

A CONCEPTUAL LOGISTIC SYSTEM FOR PRIVATE ENTERPRISE

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Abstract: The concept of the logistic system and technology of logistics have made substantial advances in decades since World War II. Today, logistics is a word that sounds scientific; however, there is still some area where much of the population prefers to live close to the production area in order to obtain their requirements. A business firm is essentially an open system. It receives input from external sources, uses and processes this input, and finally produces an output that to some extent changes the environment. A logistic system--as a sub system of the business enterprise--handles the flow of input toward the process and the flow of output toward the customer, according to plan and with minimal cost. This study introduces perspectives of the business logistics system. It describes the concept of logistics and identifies the fundamental logistics considerations and its elements. This study proposes a conceptual logistic system that can present logistics structures, functions, and responsibilities. Hopefully, it can provide a way of thinking that will eventually help the reader recognize the scope of the logistics organizations and its important roles. There are several basic elements in the logistics system of a business firm. Business logistics as a system operates according to some basic elements. However, these elements have been defined differently by different authors. The intent here was to indicate those actual factors that comprise a logistics system. These factors, which have been high lighted by other authors as well, are composed of: forecasting to eventually determine the firm's overall requirements, procurement, storage, transportation, material handling, packaging, and customer service.

Key words: Logistic, Inventory, Forecasting, Procurement, Storage, Transportation.

INTRODUCTION

Since the beginning of civilization, many of the goods desired by an individual were produced outside the immediate vicinity, including food and other. Their choices were limited, and one had to obtain goods whenever they were available, and store the excess for later use. Because of transportation and storage facility constraints, the movement of commodities was limited to those they could personally move and store and the shelf life of most goods was extremely short. These limitations and constraints forced them to live in areas close to production, and to consume a limited range of commodities. Today, for many countries, these kinds of problems do not exist any longer; however, there are still some places where much of the population prefers to live close to the production area in order to obtain their

requirements. One of the main reasons for this sort of problems is the lack of a well-developed and inexpensive logistics system to facilitate an exchange of goods and resources, not only with other areas of the country which are also involved in production, but also with the other countries which produce and consume.

In many countries where logistics systems are improved, the production companies are not setting up in the most populated areas, and consumers are not willing to live close to the production activities. Areas specialize in those commodities which can be produced most efficiently. Production can economically be shipped to market areas where and when they are needed, and in quantities desired. Extra needed goods can be imported and excess production can be exported.

Today, logistics activities are critical to the individual firm. Market areas are national--even international--in scope, but production may be limited to several points. Logistics systems provide the "bridges" between the production activities and the market, which are generally separate from each other. In many countries, the concept of the logistics system and its role in any kind of organization has come to be generally recognized. But there are still some business and government managers who have not begun to accept the importance of the system and the necessity for it to be designed and managed as a valuable component of the organization (Soonhonget, al, 2005). Further, the author believes that achieving goals in any organization without having a relatively activated logistics system is practically impossible. This study presents perspectives covering of the business logistics system mostly limited to secondary data.

The primary objective of this study is to introduce logistics concepts in a concise form so that they will be easily accepted by managers and organizational employees who have not yet recognized their significance. The intent is to provide a survey of the elements of logistics systems so that the reader will have an appreciation for the design, and will then be able to refer to it for their own design needs. The secondary purpose is to propose a conceptual logistics system that can highlight their structure, functions and responsibilities.

Fundamental logistics considerations

The concept and technology of logistics systems have made substantial advances in the decades since World War II. Today, the word "logistics" has a scientific connotation. It is generally unknown when the logistics problems of business firms was first recognized. Some authors believe the initial identification of what is now termed as "business logistics" was somewhere around 1880. Others point to discussions of physical distribution in the 1920's as the early recognition. The fact is, logistics activities have always been a component of human civilization. However, in each century it has been perceived and treated differently.

Since the dawn of time, mankind has been involved in logistics activities, namely: the identification of requirements (recognizing the need for food, protection, and shelter); procurement (hunting/gathering), production (tool-making and building shelter), packaging and transportation (packing belongings relocate or live as a nomad). Thus, without having

defined it as such, mankind has always been involved in logistics activities

However, expectations from logistics systems today are quite different. Currently, it is such a broad science that it is impossible to cover all of its aspects and features in one article. Irrespective of the precise origins of logistics, the study of business logistics as a separate subject was not undertaken until relatively recently (Grant et al, 1974).

The interest in logistics developed after World War II. During the industrial development, many large corporations were formed and attention was turned to financial practices. As a result of these large corporations, markets could not regularly absorb the increased output, thus the marketing area received attention. During this period, firms realized that it was becoming increasingly difficult to keep the flow of products efficiently moving from the end of the manufacturing line to the consumer, so they perceived and formed the distribution system.

The growth and change in production lines increased the output so that distribution systems had more items to handle. Firms then decided to store the excess commodities. All of the above factors and their related costs brought the concepts of logistics to the attention of many firms, and pointed out the need of reducing such costs while introducing more effective controls. Today, many firms in most countries recognize logistics as an area of management interest which can be utilized to implement possible changes, resulting in lower costs. (Coyle & Bardi, 1980)

Scope of Logistic

The military--as with so many other management concepts--provides a likely origin of the term "logistics." Logistics is defined in Webster's Dictionary as, "moving, supplying, and quartering troops." Logistics activities--whether they take place in the military, urban transportation systems, government supply systems, or communications--are essentially the same. They usually involve procurement, storage, and movement, but with different aspects and for the achievement of different objectives.

Elements of logistics

There are several basic elements in the logistics system of a business firm, which is essentially an open system. It receives input from external sources, uses and processes this input, and

finally produces an output that to some extent changes the environment. A logistics system, as a sub-system of the business enterprise, handles the flow of input toward the process and the flow of output toward the customer, according to a plan and with minimum cost. Business logistics as a system operates according to some basic elements. However, these elements have been defined differently by different authors. The intent here is to indicate those actual factors that make up a logistics system. These factors, cited by various authors, are composed of forecasting to determine the firm's overall requirements, procurement, storage, transportation, material handling, packaging, and customer service.

Forecasting

Forecasting is a general term referring to those activities that generate a statement concerning uncertain or unknown events that will be occurring in the future. The main objective of making forecasts is to gain some knowledge about uncertain events in the future that obviously are important to present decision-making. A forecast is useful if it reduces the uncertainty surrounding an event. Forecasting is a prerequisite to planning, which in turn should be a prerequisite to action. It cannot be denied that planning is directed toward improving decisions. Forecasting in its dictionary sense means: to anticipate or predict some future event or condition usually as the result of rational study and analysis.

In business firms, the general objective is to make a profit so forecast activities are concerned with production and sale estimation. Firms must determine how many demands they will receive for each kind of product in the future and how many of these demands can be met by their existing production capacity.

According to Plossi and Wight (1967), production control is basically concerned with the future. Manufacturing firms should start from where they find themselves and prepare for the future. To do this, it is necessary to guess, assume or otherwise estimate what is going to happen from now on. All other things being equal, a company can survive only by preparing itself to meet its customer's needs at least as quickly as its competitors (Plossi & Wight, 1967)

Forecasting, or determining the demand and requisites for a specific period of time in the future, is one of the basic elements of logistics

activities. An estimate of the future demand for different productions or commodities is essential to almost any logistics decision-making. Future demands usually determine depth and range of the inventories of finished goods that must be provided. The level of inventories, affects the number of warehouses, packaging and handling facilities. Thus, forecasts--particularly short-term forecasts of demand--play a vital role in the production processes and operation of a logistics system.

Logistics managers must determine all kinds of requirements for the entire firm for the same period of time. These requirements usually include equipment, raw material, common items, spare parts, and components. An estimate of future demands for each category of requirements forms the basic foundation of logistics activities and inventory planning. A forecast of demand for all requirements is necessary in deciding not only when and how much to replenish, but also, how much of an item to buy initially, where to stock it, and when and how much to dispose of (Eagle & Princhar, 1965)

Forecasting helps the firms avoid the costs of opportunity lost. The accuracy of the forecasting method will influence the safety level that is required to be held. The more accurate the forecasting system is, the lower the level of safety stock is required, and consequently, the lesser amount of capital will be invested in inventory. Forecasts are usually inaccurate because of the universal difficulty in estimating supply and demand, but this does not mean that forecasts should be neglected. Short-term forecasts are generally more accurate than long-term ones. Forecasts must include an estimate of errors; all forecasting models are based on historical data. This data can be accurate but there is no guarantee that their application will be precise in the future.

Procurement

Every economic entity, whether it is a family, a business, a government, etc., must decide how to procure its requirements, which frequently vary in both quantity and quality. It is true that all these economic entities may satisfy their needs and ultimately procure what they believe are required, but do all these entities procure high quality or reasonably priced requirements? Do they get maximum utility and benefit from their scarce resources? The answer is usually "no" Procurement functions are not limited to

finding and buying the requirements, rather they include many other factors such as:

What supplies are really needed and in what quantity? When and where are they needed? From which supplier and at what price must the requirements be purchased, or can they be made? Thus, to come up with appropriate answers to the above factors, a proper procurement system is essential in any logistics organization (Dominick, 2004).

Procurement--purchasing, renting, leasing, or otherwise obtaining supplies or services--is an important part of the logistics process. As a logistics element, procurement lies between requirements and distribution, and is based on the determination of requirements; therefore, it is largely dependent on the present or future availability of manpower, materials, facilities, and services. Procurement occurs at all levels of an economic entity--family, private enterprise, and government agencies--but they can be categorized into two different aspects: consumer and commercial. From the consumer point of view, procurement is characterized by a shopping basket philosophy, while commercial procurement presents a totally different picture. The needs of most organizations are often specialized, and the volume of purchase tends to be large. The number of potential sources may be small and there may be few customers in the total market (Wilbur & Leanders, 1964). There is no doubt that there are many differences between consumer and commercial acquisition. Many commercial organizations acting as buyers are even larger than their individual suppliers.

Inventory management

Inventory management can be defined as the sum of all those activities that are necessary for the acquisition, storage, disposal or use of materials. Inventory management is not a new activity; it has been very important in both private and government sectors for a great many years. For all items, inventory management measures the relative advantage of holding various amounts of different items. When this measurement is defined, appropriate decisions to provide economic equality and balance can be made. Today, inventories are one of the most important elements of a logistics system. Management of inventories strongly affects the efficiency of the system. Many of the important issues that arise in the design of a logistics system are related to the inventory investment. A well organized and properly managed

inventory system is essential in any kind of logistics system. Obviously, it is unrealistic to expect all logistics organizations to have exactly the same inventory management system or to apply the same techniques. However, the same principles apply everywhere.

When is a television not a television? In terms of logistics, when the TV is in Europe while it's supposed to be in Asia; when it is twenty-one inches instead of the desired dimensions; when it is sitting in warehouse instead of its scheduled display at a retail store; when 99% of its parts are available for manufacturing but a small, minor component is missing (Hrskett & Glaskowsky, 1964). Inventory is concerned with all of these problems, and it facilitates and provides the possibility for commodities to be utilized at the right time, in the desired form, and in the quantities needed. Inventories exist in a logistics system because it enables the system to accurately and positively respond to a customer request. It would either be very expensive or impossible to make all requirements available to a customer after they are requested or needed, even utilizing the fastest modes of transportation. There are different reasons why inventories are essential, and why this huge investment is acquired by all firms or logistic organizations. The most important reasons for holding adequate inventory can be categorized as follows:

- To be responsive to customer needs (Dominick, 2009)
- To minimize the possibility of stock-out costs
- To decrease transportation costs by ordering carload or truckload and no less
- To be flexible with regards to environmental changes
- To protect the production process
- To protect against unpredictable events

In summary, inventory acts as a buffer between a supplier who usually supplies materials in large quantities and constant intervals, and a consumer (customer or production line) who generally buys and uses the material in smaller or more variable quantities.

Transportation system

Transportation is another basic element of logistics systems. It cannot be denied that transportation systems have a major role in each logistics activity. Changes in the efficiency of

transportation are immediately reflected in support programs and procurement situations. Therefore, it is essential for logistics managers to have good knowledge of the major characteristics and elements of an effective and efficient transportation system in order to evaluate the particular significance and relationship of each element to the general situation.

The characteristics of a good transportation system are: responsiveness, flexibility, and economy. Transportation is a major part of the broad field of logistics distribution. Manpower and materials must be moved and distributed to plant operations; finished goods must be moved and distributed to customers.

Transportation is the movement of goods or persons from one place to another. Transportation involves the conveying of physical things. The movement of goods from origin to destination creates place utility. Movement or transfer at the time needed generates time utility. Both are provided principally through business enterprise (Wheeler, 1962).

Transportation permits the firm to bridge the producer-customer gap, thereby creating time and place utility in goods. It is clear that desired goals will not be achieved unless a stable bridge is created between warehouses, plants, customers, and material resources. This bridge could exist only if an adequate transportation system is activated.

Packaging

Packaging, as another important element of logistics, will affect the operation of warehouses (Alimi, 1997). Packaging is also quite essential for effective damage protection. As the size of the package may affect the ability of a company to use pallets or shelving types of materials, thus, coordination should exist between packages, handling equipment, warehouse spaces, and transportation facilities.

Packaging not only facilitates handling, transportation, protection and accessibility, but it also affects marketing and customer service. It improves the efficiency in handling and distributing, provides essential protection of goods, and facilitates identification of products.

Customer service

In general, the two major elements that affect the customer's decision with respect to choosing

a commodity in a free market are the price of the commodity, and the level of customer service received if the item is purchased. The higher the quality of customer service provided, the greater will be the revenue received from any given group of customers.

Customer service is the end result of logistics system design and operation. Customers are generally more sensitive to service rather than price, thus, variation in service provided may cause lower sale revenue. Customer service that impacts all areas of the firm attempts to ensure customer satisfaction by the provision of aid or assistance to that customer. The following are various factors that logistics customer service could provide to the customer.

1. *Shorter lead time:* Lead time (time elapsed from the period that a customer places an order until physical receipt of the order) has a direct affect upon the level of inventory that a customer should keep until the next order is received. As the lead time decreases the customer could carry lower inventory levels and consequently, lower the corresponding inventory carrying cost. Thus, a seller can lower a buyer's cost by reducing lead time while increasing the desirability of their product in the free market. Dependability of lead time has a direct impact upon the customer's inventory level and stock out costs. It can also reduce the uncertainty faced by a customer. (Dependability refers to the delivery of a customer's order with regular, consistent lead time, in safe conditions, and in harmony with the type and quality of items ordered).

2. *Communication:* Customer communication is essential to the design of a good logistics service. By communicating with the customer, it is much easier to modify the existing customer service.

3. Customer service facilitates to understand customer views and requirements

Proposed logistics system

Logistics systems exist solely to provide responsive support to customers. The customers may be production plants, departments within the firm, or the ultimate consumers in the market place. Regardless of the organizational structure and strategy within a firm or industry, every logistics system should be designed in order to achieve a number of objectives, namely:

- To improve service
- To reduce investment
- Better production stability

- Greater utilization of resources
- To maximize the economic value of products or materials by obtaining and having them where they are wanted, at the time they are needed, and at a reasonable cost. In other words, minimize the total cost while maximizing the time and place utility of goods.

Structure of the logistics system:

In order to design a proper structure for a logistics system, it is essential to find out where in the organization the logistics function should be placed. Placing logistics under marketing would result in increased customer service, warehouses, and inventories, and limit the attention given to production requirements. If located in an existing transportation department, emphasis would be placed upon rates, carrier negotiations, etc., which are important elements in logistics, but not ends in and of themselves. Likewise, if incorporated into production, difficulty could arise in administrating the needs of marketing, since primary attention would likely be directed towards production with logistics serving as a support to production.

The need to establish a logistics department in a high position on par with marketing and production may not be necessary for all firms. However, in order to operate effectively, it is advisable for enterprises using vast amounts of logistics activities to ensure efficiency and effectiveness of their outputs, to place their logistics structure in a high position, reporting directly to either the president or an executive vice president. Such a position enables logistic managers to make decisions objectively, which will then be implemented by an authority vested in the corporate hierarchy. The proposed structure (fig 1) is based on this assumption that separate logistics system should be designed.

The essential building blocks of the proposed system as shown in figure 1 are: policy and system design, a materials department, research and development, administrative services, procurement department, warehousing department, and transportation department.

Function of the system

The organization which manages a logistic system must perform several functions and ensure that these functions are properly executed. In the proposed system, each department has been designed in such a way that all these functions may be carried out separately and with adequate coordination. There is no doubt that where the enterprise situation and size permits, several of these functions could be performed by one department.

The following are descriptions of the various functional elements depicted in figure 1

1. *Policy and system design.* Policy and system design would contain three separate functions: planning and programming, control and monitoring, and facility design. Responsibilities would include the following :
 - 1.1. To define both long- and short-run logistics plans and programs for the whole system, with close coordination between different departments
 - 1.2. To provide and define logistics policy for different functions such as inventory
 - 1.3. To ensure that the defined plans are successfully implemented
 - 1.4. To modify and change the plans and programs whenever needed
 - 1.5. To analyze all alternatives which exist for any new equipment, warehouse location etc.

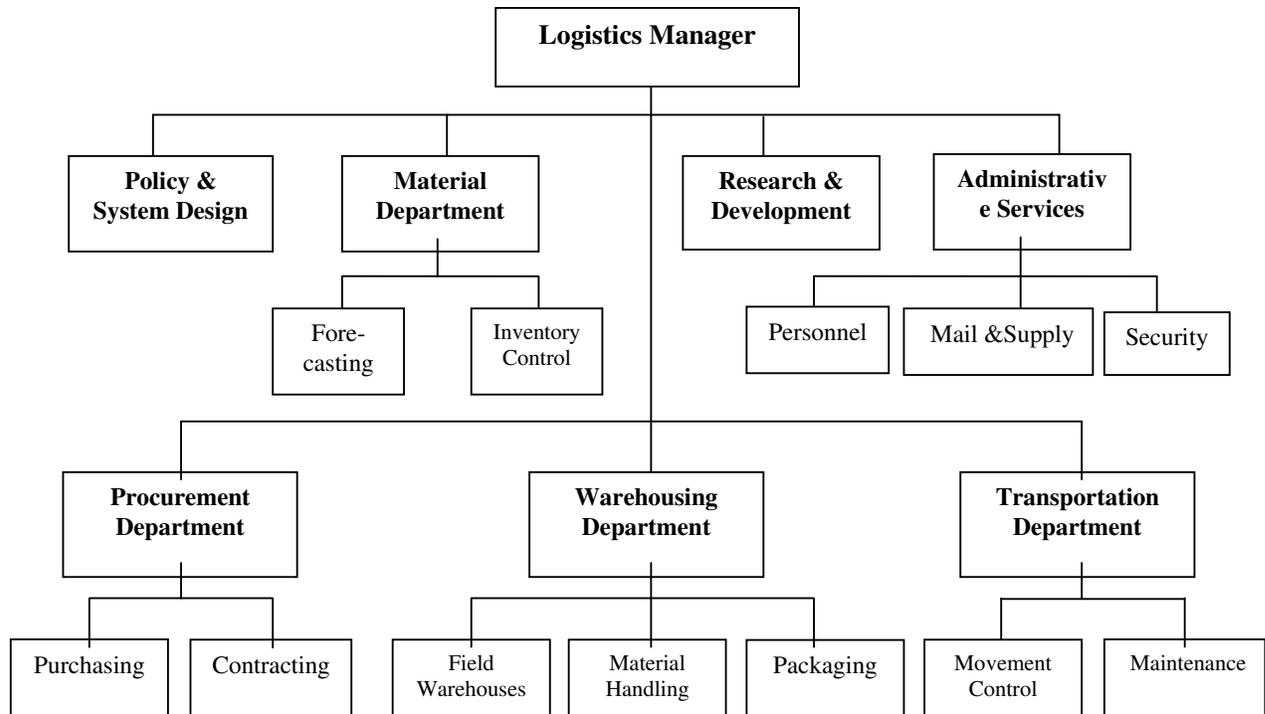


Fig No.1 A conceptual Logistic structure

2. *Materials department.* The materials department would have two different sections, forecasting and inventory control, and would be responsible for the following functions:

- 2.1. To receive all plans and programs from policy and system design
- 2.2. To receive sales forecasting from production or marketing
- 2.3. To accumulate all departmental requirements
- 2.4. To define logistics requirements for a specified period
- 2.5. To provide financial and procurement departments with a copy of logistics requirements (forecasts)
- 2.6. To modify the forecast requirements according to any changes that occurs in sale and programs, or other plans, and informs the procurement and financial departments
- 2.7. To define inventory levels and ordering methods with regards to inventory policy
- 2.8. To define safety level policy with adequate analysis in respect to the inventory costs
- 2.9. To do appropriate analysis to reduce inventory costs with regard to customer service policy
- 2.10. Coordinate all material management with the policy and system design department

3. *Administrative services.* Administrative services would be comprised of three sections: personal, mail, and supply and security. It would be responsible for the following actions.

- 3.1. To employ adequate personnel
- 3.2. To handle all personnel administration
- 3.3. To handle all correspondences
- 3.4. To ensure that security of the logistics warehouses and departments are adequate
- 3.5. To support all departmental requirements
- 3.6. Coordinate all administrative plans with the policy and system design department.

4. *Procurement department:* The procurement department is composed of contract and purchasing sections. When the logistics forecasting or special requirements are received by procurement, adequate analysis should be carried out in order to define which items should be purchased and which items should be made. The following are different steps that can be taken by procurement after adequate analysis is performed:

- 4.1. To inform production about those items which are to be made.
- 4.2. Inform contracting section to purchase those items that should be purchased by contract

4.3. Inform purchasing section to buy those items that should be purchased quickly and without any contract.

4.4. To ensure that the requirements are provided in the right quantity, the right quality, and right time

4.5. To inform the materials department if any changes should be implemented in quality or quantity of items.

4.6. Coordinate all procurement plans with the policy and system design department.

5. *Warehousing department.* The proposed warehouse department is composed of material handling, packaging, and filled warehouse. This department would be responsible for the following functions (Kazemi,2007):

5.1. Receive goods delivered from outside after adequate inspection

5.2. Record the quantity of items received

5.3. Sort goods

5.4. Allocate each item received

5.5. Hold goods under proper production and coordination

5.6. Recall, or select goods that are requested by customers

5.7. Pack the consolidated order properly

5.8. Deliver all packages to transportation departments for shipment

5.9. Update the stock record cards

5.10. Request proper handling equipment and ensure they are properly used

5.11. Coordinate all warehousing plans with the plan and system design department

5.12. Cooperate with transportation department with regard to material handling equipment repairs or service.

6. *Transportation department.* This department with two sections, movement control and maintenance, would be responsible for the following actions :

6.1. Select carrier

6.2. Document shipments

6.3. Generate information about carrier services and rates

6.4. Measure carrier performance

6.5. Determine which material or personnel must be transferred

6.6. Decide where the material or personnel must be moved, and when such material or personnel must arrive at destination or along the way

6.7. Determine mode of transportation for material or personnel

6.8. Keep the firm's transportation facilities available for use

6.9. Coordinate all transportation plans with the policy and system design department

Practical implications

The proposed logistics system and its elements can provide a way of thinking that eventually will help the reader recognize the scope of logistics organizations and its important roles.

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