at the right time. Products are not as valuable to customers if they are not available precisely when they are needed. Possession utility is the valued added to a product by allowing the customer to take ownership of the item. Possession utility is not a result of logistics, but the offering of credit, quantity discount, and delayed payments which enable the customer to assume possession of the product. The logistics and marketing processes culminate in possession utility.

During the 1950s a number of successful companies formulated and adopted the marketing concept, including General Electric, Procter & Gamble, IBM, McDonald's, Quaker Oats, General Foods, United Airlines, and Whirlpool Corporation. The marketing concept is the "marketing management philosophy that holds that achieving organizational goals depends on determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than competitors". In other words, the customer is the boss!

As part of the company's marketing effort, logistics plays a key role in satisfying the firms' customers and achieving a profit for the company as a whole. Figure 2.3 represents the marketing concept from the perspective of logistics management. Customer satisfaction involves maximizing time and place utility to the firms' suppliers, intermediate customers, and final customers. Logistics' ability to provide customer service, coupled with marketing's skill in generating and completing sales, create an acceptable level of customer satisfaction, which can lead to a differential advantage in the marketplace. Integrated effort requires that the company coordinate its marketing activities (product, price, promotion, and distribution) to achieve synergistic results; the total should be greater than the sum of its parts. The key to true integration is the "total cost concept", which examines the cost trade-offs that occur between and within the marketing and logistics activities. The final component of the marketing/logistics management concept — company profit — recognizes the need to achieve an acceptable level of long-term profits. From a financial perspective, the optimal means of achieving this profitability may be to minimize total logistics costs while providing the level of customer's service dictated by the firm's overall marketing strategy and the expectations of customers.

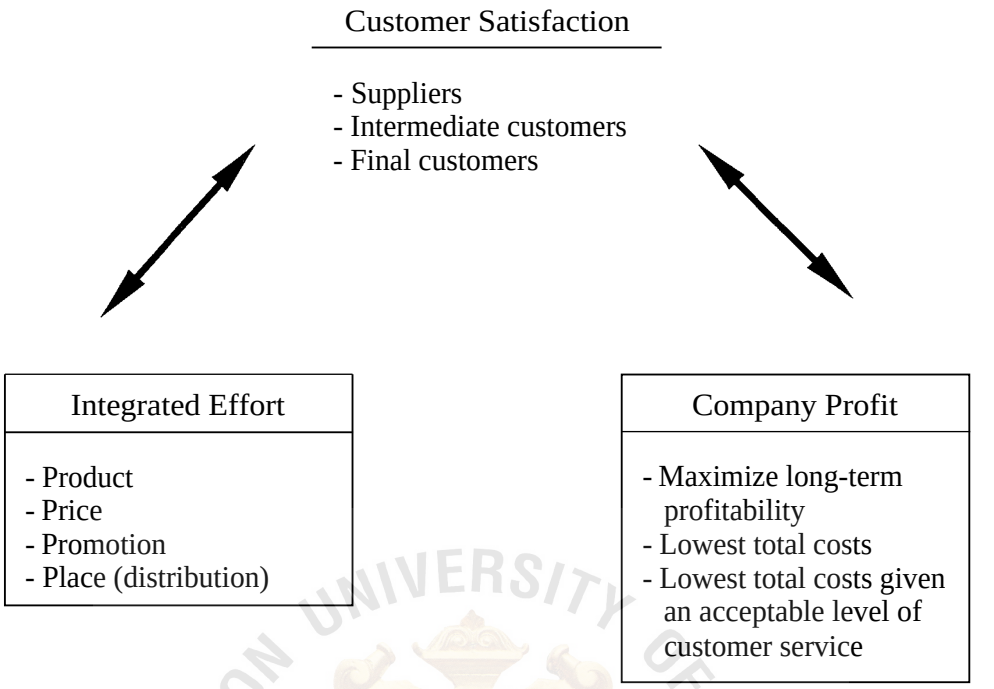

Figure 2.3. Marketing/Logistics Management Concept (Lambert and Stock 1999).

2.4 Importance of Logistics

Ballou (1999) said that logistics is about creating value-value for customers and suppliers of the firm, and value for the firm's stakeholders. Value in logistics is expressed in terms of time and place. Products and services have no value unless they are in the possession of the customers when (time) and where (place) they wish to consume them. Good logistics management views each activity in the supply chain as contributing to the process of adding value. However, value is added when customers are willing to pay more for a product or service than the cost to place it in their hands. To many firms throughout the world, logistics has become an increasingly important value-adding process for a number of reasons.,

Ballou (1992) said that traditional representation of physical distribution costs as a percent of sales may provide a deceptive picture of cost trends. Some surveys show that

physical distribution costs as a percent of sales have declined between 1980 and 1988. Although there may be some variation in the results due to sampling techniques or shifts in the costs of various activities on a year-to-year basis, the results may well indicate that physical distribution costs continue to rise. Declining costs as a percent of sales simply may reflect price levels increasing faster than costs.

Over the years a number of studies have been conducted to determine the costs of logistics for the economy and for the individual firm. There have been widely varying estimates as to the cost levels. According to the International Monetary Fund, logistics costs average about 12% of the world's gross domestic product. For the firm, logistics costs have ranged from 4 to over 30% of sales. However, we estimate logistics costs, they are substantial for most firms, ranking second only to the cost of goods sold (purchase costs). Value is added by minimizing these costs and passing the benefit to the consumers and to the firm's shareholders. Also another one is an inventory carrying costs of acquisition, that is, the costs incurred in entering an order, and the cost of possession. The obvious costs of possession are space costs obsolescence, breakage, pilferage, spillage, taxes and insurance. To these costs should be added the factor of capital tied up in inventory. If a company is earning of 20% on assets employed in its business, then it might charge 20% for the funds invested in inventory. Some firms include an additional cost for lack of liquidity of such capital. The relative importance of these costs will vary among industries and for specific inventory items. Examples of components logistics cost are shown in Table 2.1.

Table 2.1. Components of 1990 Logistics Cost (Delaney 1991).

	$ (billion)
Inventory carrying costs	
Interest	$66
Taxes, obsolescence, depreciation	84
Warehousing	61
Subtotal	$211
Transportation costs	
Motor carries:	
Public and for hire	$77
Private and for own account	87
Local freight sources	113
Subtotal	$277
Other carriers:	
Railroads	$32
Water Carriers	21
Oil pipelines	9
Air carriers	13
Subtotal	$75
Shipping related cost	4
Distribution related costs	23
Total logistics cost	$600

Logistics Adds Time and Place Utility

Manufactured products posses some value or utility because an assembled item is worth more than its unassembled components or raw materials. A completed automobile, for example, is much more valuable to a consumer than its unassembled parts. This value, or utility, of making materials available in a completed state is called form utility. To the consumer, however, the product not only must have form utility, but it also must be in the right place, at the right time, and be available to purchase. The value added to products beyond that added by manufacturing (form utility), is called

place, time, and possession utility. The logistics activity provides place and time utility, while marketing provides possession utility.

Management is quite concerned with the "value added" by logistics, because improvements in place and time utility are ultimately reflected in the firm's profits. Cost savings in logistics or a stronger marketing position due to an improved logistics system can both cause improved bottom line performance. In firms where logistics contributes a significant portion of the "value added" to a product, logistics management is particularly important.

Place Utility is the value created or added to a product by making it available for purchase or consumption in the right place. Logistics is directly responsible for adding place utility to products as it efficiently moves raw materials, in-process inventory, and finished goods from point-of-origin to point-of-consumption.

Time utility is the value created by making something available at the right time. Products are not as valuable to customers if they are not available precisely when they are needed. For example, a food processing company must have raw materials (food items), packaging materials, and other items available before the production process begins — or, if already begun, before existing supplies run out. Failure to receive these items at the proper time can cause costly production shutdowns and place the firm in a disadvantageous competitive position. Logistics activities combine to add place and time utility to products.

Possession utility is the value added to a product by allowing the customer to take ownership of the item. Possession utility is not a result of logistics, but the offering of credit, quantity discounts, and delayed payments which enable the customers to assume possession of the product. The logistics and marketing processes culminate in possession utility.

2.5 Activities Included in Logistics Management

The following varieties of activities are involved in the flow of product from point-of-origin to point-of-consumption:

(1) Customer service

(2) Order procession

(3) Distribution communications

(4) Inventory control

(5) Demand forecasting

(6) Traffic and transportation

(7) Warehousing and storage

(8) Plant and warehouse site selection

(9) Material handling

(10) Procurement

(11) Parts and service support

(12) Packaging

(13) Salvage and scrap disposal

(14) Return goods handling

Customer Service

A pioneering study that examined the state of the art of customer service in major corporations defined customer service as a customer-oriented philosophy, which integrates, and managers all of the elements of the customer interface within a predetermined optimum cost-service mix. Customer service acts as the binding and unifying force for all of the logistics management activities. Customer satisfaction, of which customer service is an integral part, occurs if the firm's overall marketing effort is successful. Each element of a firm's logistics system can effect whether a customer

receives the right product at the right place in the right condition for the right cost of the integrated logistics management concept in order to provide the necessary level of customer satisfaction at the lowest possible total cost.

Order Processing

"Order processing may be compared to the human body's central nervous system, triggering the distribution process and directing the actions to be taken in satisfying order demand." The components of the order processing activity may be broken down into three groups: (1) operational elements, such as order entry/editing, scheduling, order-shipping set preparation, and invoicing; (2) communication elements, such as order modification, and order status inquiries; and (3) credit and collection elements, including credit checking and accounts receivable processing / collecting. The speed and accuracy of a firm's order processing has a great deal to do with the level of customer service the company providers. Advanced system can reduce the time between order placement and shipment from a warehouse or storage facility. In many cases order are transmitted from the buyer's computer to the vendor's computer. Advanced systems, although initially expensive to the company, can substantially improve both order processing accuracy and order response time. Often, savings in other logistics expenses (such as inventory, transportation, and/or warehousing) or increased sales from improved customer service will justify the cost of the system.

Distribution Communication

Success in today's business environment requires the management of a complex communications system. Effective communication must take place between: (a) the firm, its customers and its suppliers; (b) the major functional components of the company — marketing, manufacturing, logistics, and finance / accounting; (c) the various logistics-related activities such as customer service, traffic and transportation,

warehousing and storage, order processing, and inventory control; and (d) the various components of each logistics activity. (Within inventory control, for example, would be in-plant inventory, inventory in transit, and inventory in field warehouse.) Communication is the vital link between the entire logistics process and the firm's customers. Accurate and timely communication is the cornerstone of successful logistics management.

A firm's communications system may be as sophisticated as a computerized management information system (MIS) or a simple as word-of-mouth communication between individuals. Whatever the system, vital information must be available and communicated to individuals who "need to know."

Inventory Control

The inventory control activity is critical because of the financial necessity of maintaining a sufficient supply of product to meet both customers' needs and manufacturing requirements. Maintaining raw materials, parts, and finished goods inventory consumes both space and capital. Money tied up in inventory is not available for use elsewhere. It is sufficient to note that inventory carrying costs can range from 14 to over 50 percent, depending on the product. Successful inventory control involves determining the level of inventory necessary to achieve the desired level of customer service while considering the cost of performing other logistics activities.

Demand Forecasting

Demand forecasting involves determining the amount of product and accompanying service that customers will require at some point in the future. The need to know precisely how much product will be demanded is important to all facets of the firm's operations — marketing, manufacturing, and logistics. Marketing forecasts of future demand determine promotional strategies, allocation of sales force effort, pricing

strategies, and market research activities. Manufacturing forecasts determine production schedules, purchasing and acquisition strategies, and in-plant inventory decisions.

Logistics management forecasts of demand determine how much of each item produced by the company must be transported to the various markets the firm serves. Also, logistics management must know where the demand will originate so that the proper amount of product can be placed or stored in each market area. Knowledge of future demand levels enables logistics managers to allocate their resources (budgets) to activities that will service that demand. Decision making under uncertainty is less than optimal in most cases because it is extremely difficult to allocate resources among logistics activities without knowing what products and services will be needed. Therefore it is imperative that the firm undertake some type of demand forecasting and communicate the results to the marketing, manufacturing, and logistics departments. Sophisticated computer models, trend analysis, sales force estimates, or other methods can help develop such forecasts.

Traffic and Transportation

One major component of the logistics process is the movement or flow of goods from point-of-origin to point-of-consumption—and perhaps their return as well. The traffic and transportation activity refers to managing the movement of products and includes activities such as selecting the method of shipment (air, rail, water, pipeline, truck); choosing the specific path (routing); complying with various local, state, and federal transportation regulations; and being aware of both domestic and international shipping requirements.

Transportation is often the single largest cost in the logistics process. Therefore, it is an important component that must be managed effectively.

Warehousing and Storage

Products must be stored at the plant or in the field for later sale and consumption unless customers need them the instant they are produced. Generally, the greater the time lag between production and consumption, the larger the level or amount of inventory required. Warehousing and storage are activities that manage the space needed to hold or maintain inventories. Specific storage activities include decisions as to whether the storage facility should be owned, leased, or rented; warehouse layout and design; product mix considerations; safety and maintenance; security systems; personnel training; and productivity measurement.

Plant and Warehouse Site Selection

Whether facilities are owned, leased, or rented, the location of plants and/or warehouse (storage facilities) is extremely important. The strategic placement of plants and warehouses near the company's markets can improve the firm's customer service levels. Proper facility location can also allow lower volume-related transportation rates in moving product from plant to warehouse, plant to plant, or warehouse to customer.

The first consideration in selecting a site is the location of the firm's various markets. The needs of the customers and the location of raw materials, component parts, and subassemblies are also major considerations, for the company must be concerned with inbound movement and storage of materials in addition to outbound flows. Other important factors include labor rates; transportation services; city, country, and state taxes; security; legal concerns; local factors, such as the attitude of the community toward new industry; land cost; and availability of utilities.

Material Handling

Material handling is concerned with every aspect of the movement or flow of raw materials, in-process inventory, and finished goods within a plant or warehouse. The

objectives of material handling are (1) to eliminate handling wherever possible; (2) to minimize travel distance; (3) to minimize goods in process; (4) to provide uniform flow free of bottlenecks; and (5) to minimize losses from waste, breakage, spoilage, and theft.

A firm incurs costs every time an item is handled. Since handling generally adds no value to a product, these operations should be kept to a minimum. For items with low unit value, the proportion of material handling costs to total product cost can be significant. "Poor material handling can lead directly to lost or damaged products, customer dissatisfaction, production delays, and idle employees and equipment. [Material handling] plays a vital role in reducing inventory, lowering costs, and increasing productivity.

Procurement

Every company relies to some extent on materials and services supplied by other firms. The great majority of U.S. industries spend from 40 to 60 percent of their revenues for materials and services from outside sources. *Procurement* is the acquisition of materials and services to ensure the operating effectiveness of the firm's manufacturing and logistics processes. The procurement function includes the selection of supply source locations, determination of the form in which the material is to be acquired, timing of purchase, price determination, quality control, and many other activities. The changing economic environment of recent years, marked by wide variations in availability and cost of materials, has made procurement even more important in the logistics process.

Parts and Service Support

In addition to the movement of raw materials, in-process inventory, and finished goods, logistics must be concerned with the many activities involved in repair and

servicing of products. Logistics' responsibility does not end when the product is delivered to the customer. Part of the firm's marketing activity is to provide the customer with service after the sale. This involves providing replacement parts when products break down or malfunction. Automobile dealerships, for example, must have efficient service departments that offer complete servicing and auto repair. Adequate supplies of spare and replacement parts are vital to the service and repair activity—and logistics is responsible for making sure those parts are available when and where the customer needs them. In the industrial marketplace, where the product may be a piece of manufacturing equipment, downtime can be extremely costly to the customer if product failure results in a production-line slowdown or shutdown. The firm supplying the spare or replacement part must be able to respond quickly and decisively. Adequate parts and service support is extremely important whenever post-sale support is part of the firm's marketing effort.

Packaging

Packaging performs two basic functions—marketing and logistics. In a marketing sense, the package acts as a form of promotion or advertising. Its size, weight, color, and printed information attract customers and convey knowledge about the product. From a logistics perspective, packaging serves a dual role. First, the package protects the product from damage while it is being stored or transported. Second, packaging can make it easier to store and move products by reducing handling and thereby material handling costs. When firms are involved in international marketing, packaging becomes even more important. Products marketed in foreign countries travel greater distances and undergo more handling operations—and handlings may occur under conditions much less favorable than in the United States. In many countries, management must deal with a lack of adequate material handling equipment and must rely on poorly

trained personnel. In general, domestic packaging is not strong enough to withstand the rigors of export shipment.

Salvage and Scrap Disposal

One by-product of the manufacturing and logistics process is waste material. If this material cannot be used to produce other products, it must be disposed of in some manner. Whatever the by-product, the logistics process must effectively and efficiently handle, transport, and store it. If the by-products are reusable or recyclable, logistics manages their transportation to remanufacturing or reprocessing locations.

Return Goods Handling

The handling of return goods, often referred to as *reverse logistics*, is an important part of the logistics process. Buyers may return items to the seller due to product defects, overages, incorrect items received, or other reasons. Reverse logistics has been likened to going the wrong way on a one-way street because the great majority of product shipments flow in one direction. Most logistics systems are ill-equipped to handle product movement in a reverse channel. In many industries in which consumers return products for warranty repair, replacement, or recycling, reverse logistics costs may be high. The cost of moving a product back through the system from the consumer to producer many be as much as nine times the cost of moving the same product from producer to consumer. Often the returned goods cannot be transported, stored, and/or handled as easily, resulting in higher logistics cost. Reverse logistics promises to become even more important as customers demand more flexible and lenient return policies and as recycling and other environmental issues become more significant.

2.6 Development of Logistics Management

To understand the important role of logistics management in today's business enterprise, it is worthwhile examining the historical development of the discipline.

Historical Development

Logistics was first examined in scholarly writing in the early 1900s; although as a human activity it is centuries old. John Crowell (1901) discussed the costs and factors affecting the distribution of farm products in the U.S. government's "Report of the Industrial Commission on the Distribution of Farm Products". Later, in his "An Approach to Business Problems" (1916), Arch Shaw discussed the strategic aspects of logistics. During that same year, L.D.H. Weld introduced the concepts of marketing utilities (time, place, possession) and channels of distribution. In 1922, Fred Clark identified the role of logistics in marketing. And in 1927 the term *logistics* was defined in a way similar to its use today.

With the onset of World War II, logistics was further developed and refined. Used in conjunction with a new corporate philosophy that originated in the 1950s—"the marketing concept"—logistics came to be associated to an even greater degree with the customer service and cost components of a firm's marketing efforts.

A 1956 study of the economics of air freight added an additional dimension to the field of logistics. The study introduced the concept of *total cost analysis.* Air freight is a high-cost form of transportation. However, air freight, when used instead of other modes of transportation, could result in lower inventory and warehousing cost because a firm distributes directly to its customers.

The 1960s saw a number of developments in logistics. In 1961 Edward Smykay, Donald Bowersox, and Frank Mossman wrote one of the first texts on logistics management. The book examined logistics from a systems or companywide perspective and discussed the total cost concept. The Council of Logistics Management (formerly the National Council of Physical Distribution Management) was formed in 1963 "to develop the theory and understanding of the [logistics] process, promote the art and

science of managing [logistics] systems and to foster professional dialogue and development in the field operation exclusively without profit and in cooperation with other organizations and institutions.

During the remainder of the 1960s and into the 1980s, a multitude of textbooks, articles, monographs, journals, and conference were devoted to the subject of logistics management. One of the earliest writings to examine the connection between accounting and logistics was Michael Schiff s Accounting and Control in Physical Distribution Management, published in 1972. The study was instrumental in creating an awareness that accounting and financial information are vital to the logistics activity. In 1976, LaLonde and Zinzer published their landmark study, Customer Service: Meaning and Measurement, the first detailed exploration of the topic of customer service. As part of the marketing concept, customer satisfaction requires a complete understanding of customer service. Two years later, in 1978, A.T. Kearney, Inc., under the sponsorship of the Council of Logistics Management, examined logistics productivity. The state-of-the-art appraisal of this important aspect of logistics was entitled Measuring Productivity in Physical Distribution. These studies continue to influence the logistics profession.

Beginning in the late 1970s and continuing throughout the 1980s, logistics managements were significantly affected by deregulation of the transportation industry. The Airline Deregulation Acts of 1977 and 1978, Stagers Rail Act of 1980, Motor Carrier Act of 1980, and Shipping Act of 1984 removed or modified the existing economic sanctions on air, rail, motor, and ocean transport, respectively. The impact on carriers and shippers has been profound. In the case of carries, deregulation has resulted in increased competition; greater pricing freedom (i.e., establishing and modifying rates); more flexibility in routing and scheduling; and increased need to become marketing oriented; and a need to be creative in terms of marketing mix offerings.

Shippers have more carriers from which to choose. New and varied types of service are now available. Most rates are now negotiated and involve long-term agreements. Service levels provided by carries vary widely depending on the origin/destination combination.

Computer technology and distribution software are two other factors that have caused businesses to become more interested in logistics management. The development of computer technology, particularly the microcomputer, has allowed executives to manage and implement logistics management much more effectively and efficiently. Firms can become much more cost efficient because of the speed and accuracy of the computer; they can use sophisticated techniques (e.g., MRP, MRPII, DRP, DRPII, Kanban, and Just-in-time) to manage and control activities such as production scheduling, inventory control, order processing, and others. In fact, such advances, and the resulting impact on the firm's marketing, production, and financial activities, have been instrumental in creating top management awareness of logistics. Beginning in the 1970s and accelerating in the 1990s has been the development of expansion of global competition. Firms have increasingly become more international, as evidenced by the increase in foreign sourcing of raw materials, component parts, subassemblies, and labor. Companies have penetrated new markets throughout the world. For example, the Unities States became an attractive marketing opportunity for many Asian and European firms producing automobiles, electronics, and computers in the 1970s and 1980s. Similarly, markets in Western Europe (as a result of Europe 1992), China, the Soviet Union, and Eastern Europe are increasingly becoming significant markets for companies producing a variety of goods and services. Enterprising firms throughout the world have recognized the need to become more

globally oriented. In many instance, companies have discovered that their international markets exhibit higher growth rates and sales volumes than domestic markets.

Factors Underlying the Development of Interest in Logistics Management

A number of factors underlie the recognition of the importance of logistics management. Among the most important factors are advances in computer technology and quantitative techniques; development of the systems approach and total cost analysis concept; recognition of logistics' role in the firm's customer service program; erosion of many firms' profits because of their failure to examine functional areas where cost saving might be realized; profit leverage resulting from increased logistics efficiency; general economic conditions since the 1950s; and recognition that logistics can help create a competitive advantage in the marketplace.

In addition to the logistics expense of the firm, the profit squeeze and potential profit leverage that can result from increased efficiency in logistics have contributed significantly to the development of interest in logistics management. During the 1970s and 1980s many firms found it increasingly difficult to maintain traditional profit levels and growth rates because of increasing domestic and foreign competition, saturated markets, government regulation, and other factors.

A company can pursue three basic strategies in a "profit squeeze" situation. First, it can attempt to generate additional sales volume through increased marketing efforts. For many firms, however, this may be very difficult and costly. Incremental sales increases in saturated or highly competitive markets are hard to achieve. In low-growth markets, the rate of growth may be less than the firm needs to generate additional sales. Even in high-growth market situations, a firm may be unable to achieve desired sales increases because of resource problems, competition, and other market conditions. A second way to improve profitability may be to increase prices of the firm's products.

Again, such increases may not be possible given market conditions. Depending on price elasticity of demand, price increases may not have the desired impact on sales. Typically firms hesitate to increase prices unless higher costs of materials, production, or labor make those increases unavoidable. Therefore a third strategy, that of reducing the firm's costs of doing business, has been the one most companies have had to follow.

As firms looked inward, they attempted to identify areas for cost savings and/or productivity increase. Three basic areas of a firm's operations are (1) manufacturing, (2) marketing, and (3) logistics. Many companies find it difficult to reduce costs in manufacturing and marketing. However, many firms engaged in manufacturing are already mechanized and highly efficient. They can increase productivity to reduce the cost of manufacturing, but the incremental costs of this approach can be quite high. There are some industries where significant production efficiencies are being achieved, but this is not the case in many others. In the marketing area, there are often elements management can reduce and/or make more cost-effective. However, many firms are unwilling to reduce marketing activities, especially advertising, fearing an adverse reaction in the market place. Companies that market consumer products in highly competitive industries (e.g., Procter & Gamble, Lever Brothers, General Motors, Ford, McDonald's, and Burger King) typically hesitate to reduce marketing expenditures. In fact, they usually increase the size of their gross marketing budges each year.

In most firms, logistics is the most promising area in which to achieve significant cost savings. And in some instances, such cost savings can have a far greater impact on the firm's profitability than increasing sales volume.

During the 1960s a large appliance firm found that its logistics activities were not integrated under a single logistics executive, but were dispersed throughout the organization. Some logistics elements fell under the jurisdiction of manufacturing,

others under marketing or finance. Top management discovered that the company was spending almost $20 million on logistics activities, yet no one was managing it as a major cost center. The firm created a senior-level logistics executive position and placed all logistics activities under that individual. The elimination of duplicate activities, better control, and increased management attention to the logistics activity resulted in a cost savings of approximately $10 million dollars during the first year of full implementation. The savings had a sizable impact on profitability—one that the firm could not have achieved by an equivalent level of additional sales. Factors such as competition, market growth rates, and company resources would have precluded any significant sales increases. "The profit leverage argument makes a persuasive argument to management for reviewing cost reduction opportunities available from integrated [logistics] management.

2.7 Operationalizing a Logistics Management Systems

Logistics management approaches will vary depending on the , specific characteristics of the company and its products. While the exact organizational structure will differ by company, it is important that the logistics system be as efficient as possible from a cost and service perspective.

In the face of higher costs of operation and increasing pressures from customers for better service, the logistics organization must evolve and change to meet the challenge. Understandings of the factors that make organizations effective and knowledge of how those factors interrelate are the first steps toward developing an optimal logistics system in a company.

Whatever logistical system is selected by a firm—and there are many—the system must be flexible; that is, can the system handle the non-ordinary? A study of major U.S. manufacturers, wholesalers, and retailers revealed that logistics system flexibility was

extremely important to customers. Those firms considered by the industry to be logistics leaders, referred to as "leading edge" companies, place a premium on flexibility. Areas or activities where logistics flexibility is most important include special customer service requests, product introductions, and phase-outs, supply distributions, computer breakdowns, product recalls, and customization of service levels to specific markets or customers.

2.8 Future Challenges

Logistics professionals will face many complex challenges in the next decade. Future challenges will be significant in the areas of strategic planning, the use of logistics as an offensive marketing weapon, distribution accounting, the need for broader-based management skills, use of third parties, global logistics, strategic alliances and partnerships, and technology.

Strategic Planning

Activities such as customer service, budgeting and control of the logistics function, inventory control, and positioning of inventories have become important components of a firm's strategic planning process. Many companies, such as Ford, Quaker Oats, Whirlpool, Nabisco Brands, and Fleming Companies, have realized that a good logistics system can result in improved market share, higher levels of profitability, and competitive advantage.

Charles W. Smith, a marketing consultant, past president of the American Marketing Association, and former director of distribution planning and research for Nabisco, has commented: Today, many people in top marketing management are asking questions directed not so much at the level of distribution costs, but towards strategies for providing the kind of delivery service and market coverage that is needed to maintain and increase market share profitability. This new attitude towards distribution

reflects awareness on the part of top management that what is done to strengthen a company's distribution system may well determine not only its profitability but also its very survival.

An example of a firm that has successfully integrated logistics into the strategic planning process is 3M Canada. In 1987, the president challenged the logistics function to more fully participate in helping the firm achieve its corporate profitability objectives. As a result, a new logistics mission statement was developed; more complete integration of activities was established between logistics, marketing, and manufacturing; and higher levels of productivity were achieved.

Indeed, the future success of a company will be affected by the degree to which logistics becomes integrated into the firm's strategic planning process.

As an example, logistics has become a very important part of the strategic planning process for U.S. firms applying for the prestigious Malcolm Baldrige National Quality Award. The award, managed by the U.S. Department of Commerce, recognizes companies that have attained a high level of excellence and competitive advantage in domestic and world marketplaces.

Logistics plays a pivotal role in a firm's "winning" the Baldrige award. Thirty percent of the points used in granting the award is based on customer satisfaction. Logistics, through creation of customer service, contributes significantly to marketing's ability to satisfy customers. Without a good logistics system, it is unlikely that a firm could satisfy customers sufficiently enough to win a Baldrige award. The "Customer Focus and Satisfaction" category examines the company's knowledge of the customer, overall customer service systems, responsiveness, and ability to meet requirements and expectations. Without a good logistics system, coupled with the inclusion of logistics in the strategic planning process, a firm cannot hope to score well in this important area.

2.9 Logistics as an Offensive Marketing Weapon

Logistics can be a source of competitive advantage for a firm just like a good product, promotion, and pricing strategy. "Distribution can be used as the primary reason why the target market will purchase, and distribution can be designed as a unique offering not duplicated by competition.

Several high-ranking logistics executives concurred that never before had logistics been in a better position to build profits for companies. As stated by C. Lee Johnson, president of Limited Distribution Service (formerly senior vice president of operations for Beatrice Foods Company): "Although the distribution function over the years has proven that it can reduce costs, it can also produce revenues. We're working on the theory that effective distribution can provide us with a competitive advantage."

In 1990, 3M surveyed 18,000 European customers in 16 countries. Respondents agreed that on-time delivery, short lead times, product delivered in good condition, and effective handling of problems were important to a firm attempting to increase customer satisfaction and sales. "Today, in an era of shrinking product life cycles, proliferating product lines, shifting distribution chains, and changing technology, mastery of [logistics management] has become an essential ingredient of competitive success." Companies that view logistics as an offensive marketing weapon will likely make logistics an integral part of their business strategy.

Distribution Accounting

Integrated logistics management is based on total cost analysis. That is, at a given customer service level, management should minimize total logistics costs rather than attempts to minimize the cost of individual activities.

In general, accountants have not kept pace with developments in logistics and have shown relatively little interest in the area. Consequently, the necessary cost data

have not been available, and the lack of data has prevented firms from achieving least total cost logistics. The availability of logistics cost information should be a primary concern of management. Developing logistics cost information for decision making and control is one of the most critical tasks many firms face.

Full implementation of integral logistics is based on total cost analysis, and the true potential will not be reached until the required cost information is made available to decision makers. There is a considerable gap between the amount of cost information required and its availability in most firms. Overcoming these limitations will be a significant challenge. The future potential of the integrated logistics management concept depends on the ability to obtain the necessary accounting information. Additionally, while many firms are utilizing profitability (full cost) and contribution reports, the quality of those reports varies widely. In a study of manufacturing companies it was reported that 84 percent of the firms generated reports of questionable accuracy. It is not sufficient merely to have distribution accounting systems in place; rather, accurate and timely reports must be generated from such information and given to executives who have a "need to know". Only then can the optimal logistics cost trade-offs be made.

Global Logistics

An increasing number of companies are becoming involved in international markets through exporting, licensing, joint ventures, and ownership. This trend should continue. With this expansion into global marketing comes a need to develop worldwide logistics networks. The international logistics executive will have to acquire a wide range of skills not needed in domestic logistics—skills in areas such as international finance, documentation, political science, and foreign business practices and customs.

As the firm expands internationally, the concepts of integrated logistics management and total cost trade-off analysis become even more complex and difficult to manage.

In the future, several trends or events are expected to occur that will have an impact on those firms already involved in international logistics or those companies anticipating such involvement. These items include the following: (1) an increasing number of logistics executives with international responsibility and authority. (2) Expansion of the number and size of foreign and trade zones. (3) Reduction in the amount and increased standardization of international paperwork a documentation, especially the bill of lading. (4) Increasing utilization of foreign warehousing owned and controlled by the exporting firm. (5) Increasing number of smaller firms engaging in exporting with larger firms utilizing licensing, joint venture, or direct ownership in lieu of exporting to foreign markets. (6) Domestically, especially in the United States, a trend toward foreign ownership of logistics service firms, for example, public warehousing and transportation carriers. And (7) Increasing vertical integration of the channel of distribution, and including channel members from several different countries (especially in the acquisition of foreign sources of supply for certain raw materials).

As firms identify customer markets in foreign countries, they must establish logistics systems to provide the products and services demanded. The single most significant development in international logistics will be the increasing sophistication and expertise of global logistics executive and depaitments.

Technology

Technology has had an impact on all facets of business, but in the logistics area the impact has truly been significant. The diffusion of technology is changing the way companies do business and they way firms relate to customers and suppliers. Computers, information systems, and communication systems are being increasingly

used in transportation, warehousing, order processing, materials management, purchasing, and procurement. Literally, every area of logistics has been affected by the technological revolution and the developments in computers and information and communication systems.

Traditional methods of managing logistics activities are proving inadequate in today's fast-paced economy, and executives have been forced to innovate. If firms do not respond appropriately, they may face losses in market share, creating for themselves positions of competitive disadvantage. Fortunately, assistance is available due to recent innovations and developments in technology.

In a Council of Logistics Management (CLM) study of senior executives in manufacturing, merchandising, and logistics service organizations, "Logistics 1995" several trends occurring in logistics were identified. The top tree trends were all directly related to the use of computers, communications system, and information systems:

(1) The rapid proliferation of data processing systems enables the distribution or logistics organization to handle and control information in ways that will change the traditional methods of servicing customers and supplying products.

(2) Advances in computer technology will allow electronic data interchange to be pervasive by 1995. All phase of logistics will be involved, and communication technology will create opportunities for large savings.

(3) The major difference between the logistics operating environment of 1995 and that of today will be the improvement in the timeliness and completeness of the exchange of information between channel members.

2.10 Why Should Logistics Activities Be Integrated?

During the past 30 years, logistics has emerged as a separate and dynamic discipline. Many major corporations have acknowledged the importance of logistics by placing responsibility for this function at the vice presidential level. Basically, the integrated logistics management concept refers to administering the various activities as an integrated system. In firms that have not adopted a system integrative approach, logistics is a fragmented and often uncoordinated set of activities spread throughout various organizational functions with each individual function having its own budget and set of priorities and measurements. A number of firms, including Herman Miller, Quaker Oats, and Whirlpool Corporation, have found that total distribution cost s can be reduced by integrating such distribution-related activities as customer service, transportation, warehousing, inventory management, order processing and information systems, and production planning and purchasing. Without this integrated approach, inventory tends to build up at the following critical business interfaces:

(1) Supplier-purchasing

(2) Purchasing-production

(3) Production-marketing

(4) Marketing-distribution

(5) Distribution-intermediary (wholesaler and/or retailer)

(6) Intermediary-consumer/user

A manufacturing environment inventory commonly builds up these interfaces for the following reasons:

(1) Purchasing management is often rewarded for achieving low per unit costs for raw materials and suppliers.

(2) Production management is usually compensated for achieving the lowest possible per-unit production cost.

(3) Salespeople like to have market presence by positioning large inventories of product in the field and as close to the customer as possible. This makes it possible for salespeople to offer the fastest possible order cycle time and to minimize the difficulties associated with forecasting customers' needs.

(4) In some companies transportation is the only logistics cost that is closely monitored. With transportation rates rising because of higher energy costs, higher labor costs, and higher rates for small shipments due to deregulation, transportation managers have more incentive to ship products by truckload or by railcar in order to obtain lower rates. Generally, these large shipments of products require increased inventories at both the origin and destination—for example, at the manufacturer and at the wholesaler/retailer.

(5) Both consumers/users and intermediaries may attempt to reduce their inventories by purchasing more frequently, thereby forcing inventories and the associated carrying costs back toward the manufacturer. This is particularly true in times when intermediaries are concerned with cash flow management.

In addition to improving the flow of inventory, integration improves transport asset utilization and warehouse utilization, and eliminates the duplication of departmental efforts. For example, rather than having the purchasing department negotiate with inbound carriers and the distribution department negotiate with outbound carriers, one organization can negotiate for both inbound and outbound transportation and plan the shipments to offset high-volume inbound shipments with high-volume outbound shipments to the same geographic areas. The central coordination of the

various logistics activities forces cost trade-offs to be made between and among customer service levels, transportation, warehousing, inventory management, order processing, and production planning and/or purchasing.

2.11 Logistics and Marketing Function

The importance of a marketing orientation for business success has been well documented. How management allocates scarce resources to the components of the marketing mix—product, price, promotion, and place—will determine a company's market share and profitability. Management can improve a firm's competitive position by spending more dollars on the marketing mix, by allocating resources more effectively and efficiently to the individual components of the marketing mix, and/or by making changes within a component that will increase effectiveness and/or efficiency. Figure 2.4 summarizes the cost trade-offs that management must make. The objectives is to allocate resources to the product, price, promotion, and place components of the marketing mix in a manner that will lead to the greatest long-run profits.

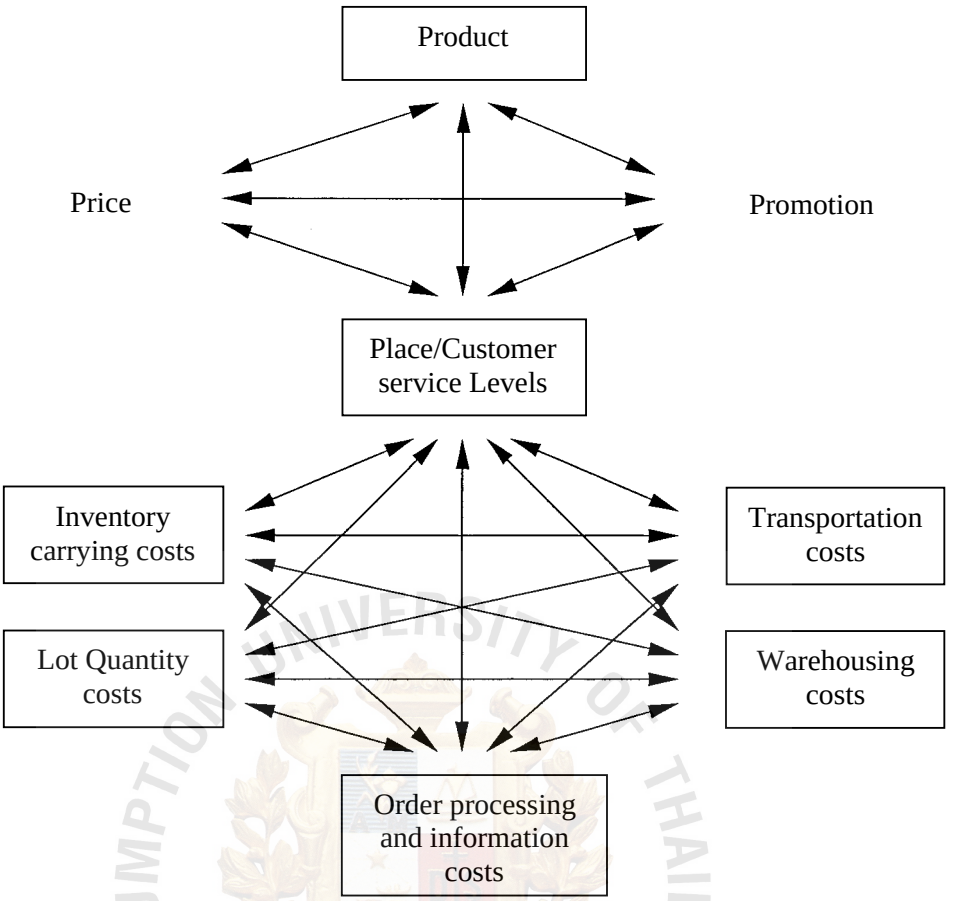

Figure 2.4. Cost Trade-Offs Required in Marketing and Logistics (Lambert and Stock 1999).

Product is the bundle of attributes the customer receives from the purchase. Management may allocate resources to product development to bring new products to market or to improve the quality of existing products. The quality of the product influences demand in the marketplace and the price the company can change. Reducing quality lowers manufacturing costs and increases short-run profits but may erode long-run profitability. In the global marketplace, all major competitors will be required to have high-quality products. To quote a senior vice president of a Fortune 500 firm: "A high-quality product is simply the price of admission; the Japanese competitors all have

high-quality innovative product. It is very difficult if not impossible to differentiate the firms based on the product.

In some industries, success depends on spending substantial sums on research and development to bring a continuous stream of new products to the marketplace. However, many new products are nothing more than product line extensions that do little to increase total market size but do increase the cost of doing business. In these situations, the market is simply carved up into smaller and less profitable pieces. Management must carefully consider the profit impact of changes in the product offering.

Price is the amount of money the manufacturer receives for its product. Management must determine how changes in price will affect the purchase behavior of intermediaries and ultimate consumers. Price changes are not limited to changes in a product's list price. When a manufacturer demands faster payment of accounts receivable, provides a discount for early payment, or otherwise changes the financial terms of sale, it is changing the price of its products, and such changes may affect demand. The price that the manufacturer receives for its products differs depending on the channel of distribution used.

Management may attempt to increase sales and profitability by reducing prices. However, in mature industries this is a questionable strategy. For example, if a firm's net profit after taxes is 4 percent of sales, a 2 percent price reduction will lower net profit after taxes from 4 percent to 3 percent in the absence of an increase in sales. A substantial sales increase is required just to break even and maintain the 4 percent profit. Achieving the necessary sales increase in a mature market is very difficult. Typically, competitors will match price reductions, and every firm will then make less profit because industry sales increase very little or not at all.

Promotion refers to both advertising and personal selling. Increasing expenditures for advertising will increase sale, but at some point additional advertising expenditures will not increase sales enough to justify the expenditure. The amount of sales support required depends on the channel of distribution used. For example, manufacturers that use direct sales have to spend more on salespeople. The size of the sales force influences the size of potential market and the manufacturer's market share. To justify the additional expense, however, increased expenditures for promotion must lead to an equal to greater increase in contribution as a result of increase sales. In many industries there is an opportunity to use personal selling more effectively by training salespeople to sell the value-added that is provided by excellent logistics.

The **place** component represents the manufacturer's expenditure for *customer service,* which can be thought of as the output of the logistics system. Customer service is the interface of logistics with marketing. While customer service is the output of the logistics system, *customer satisfaction* results when the company performs well on all components of the marketing mix. Product availability and order cycle time can be used to differentiate the product and may influence the market price if customers are willing to pay more for better service. In addition, manufacturers add logistics costs to product cost, so logistics costs may affect the market price set by the company.

For many firms customer service may be the best method of gaining a competitive advantage. The firm may be able to significantly improve its market share and profitability by spending more than competitors on customer service/logistics. By systematically adjusting the customer service package, however, the firm may improve service and reduce the total costs of logistics. When evaluating alternative customer service strategies, management's goal should be to maximize the firm's long-run profitability.

Increases in expenditures for the various components of the marketing mix require sales increases just to recover the additional cost. Most companies have limited resources and therefore must allocate these resources in a manner that will increase market share and profitability. Shifting marketing mix dollars to customer service from areas in which the money is not achieving sufficient sales may result in cost savings as well as improved customer service. The advantage of this method is that the contribution margin on resulting sales increases goes directly to the bottom line of the profit and loss statement. The impact on net profit is substantial because cost reductions to other components of the marketing mix offset the increased cost of customer service and it is not necessary to deduct the incremental contribution generated. Also, customer service improvements are not as easily duplicated by competitors as are changes in product, price, and promotion.

2.12 The Total Cost Concept

Total cost analysis is the key to managing the logistics function. Management should strive to minimize the *total* cost of logistics rather than the cost of each activity. Attempts to reduce the cost of individual activities may lead to increased total costs. For example, consolidating finished goods inventory in a small number of distribution centers will reduce inventory carrying costs and warehousing costs but may lead to a substantial increase in freight expense or a lower sales volume as a result of reduced levels of customer service. Similarly, savings associated with large volume purchases may be less than the associated increase in inventory carrying costs. Management must consider the total of all of the logistics costs. Reductions in one cost invariably lead to increases in the costs of other components. Effective management and real cost savings can be accomplished only by viewing logistics as an integrated system and minimizing its total cost given the firm's customer service objectives. The cost categories are

customer service levels (the cost of lost sales), transportation costs, warehousing costs, order processing and information costs, lot quantity costs, and inventory carrying costs.

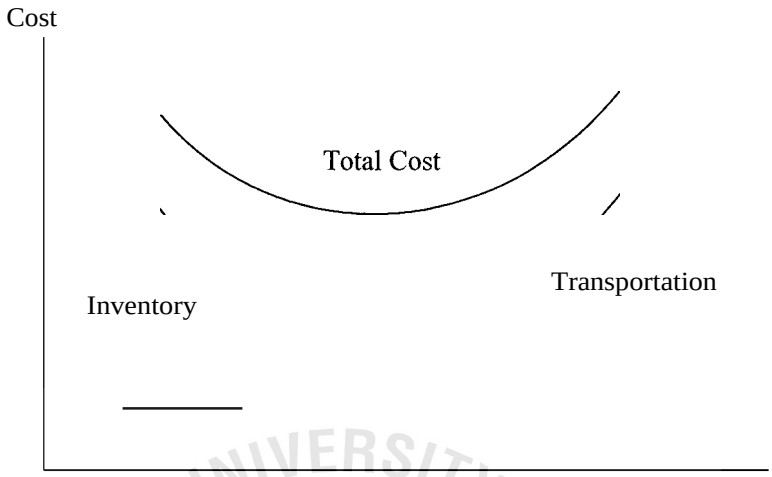

Figure 2.5. Total Cost Concept (Ballou 1999).

Customer Service Levels

The cost associated with alternative customer service levels is the cost of lost sales (not only the margin lost by not meeting current sales demand, but the present value of all future contributions to profit forfeited when a customer is lost due to poor availability, long lead times, or other service failures). Most businesspeople find it difficult, if not impossible, to measure this cost. For this reason, management should strive to minimize the total of the remaining five cost components, given a desired level of customer service. By comparing total logistics system costs, management can make a knowledgeable judgment about the likelihood of recovering, through increased sales, the increase in total system costs brought about by an increase in customer service levels. Of course, management could also reduce spending in some other component of the marketing mix—promotion, for example—in order to maintain profits with a similar sales volume. Likewise, with decreases in customer service levels, management can

improve profitability or increase expenditures for other components of the marketing mix in an effort to maintain or improve market position.

Though the cost of lost sales associated with a particular level of customer service is elusive, better decisions are possible if management determines customer service levels based on customer needs and an understanding of the interaction between customer service and the other marketing mix components. The goal is to determine the least total cost method of logistics while keeping customer service objectives in mind. This requires that good cost data be available for the other five cost categories in Figure 2.1. With this approach, the cost of achieving a specific customer service objective is the total cost of the logistics system that provides the desired level of customer service.

Transportation Cost

Costs associated with the transportation function can be identified in total and by segments (i.e., inbound, outbound, by vendor, by customers, by mode, by carrier, by product, or by channel). This detail is necessary to determine the incremental costs associated with changes in the logistics system. If transportation costs are not currently available in any other form, management can determine them at a relatively low cost by sampling product flows and auditing freight bills (for common carriers) or corporate accounting records (for private fleets).

Warehousing Costs

Warehousing costs are all the expense that can be eliminated or that must be increased as a result of a change in the number of warehousing facilities. There has been a great deal of confusion in the literature about these costs. Many authors have included all warehousing costs in inventory carrying costs. This is a misconception, however, since most warehousing costs will not change with the level of inventory stocked, but

rather with the number of stocking locations. However, the number of warehouses used in the logistics system will have an impact on the levels of inventory.

In the case of leased or owned facilities, the costs associated with storage are primarily fixed and take the form of step functions. Management would have to close the warehouse to eliminate the fixed costs. Costs such as labor have a fixed and a variable component. For example, a company may need one warehouse manager, an office worker, security guards, and a warehouse crew of four to maintain one warehouse location. If the volume of product moving into and out of the warehouse increases beyond a certain level, existing employees will be required to work overtime or additional employees will be hired. But these labor costs vary with the amount of product moving into and out of the warehouse and not with inventory levels. Sales volume will affect these variable costs, but inventory levels will have little or no effect.

Warehousing costs should be separated into two distinct categories: those related to throughput and those related to storage. Throughput costs are the costs associated with selling product in a given market by moving it into and out of a warehouse in that market and the fixed costs associated with the facility. Examples of throughput costs are the charges that public warehouse officer assess for moving product into and out of their facilities, and the costs of leased and owned facilities. Warehousing costs related to inventory storage should be included in inventory carrying costs. These warehousing costs change with the *level* of inventory held in a specific warehouse and tend to be negligible in a company-owned or leased warehouse. In the case of public warehouses, handling charges reflect the amount of product sold in the market served by the warehouse and are distinct from storage space costs, which public warehouse officer bill to their customers based on the amount of inventory stored in the facility. The inclusion of throughput warehousing costs in inventory carrying costs is a mistake since they will

not be reduced by cutting inventory levels. Throughput costs should be included instead in warehousing costs so that the increments can be easily added or subtracted when the logistics system configuration changes.

Order Processing and Information Costs

Order processing and information costs include the cost of order transmittal, order entry, order processing, related handling costs, and associated internal and external communication costs. When establishing these costs, management must remember to include in the analysis only those costs that will change with the decision being made.

Lot Quantity Costs

Lot quantity costs are those production-related or purchasing/acquisition costs that will change as a result of a change in the logistics system. Usually production lot quantity costs will include some or all of the following:

(1) Production preparation costs

(a) Setup Time

(b) Inspection

(c) Setup scrap

(d) Inefficiency of beginning operation

(2) Capacity lost due to changeover

(3) Materials handling scheduling, and expediting.

The production preparation costs and lost capacity costs are available in most manufacturing firms since they are used as inputs to production planning. A firm can approximate the other costs by dividing the incremental total costs incurred for two different levels of activity by the change in volume. The company can also use regression analysis to isolate fixed and variable cost components. The numbers obtained

can be used for logistics system planning. The lot quantity costs associated with purchasing are the costs of buying in various quantities.

Inventory Carrying Costs

Conceptually, inventory carrying costs are the most difficult costs to determine next to the costs of lost sales. Inventory carrying costs should include only those costs that vary with the level of inventory stored and that can be categorized into the following groups: (1) capital cost, which is the company's opportunity cost of capital multiplied by the variable out-of-pocket investment in inventory; (2) inventory service costs, such as insurance and taxes on the inventory; (3) storage space costs; and (4) inventory risk costs, including obsolescence, damage, pilferage, and relocation costs.

Conducting a Marketing and Logistics Audit

An important prerequisite to successful implementation of integrated logistics management is a marketing and logistics audit. Management should conduct an audit program routinely, although the length of time between audits may vary among firms. In many cases, management will become involved in special studies that include an audit, but these should not substitute for regularly scheduled audits.

Audits of current practices and performance are required if the firm is to successfully adapt to the changing business environment. Knowledge of past behavior and current policies and practices, as well as of competitive and environmental behavior, is important for future planning. Management can accomplish this by evaluating corporate objectives and plans, given the audit results. A good audit should include evaluation of the external market as well as internal operations.

Items that should be included in the external market audit are customer service levels demanded in the marketplace, market requirements, and competition.

(1) In the category of *customer service it* is important to determine out-of-stock/order completeness, the percentage of items ordered that can be shipped on the initial shipment; order cycle time/variability, the time that the customer expects to wait after placing an order before receiving the products, as well as the accepted ranges of variability in this time; system accuracy, the ability to ship the ordered products and invoice correctly; and information capabilities, which may include ability to determine product availability at the time of order placement, order status, advance information on price changes, and shipping data.

(2) In the market requirements category it is important to determine the level of product quality and the breadth of the product line; whether there are new potential markets for the products and the location of such markets; the price and promotion policies that should be considered; whether there are identifiable market segments for the company's products; how market needs differ by such business segments as geographic area, customer, and product; and demand elasticity with regard to various marketing mix strategies.

(3) Finally, it is necessary to obtain information about the competition including company-specific data such as the competing firms' customer service levels, their strengths and weaknesses, and their distribution policies/patterns.

Figure 2.6 summarizes the elements of the external market audit. Once the company has completed the external market audit, its next step is to perform an internal operations audit. The internal audit should include investigation of existing customer service levels, transportation, warehousing operations, the order processing system, lot quantity considerations, and inventory management.

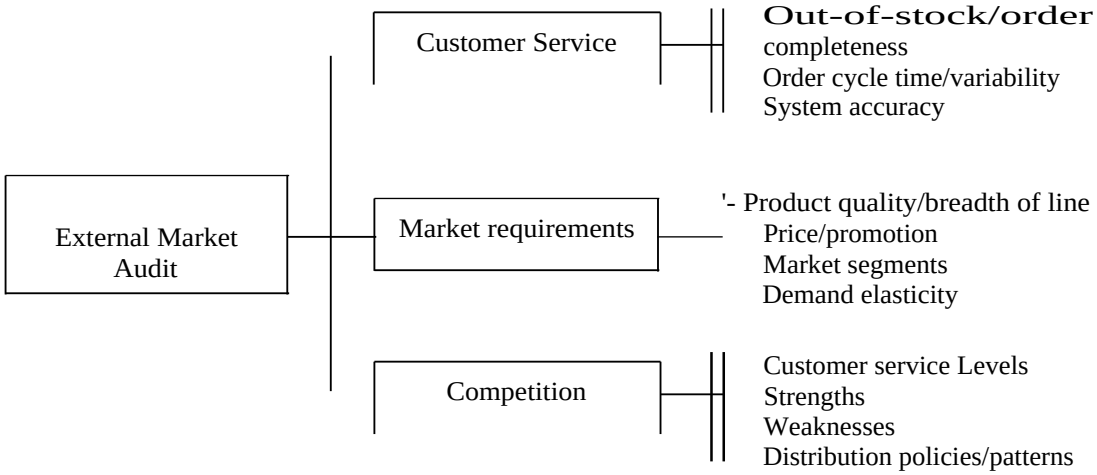

Figure 2.6. Element of External Market Audit (Lambert and Stock 1999).

Developing a Logistics Strategy

Once the firm has completed marketing and logistics audit, identified the strengths and weaknesses of the current operations, and recognized market opportunities, it must formulate objectives for the logistics function. To achieve those objectives, the company should develop a logistics strategy. At this point, management must consider various alternatives. For example, it may be possible to achieve the desired objectives—perhaps a 95 percent in-stock product availability and 72-hour delivery—with a motor carrier-based system and few field warehouses, or with a rail and motor carrier combination, which would require more field warehouses and increased levels of inventory. When management has established the costs of various structural alternatives, it must select the structure that is the most likely to accomplish the specified objectives at the least total cost. It is important to recognize that vendor-related policies and procedures often differ depending on the structural alternatives being considered.

With the logistics structure determined, management must establish criteria for valuating and selecting individual channel members, and methods of evaluating their performance. Then it should select individual channel members and measure their performance. In instances where performance is not adequate, management should ask the following questions: (1) Can performance be improved? (2) Would a change of intermediaries and/or vendors improve performance and solve the problem? (3) Is a change of channel structure required?

If the answer to the first question is yes, then management should take corrective action. Otherwise, the second question must be asked. If changing a particular channel member such as a distributor, warehousing, carrier, or vendor will not suffice, it may be necessary to change the system. This entire procedure should be repeated as a routine part of the planning process that begins with the marketing and logistics audit.

2.13 Areas in Which Logistics Performance Can Be Improved

A number of areas offer particularly good opportunities to improve logistics productivity. These include (1) customer service, (2) transportation, (3) warehousing, (4) inventory management, (5) order processing and information systems, (6) forecasting, and (7) production planning and purchasing.

Customer Service

In today's highly competitive business environment, customer service is a critical component of the marketing mix. An important element of customer service is the communication that takes place between the vendor and customer. Customer service levels can also be improved by inventory management techniques that increase product availability, as well as by order communications and transportation systems that provide more consistent and/or shorter order cycle times.

Transportation

Transportation usually represents the largest single logistics expense. The company that embarks on a program of transportation consolidation can realize substantial savings. If it also implements an advanced order processing system, as much as three or four days may be made available for planning more efficient and less costly movement of products.

Warehousing

Many of the management accounting techniques developed for manufacturing operations (e.g., standard costs and flexible budgets) are applicable to warehousing. Warehouse management systems can also improve warehousing performance significantly.

Inventory Management

Inventory can account for more than 35 percent of a firm's assets. Improved inventory management can free capital for use in other investments. The rate of return possible for such investments is the opportunity cost associated with the inventory. In addition, out-of-pocket carrying costs, such as insurance, taxes, storage costs, and inventory risk costs, can raise the total cost of carrying inventory to more than 40 percent of the inventory value. Advanced order processing systems and computerized inventory management packages are just two ways inventory levels can be reduced. Savings can also be obtained by decreasing the labor costs associated with inventory management and reducing the number of back orders and related costs. Firms back order when they cannot completely fill an order within the specified order cycle time.

Order Processing and Information Systems

The order is the device that sets the logistics system in motion. Order processing is the nerve center that guides the flow of products to customers and cash to the firm.

Many firms have not capitalized on the latest technology in order processing and information systems. The implementation of an advanced order processing system can lead to significant productivity gains by improving customer service, reducing costs by eliminating errors and redundancy, and improving cash flow by making the order flow more efficient. The order processing systems that link the firm with its vendors also offer significant opportunities for profit improvement.

Forecasting

Forecasting product demand is necessary to schedule production and to ensure that required inventories are made available at reasonable cost where customers expect to make the purchase. If logistics is to successfully provide time and place utility, management must be able to forecast each item by market area for a specific period. In recent years, forecasting has been studied extensively and methods have been developed to make predictions more objective and reliable. However, many companies are still relatively unsophisticated in their approach to this very important logistics activity. Consequently, improved forecasting procedures offer significant potential for increasing productivity.

Production Planning and Purchasing

Production planning and purchasing represent the two major components of lot quantity costs. Production planning, which determines when products should be produced and in what quantities, is becoming an important part of the logistics function in many firms.

Purchasing is another activity that firms have successfully included in the logistics function. A major reason for doing so is to offset high-volume outbound transportation lanes with inbound shipments, in order to obtain backhauls (return loads) for the private fleet or contract carriage operations. In addition, purchasing policies and procedures

influence inventories of raw materials, as well as production planning and finished product availability, if the purchased materials are not in stock when required for production.

III. EXISTING BUSINESS LOGISTICS PROCESSES

Having worked in a trading company for more than 5 years, the author found that the most important thing in a trading company is to offer the best service to the customers. The basic function is to supply the required products and allocate them to the customers at the required period.

The case study below will describe the business logistics route in a trading company. The author would not use the real name for the company name and product name in order to keep the company's privacy.

Case Study

"ABC Trading Company Limited" (ABC) is a trading company which imports the products from Japan to supply to the customer in Thailand named "XYZ Company Limited" (XYZ). But the customer uses the policy of JIT. That is why ABC has to operate the warehouse to keep the inventory and partial delivery to the customer upon the customer's request day by day.

The business processes start by the customer - "XYZ" who will issue the purchase order (P/O) to "ABC". After receiving the P/O, "ABC" will check the order availability to the supplier in Japan. The supplier will confirm back whether they can deliver on time or not. After that, "ABC" will place the P/O to the supplier and the supplier will arrange the shipment from Japan to Thailand. When the cargo arrives Bangkok, "ABC" will take charge for the customs clearance and keep the products in the warehouse. Once the customer — "XYZ" requests for the delivery, "ABC" will arrange the delivery to the customer's factory by truck.

3.1 Business Logistics Management

Since the collapse of Thai economy in the last four years, global marketplace has forced organizations to find new ways to create and deliver stronger value to customers. All businesses are confronted with the difficulty in running the business as smoothly or easily as the past because of the high and rapid competitiveness in doing business under such an economic crisis or the influence of globalization or even the new information hi-technology. Also, the trading business is included. And that is the reasons why trading companies need to improve and prepare more value to their tasks and service.

Logistics management is a suitable method to deal with this situation. With the Logistics planning, it will help the company to decrease the cost and increase the service improvement.

Cost **Reduction**

According to the studies of Ballou (1999), normally the costs of logistics for the economy and for the individual firm are around 12% of the world's gross domestic product, the supply chain costs are around 10.5% of the gross domestic product. For the firm, logistics costs have ranged from 4 to over 30% of sales. The distribution cost is around 8% of sales.

As the result of above studies, logistics cost is quite a big amount compared to sales ratio. So, to add value to the company by minimizing these costs will pass the benefits on to the customers. And it helps a trading company to survive in this kind of economy. Also, the customers will more appreciate the tasks and services of a trading company.

Service Improvement

From the above case study, it shows that the customer has a policy for the stock control as JIT (Just in Time). JIT is a philosophy of operation that is an alternative to

the use of inventories for meeting the goal of having the right goods at the right place at the right time. It is a way of managing the materials supply channel which its characteristics which are - close relationships with supplier and transport carriers. Information will be shared between buyers and suppliers, frequent production/purchase and transport of goods in small quantity with resulting minimal inventory levels.

With this condition, "ABC" must keep the best service for the delivery of the products in a small quantity upon customer's request. And "ABC" has to absorb the inventory cost which occurs in order to satisfy the customers.

3.2 Differentiated Distribution

An improved strategy might be the first to differentiate those products that should move to warehouse from products that should be shipped directly to customers from the suppliers.

Differentiated distribution may be applied to classify the products into limited groups such as high, medium and low sales volume and then apply a different stocking level to each. That is, separate distribution channels may be established for regular customer orders and the back orders. The regular distribution channel might be to fill orders from warehouses. When an out-of-stock situation occurs, a backup distribution system may come into play that fills the order from secondary stocking points and uses premium transportation to overcome the disadvantage of increased delivery distances.

Products in This Case Study

From the case study, "ABC" supplies five main products to "XYZ". These five products have different lot sizes as follows:

Table 3.1. Lot Size of the Products in the Case Study.

Product Name	Pallets/Container	Pallets/Truck
M-01	50	10
M-02	20	10
M-03	24	6
M-04	24	8
M-05	32	8

The order from the customer per month is different for each product. Some products have no order for a long time or only few pallets in some months. And there are always orders in short lead time and always the company faces the shortage problem. But for product "M-01" and "M-02", the order is quite the same every month. The average is around 300 pallets each month. And it is the most priority since the customer buys this product from "ABC" only.

Logistics Route of the Case Study

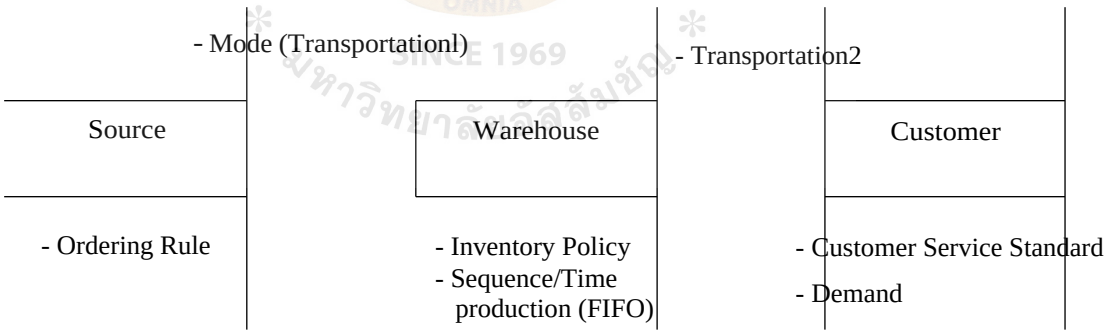

Figure 3.1. Logistics Route of the Case Study.

From the above logistics route, the customer uses "Pull System". (Pull system — replenish inventory with order sizes based on specific needs of the local conditions)

Customer service standard — the customer service level is using JIT policy (Just in Time) to control their stock to be zero. So that the supplier must keep supporting them to meet the customer's policy.

Demand/Order — The customer will issue the order to "ABC" on 10th of each month. "ABC" will check the order availability and place the order to the supplier in Japan.

Inventory Policy — "ABC" will also try to minimize the stock in order to reduce the costs. Anyhow, "ABC" has to keep some safety stock for deliveries.

Sequence/Time production (FIFO) — "ABC" chooses FIFO (first-in-first-out) to manage the delivery from warehouse to the customer in order to avoid the problem of accounting audit and also the product quality.

Ordering Rule — After "ABC" gets the order, it will check the order availability and place the order to the supplier.

Mode of shipment (Transportation#1) — The supplier will arrange the shipment by Sea/Air based on "ABC" requirement.

Transportation#2 — "ABC" will arrange the delivery upon the customer's request by truck.

3.3 Business Flow of the Case Study

The Figure 3.2 illustrates the business flow for easily understanding of the process of jobs/tasks in the case study.

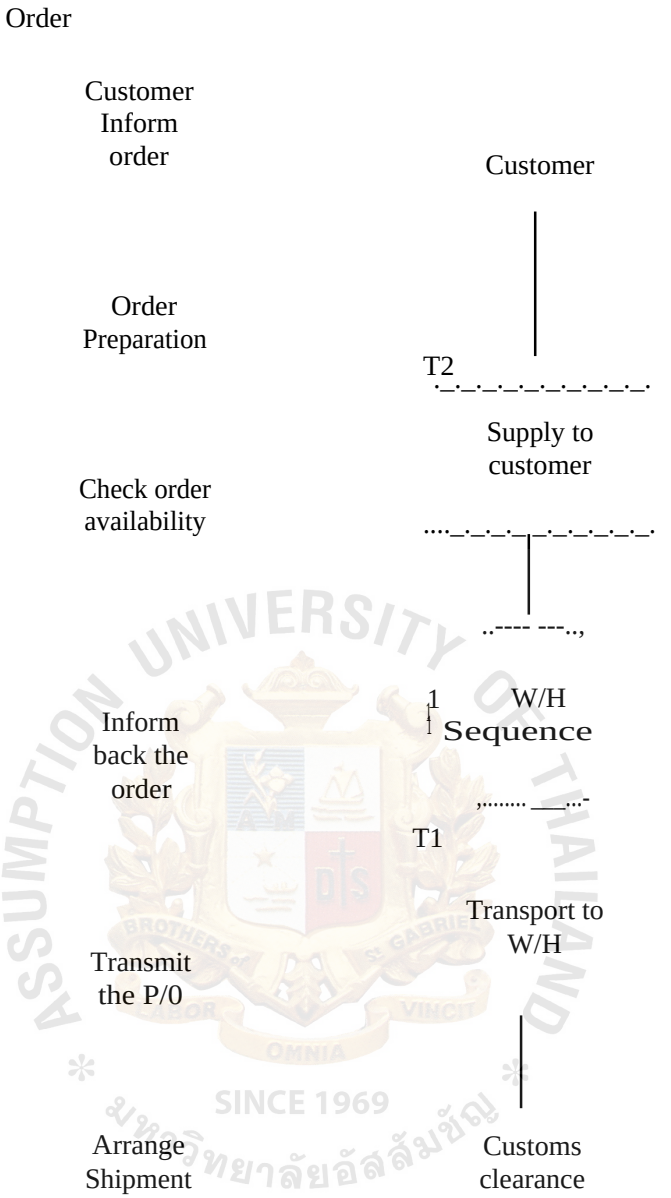

Figure 3.2. Business Flow of the Case Study.

3.4 Existing Problems in the Case Study

From the above business flow, there are some problems in some points. It is better to study and find out the solutions to make the flow smoothly, reduce the costs, and make the customers the service more appreciated.

Ordering Process

From the Figure 3.2, it shows that the ordering process takes most steps compared to other steps in this flow. If the order requirement is available, it has no problem. But in case that the order is not available, it will take time to produce which will make the shipment delay and the customer will face the shortage. In such a case, the customer will not like this kind of situation. So, it is a must to study and find out the way to solve this kind of problem. The solution to this issue will be discussed in the next chapter.

Mode of Shipment

In order to import the products from Japan, "ABC" uses two modes of shipment which are air and sea. Both methods have advantages and disadvantages. Which method should be used in which situation? Advantages and disadvantages of both methods will be mentioned in the next chapter.

Customer Inventory Policy / Safety Stock

After the products have already taken-in the warehouse, "ABC" must has a good policy to control the stock and make the delivery to the customer. Since the customer uses JIT, it means that they will not keep any stock. The warehouse must support them keeping delivery without any shortage. So, the warehouse should have some safety stock. And the problem is the quantity the warehouse should keep for safety stock which is not too much and not too less. If the stock is too much, the inventory expense will be higher. But if the stock is too less, it is possible to face shortage problem. The next chapter will clarify the solutions for this problem.

Supply Mode (Transportation#2)

Since the customer uses JIT, a small quantity will be requested per day. "ABC" has to arrange the truck to deliver the products to the customer's factory located quite

far from the warehouse. And the cost of truck/shipment is quite high. So, "ABC" should find out the way to reduce the cost of transportation2.

IV. ANALYSIS OF THE PROBLEMS

4.1 Ordering Process

When "ABC" gets the order from the customers, it will check the order availability to the supplier in Japan and then place the order. It takes around 3 days to get the reply from the supplier whether the supplier can allocate the product. And the reply from the supplier in Japan will be two kinds — (1) all order is available, and (2) it is not available. So, in each situation, what should "ABC" do?

All Order Is Available

If the order is available, "ABC" must immediately place the order to the supplier and ask them to arrange the shipment as soon as they can. And the shipment will arrive on time. The route will be shown in Figure 4.1 as below.

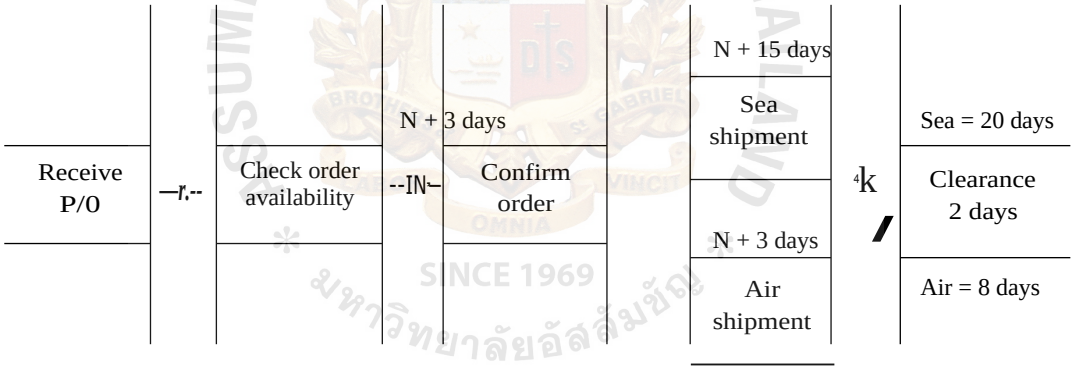

Figure 4.1. Transaction of Ordering Process (Available).

All Order Is Not Available

In case that all order is not available, it will take time to produce the products (around one week) before arranging the shipment. In this kind of situation, the shipment will arrive in Bangkok later than the customer's due date. And it will make the customer

face the shortage and unsatisfied. The transaction of ordering process in case the order is not available is shown in Figure 4.2

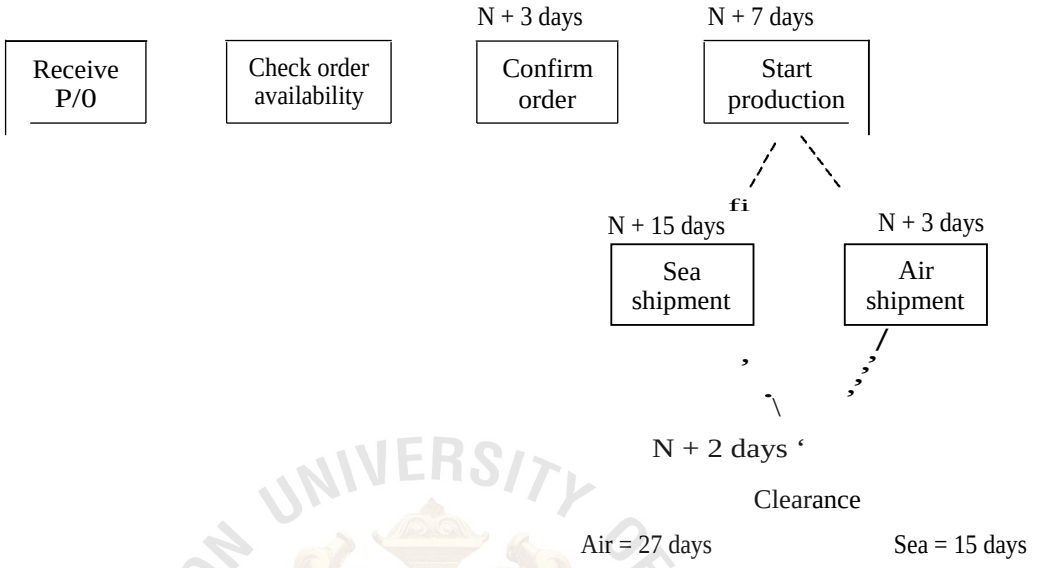

Figure 4.2. Transaction of Ordering Process (Not Available).

Table 4.1. Proposed Idea.

Current	Propose
- Receive P/O from the customer before issuing P/O to the supplier	- Request for 3 months forecast from the customer for better forecast - Issue early P/O for safety stock.

Currently, "ABC" waits until it receives the P/O from the customer before checking the order availability and place P/O to the supplier which will not be effective in case the order is not available. So, two methods are proposed for this problem.

First, it is better to request for order forecast (three months for safety) from the customer in order to alert and roughly inform to the supplier to prepare the materials.

Secondly, "ABC" should take risks to issue early P/O for safety stock in the warehouse for the most priority products in order to continue supporting the customer. The most priority products are "M-01" and "M-02". So, "ABC" should consider issuing early P/0 to these 2 products. From the Figure 4.2, it shows that it takes around one week to produce the product. And the customer request 5 pallets for each products every day. So, the safety stock for product "M-01" and "M-02" in warehouse should cover one week delivery for a delayed shipment, so that "ABC" can continue supporting the customers without any shortage.

4.2 Mode of Shipment

There are two modes to arrange the shipment, which are air and sea. Both modes have both advantages and disadvantages. For the sea shipment, it is very cheap but it takes 15 days which is quite long. For the air shipment, it is very fast — 3 days. But the disadvantages are the cost is very high and we can arrange only few pallets via air shipment. The following is the freight cost for both sea and air shipment for Model "M-01" which includes the shipping agent service cost.

Table 4.2. Cost of Transportation#1 in the Case Study.

Mode	Lead-time (days)	Exp/Cont. (Baht)	Exp/Plt. (Baht)	Clearance / **Pit** (Baht)	Total Cost/Pk. (Baht)
Air	3	-	16,500.-	3,000.-	19,500.-
Sea	15	30,000.-	600.-	8,000.-	8,600.-

Remark: e.g. Product "M-01" - (50 pallets/container)

From the above table, it shows that the air shipment is more expensive than sea shipment. In this case, "ABC" should plan carefully to arrange the shipment by sea in order to save the cost of freight charge and to avoid the air shipment unless there are urgent sudden requests from the customer.

4.3 Warehouse Safety Stock

As the customer in the case study uses **JIT** policy, "ABC" will be the one who absorbs the inventory stock and all inventory cost. The rental fee of the warehouse is fixed as 30,000 baht. And the storage charge is around 150 baht/pallet.

Currently, "ABC" pays for the rental fee and storage charge around 35,000 baht/month. But from the proposed idea in 4.1, "ABC" should keep safety stock in warehouse covering one-week delivery. If so, the storage charge will be higher. For example, Model "M-01" which one-week delivery is around 35 pallets, so the storage charge will be increased for 5,250 baht.

Another method to avoid the increased storage charge is planning the shipment to be arrived exactly the same day of delivery. So that, "ABC" could deliver the products to the customer's factory directly — there is no need to keep for inventory. Figure 4.3 illustrates the flow for this method.

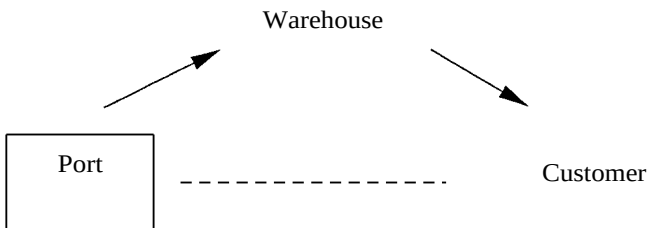

Figure 4.3. Flow of Direct Delivery.

4.4 Supply Mode (Transportation#2)

Since the warehouse is located quite far from customer's factory, the transportation charge is around 800 baht/truck.

Currently, the customer requests for partial delivery in a small quantity shown as Table 4.3.

Table 4.3. Delivery Quantity per Time.

Product Name	Pallets/Truck	Request Q'ty/Time
M-01	10	
M-02	10	
M-03	6	
M-04	8	8
M-05		

In the above table, the customer requests delivery quantity per time of product "M-01" and "M-02" do not optimize the truck. In this case, firstly, "ABC" should negotiate with the customer to accept 10 pallets per delivery. Anyhow, if the customer does not accept this request, there is another way to solve this situation. We suggest "ABC" re-arrange the delivery of model "M-01" and "M-02". Combining these two products together will optimize the truck and also save cost.

V. EVALUATION OF THE EXISTING AND PROPOSED METHODS

From the previous chapter, we would like to summarize and evaluate the existing and the proposed methods as follows.

5.1 Ordering Process

In Chapter 4, the lead-time of ordering process is different based on the mode of shipment and order availability which can be summarized in the following table.

Table 5.1. Table of Lead-time of Ordering Process.

Mode of shipment	Order Available	Order Not Available
Air	8 days	15 days
Sea	20 days	27 days

The proposals are (1) to request for 3 months forecast from the customer, and (2) to issue early P/O for safety stock in warehouse.

To request for 3 months forecast from the customer will make the company improve its order forecast planning. Also, it is easier for the supplier to prepare the materials. And finally, the supplier can prepare everything and can get rid of the problem of order unavailable.

To issue early P/O for safety stock in warehouse in Thailand will make "ABC" easier to arrange the shipment from Japan. The safety stock that should be kept in Thailand is around 7 days' usage in order to cover the production in Japan. Then, with 7 days stock in Thailand, the lead-time between the customer and "ABC" will be reduced.

5.2 Total Logistics Cost Analysis

The total logistics cost in this case study will be calculated by the transportation cost from the warehouse to the customer's factory. When the customer requests the product, **the** units of delivery by pallet are taken into consideration. Therefore, "ABC" should combine any requested products to be delivered in one truck at 10 pallets to optimize the load truck. So, the total logistics cost will be concluded in the table below:

Table 5.2. Total Logistics Cost Analysis.

Details of Pallet Sales for Each Product

Product	M-01	M-02	M-03	M-04	M-05
Pit. / Truck	10	10	6	8	8
Pit. / Cont.	50	20	24	24	32
Truck / Cont.	5	2	4	3	4
Sales (Pit/Mth)	300	300	210	120	120
Truck / Mth.	30	30	35	15	15
Cont. / Mth	6	15	9	5	4

Existing Logistics Cost

Cost — Sea: e.g. "M-01" - 50 pallets ordering, full container, full 5 trucks load

Logistics Cost	Mode	Lead-time	Cost/Unit	(1) Available by Sea (per cont.)	2) Not Available by Air (per plt)
Ordering Admin Cost	a: Available	3 days	150 B/day	450	
	b: Not Available	10 days	150 B/day		1.>n0
Transportation#1	a: Sea	15 days	1000 B/ It	( ) ( )()()	
by Sea/Air	b: Air	3 days	19,500 B/P11		it) -( )0
Inventory Cost	a: Stock	5 days	150 BkLay	;-.Oi	
	b: Direct	-			-
Transportation#2	a: Port-W/H-Cust.	2 trips	800 B/trip	12 Do	
by truck	b: Port-Cust.	1 tri	800 B/trip		tii)0
			Cos t/Cont.	 99,950	
			Cos t/Plt.	1,999	21,800
			Lead-time	20 days	15 days

Note: The customer issue order at the 5th of the month for next month usage. The lead-time of the shipment is 20 days. So, "ABC" needs to keep the stock 5 days before delivery. For the cost of clearance and transportation#1 and #2, see Chapter 4.

Proposal Logistics Cost Example (After Improvement)

Cost - Sea: e.g. "M-01" - 50 pallets ordering, full container, full 5 trucks load

Logistics Cost	Mode	Lead-time	Cost/Unit	(1) Available by Sea (per cont.)	2) Not Available by Air (per p lt)
Ordering Admin Cost	a: Available		150 B/day	-	
	b: Not Available	10 days	150 B/day	i	I Su0
Trans portation#1	a: Sea	15 days	1,000 B/ lt	,1) (mu	
by Sea/Air	b: Air	3 days	19,500 B/Plt		1() -7()0
Inventory Cost	a: Stock	0 days	150 B/day		
	b: Direct				
Transportation#2	a: Port-W/H-Cust.	2 tri • s	800 B/trip	ono	
by truck	b: Port-Cust.	1 trip	800 B/trip		800
			Cost/Cont.	58,000	
			Cos t/Plt.	1,160	21,800
			Lead-time	15 days	15 days

Note: 3 months' forecast of the customer makes "ABC" easier to arrange the sea shipment to arrive at the exact date of delivery. So, there is no need to keep stock before delivery as in the existing method.

The above table shows the parameters of logistics derived from quantity of pallets. When the customer orders the products, they expect to get the product the 1st of next month. This behavior will affect to the trading company to order to the supplier. In order to calculate total logistics cost, "ABC" should calculate at the optimum number of pallets which are 50 pallets (due to optimized container and truck for transport to customer). The availability of the products when "ABC" orders to the supplier, is the criteria for the selection of mode of transportation. There are 2 types of transportation from the supplier to "ABC". The first mode is by sea shipment. Each shipment will take around 18 days after receiving P/O from the customer. Then, the products arrive at the port; it will take around 2 days to clear and deliver them to warehouse and wait for customer requirement notice.

After reviewing all logistics process, it is possible to save cost by reducing lead-time of transportation from the supplier at the appoint time. This method is to have safety stock in Thailand. In this case, there is no need to waste the time of checking availability period. Also, the problem of the stock is unavailable will be solved. Finally, "ABC" can provide shorten lead-time to the customer which will make them more satisfied. On the other hand, "ABC" can plan for the shipment to arrive Bangkok at the exact date of delivery. As a result "ABC" can save cost of inventory also. This suggestion can reduce the cost from 99,950 to 58,000 baht. It seems not so much amount. But this is just an example for 1 product. And if they apply this method to other product or other cases, it will affect to the total benefits of the whole business.

For air-freight, its cost is very high. Therefore, the trading company should not select unless there is an urgent request for sudden increase usage from the customer. In that case, the trading company must use air shipment. Otherwise the customer may face the shortage problem.

VI. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

From the collapse of Thai economy since 1997 until now, the global marketplace forced organizations to find new methods to create and deliver value to stronger customers. A trading company also confronts with the difficulty in running the business as smoothly or easily as in the past because of the high and rapid competitiveness in doing business under such an economic crisis or the influence of globalization or even new hi-technology information. Those are the reasons why the trading company needs to improve and prepare more value to their tasks and services which will help the company to maximize the profit with the lowest cost. In this project, the author studied the concepts of logistics management and applied it into the trading company to reach the goal.

The study of the logistics makes us clearer what it is. The definition of Logistics Management is "Logistics is the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-to-consumption for the purpose of conforming to customer requirements". This idea will be applied to the trading company to reach the objectives of this project which is (1) to reduce the transaction costs, (2) to make better forecasts for demand, (3) to coordinate between manufacturing and distribution systems, (4) to reduce lead-time, and (5) to improve the customer's satisfaction.

The tasks in this project are concerned about ordering the products for the customers within the due date. Chapter 3 explains the situation of the current business. It shows the existing problems. The existing situation has so many problems.

Sometimes there are delays of delivery caused by forecasted demand and the orders are not available. The long lead-time of ordering and shipment are another problem since the products are imported from overseas. Also, the transaction cost is quite high compared to the commission. That is why these problems should be solved.

In the chapter 4, the author analyzes each problem and proposes a new method to settle the problem. In the ordering process, the order availability is a big issue to select the mode of transportation. The proposal to request the 3 months' forecast from the customer will make the better planning for the supplier to prepare the materials. Another proposal is taking risk to issue early P/0 and keeping some stock in the warehouse in Thailand. It will not increase much cost but it affects the customer's satisfaction. For the modes of shipment, there are 2 modes which are sea and air shipment. Each mode costs differently. Also, there are advantages and disadvantages of both modes. Another transportation charge occurs when "ABC" delivers the products to the customer. The problem is the customer does not request full truck/time. The author's suggestion is to combine different products to full the truck. It will save the cost of 800 baht/truck.

Chapter 5 mentions the evaluation of the existing methods and the proposed method. The proposal to request the 3 months forecast from the customer will make "ABC" easier to plan the order and arrange the shipment to arrive at the appointed time. At the same time, "ABC" should convey that forecast to the supplier in order that they can prepare the materials. This can make the better coordinating between supplier and "ABC". Also, "ABC" should issue early P/0 for safety stock in Thailand. In case the customer suddenly increases the products, "ABC" could supply them. With the good order planning, "ABC" can continue to supply the products to the customer without shortage. This can improve the customer's satisfaction.

Actually we have two ways to increase our net profit as shown in Figure 6.1. First is to increase total sales and secondly is to reduce cost. In this project, the proposed way is to apply the study of logistics management to reduce cost of total expenses which it could be concluded as effective.

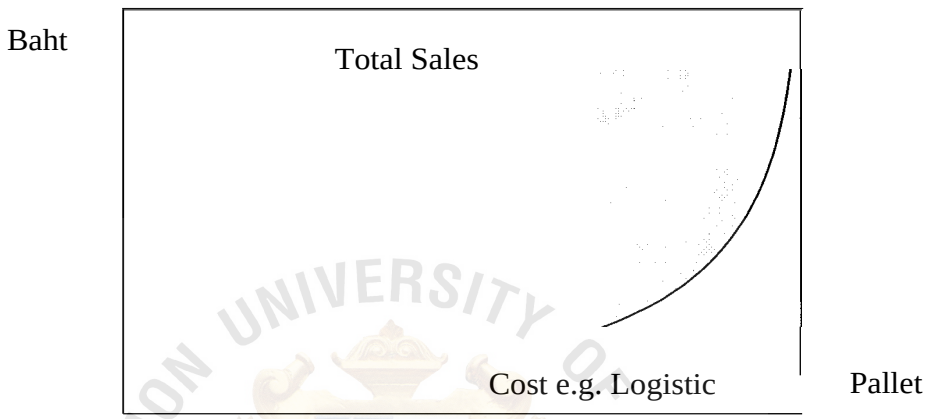

Figure 6.1. Total Net Profit Relation with Logistic Cost.

The amount of sales is related to the total net profit because more sales means more gains. However, the study of logistics management can reduce the expenses of logistics cost, which also increase the total net profit. Hence, this project studies the case study in the trading company as a sample. And finally, the proposal can reduce the total cost.

6.2 Recommendations

Nowadays, companies in general will be interested in sales promotion to increase their sales/profits. However, they should not forget to study about the logistics management when there is no way out to increase sales volume. It is still profitable when you are able to reduce cost or expense.

However, in business competitiveness, when the customers would like to buy products, they are not concerned about only lowest cost but also the good quality of

products and services. Therefore, please do not take a risk to reduce your cost until you derive the effects with your customers' expectation such as reducing the quality or level of service.

From the study of logistics management, it is better to apply its theory to a trading company in order to improve the forecast planning, reduce lead-time, reduce the transaction cost, and improve the customer's satisfaction. In Chapter 4 — based on the analysis of the problems, the author is concerned about only one product as an example. So, the cost that is calculated is not much different from the existing method. But if the study of logistics management can be applied to more products — more cases, the total cost reduction can affect the net profit of all businesses in a trading company.

Finally, the author would like to recommend the trading companies to study more about logistics management and apply it to whatever business. The author believes that it can help the company to reduce some costs and make it get more profits as a result.

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