Transportation The Key Player In Logistics Management

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Abstract

Transportation is on wheels mostly. The wheel is everywhere on all our cars, trains, planes, machines, wagons, and most factory and farm equipment. What could we move without wheels? But as important as the wheel is as an invention, we don’t know who exactly made the first wheel. But this invention led to the movement of goods from one place to another to transform into some usable product or any in the logistics chain. The application of management techniques and principles improves the moving, delivery, service, operation costs and the usage of facilities. Transportation takes a key part in the operation of logistic. Reviewing the present condition, a strong system needs an unambiguous outline of logistics and a proper transport implements and techniques to bond the producing procedures.

Introduction

In the present scenario with the nationalization and globalization, the importance of logistics management has been growing in various areas. In case of most industries, logistics helps to optimize the existing production and distribution processes based on the similar resources through management techniques for promoting the efficiency and competitiveness of enterprises. Transportation system is the key element in logistics chain that joints the separated activities. Transportation occupies one-third of the amount in the logistics costs and transportation systems influence the performance of logistics system hugely. Transporting is required in the whole production procedures, from manufacturing to delivery to the final consumers and returns.

This paper represents the positional relationship between transportation and logistics systems through collecting and analyzing different application cases and practices in logistics from literatures. Introducing the development of logistics and transport-related sectors based on a historical review and the interrelationships of transportation and logistics. It expresses the benefits that transportation brings to logistics activities and vice versa. The future integration of transport and logistics in the urban areas. At last, this paper will discuss and conclude the potential further development of logistics systems.

Transportation And Logistics

Peter Drucker’s comment on distribution as the ‘last Dark Continent’ for business to conquer resulted in an important management function that has multiple strides ranging from integrated logistics management to supply chain management.

It is virtually inconceivable in today’s economy for a firm to function without the aid of transportation. Transportation is an essential and a major sub-function of logistics that creates time and place utility in goods. In fact, the backbone of the entire supply chain is the transport management that makes it possible to achieve the well known seven Rs- the right product in the right quantity and the right condition, at the right place, at the right time, for the right customer at the right cost. Transportation is a critical part of any global logistics effort because of the long distances that can separate a firm from its customers. A transportation system can be inbound and outbound. A transportation system must fit within other logistics activities. Historically, national governments have exercised tight economics control over transport organizations, either through direct company ownership or through laws intended to regulate the way those businesses were run. This governmental involvement in the business of transportation is gradually waning as nations move to privatize state-owned businesses and / or deregulate privately held firms. For the logistics manager, the competitive nature of goods movement today means greater opportunities for obtaining better service and / or lower costs for transport providers. The five primary modes of transportation are rail, road, pipeline, water and air.

Logistics is ‘part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers’ requirements’. Logistics describes the entire process of materials and products moving into, through, and out of firm. Inbound logistics covers the movement of material received from suppliers. Materials management describes the movement of materials and components within a firm. Physical distribution refers to the movement of goods outward from the end of the assembly line to the customer. Finally, supply-chain management is somewhat larger than logistics, and it links logistics more directly with the user’s total communications network and with the firm’s engineering staff.
Logistics is a process of moving and handling goods and materials, from the beginning to the end of the production, sale process and waste disposal, to satisfy customers and add business competitiveness. It is ‘the process of anticipating customer needs and wants; acquiring the capital, materials, people, technologies, and information necessary to meet those needs and wants; optimising the goods- or service-producing network to fulfill customer requests; and utilizing the network to fulfill customer requests in a timely way’.

Revolutions In Logistics From Past To Present
Initially Logistics was a military activity concerned with getting soldiers and arms to the battlefront, but it is now seen as an integral part in the firm’s production process to carry raw-materials, semi-finished goods and finished goods to market and customer’s. The term, logistics, was initially developed in the context of military activities in the late 18th and early 19th centuries and it launched from the military logistics of World War II. The probable origin of the term is the Greek logistikos, meaning ‘skilled in calculating’. Military definitions typically incorporate the supply, movement and quartering of troops in a set. And now, a number of researches were taken and made logistics applications from military activities to business activities.

Business logistics was not an academic subject until the 1960s. A key element of logistics, the trade-off between transport and inventory costs, was formally recognized in economics at least as early as the mid-1880s. Based on the American experience, the development of logistics could be divided into four periods which are represented as above in the Figure. Logistics historical development Before the 1950s, logistics was under the dormant condition. Production was the main part of the managers concerned, and industry logistics was once regarded as “necessary evil” in this period. During the 1950s to and 1960s, applying new ideas of administration on business was a tendency. Drucker (2001), who thought Logistics was The Economy’s Dark Continent, regarded the procedure of physical distribution after producing products as the most possible development area in American businesses but also the most neglected area. Lewis’s study (cited in Chang, 1998) in 1956 on the role of air transportation in physical distribution was the application of “total cost concept” and it pointed out the notions of trade-off between inventory and transportation. From the 1970s onwards, more and more applications and researches of logistics appeared. Due to petroleum price rise in 1973, the effects of logistics activities on enterprises grew. Slow growth of market, pressure of high stagflation, release of transportation control, and competitions of the third world on products and materials all increased the significance of logistics system on planning and business at that time.

The further tendency of logistics in the early 21st century is logistics alliance, Third Party Logistics (TPL) and globalised logistics. Logistics circulation is an essential of business activities and sustaining competitiveness, however, to conduct and manage a large company is cost consuming and not economic. Therefore, alliance of international industries could save working costs and cooperation with TPL could specialize in logistics area.

Components of Logistics System
The logistics system consists of the following components: Customer service, Inventory management, Transportation, Storage and materials handling, Packaging, Information processing, Demand forecasting, Production planning, Purchasing, Facility location and other activities for a specific organization could include tasks such as after-sales parts and service support, maintenance functions, return goods handling and recycling operations.

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

The point is that every organization, be it manufacturer or service provider, for-profit or non-profit, has customers that it wants to reach. By integrating the appropriate functions into a customer-focused logistics system, the enterprise can develop a sustainable advantage that is very difficult to be imitated by a competitor. Some of these activities have traditionally had a well-defined stand-alone role within a company (purchasing, production, information processing), while others have generally been more closely associated with logistics (transportation, warehousing, packaging). What ties all of these functions together is their ability to improve customer satisfaction. This is not to say that production, for example, should be subordinate to logistics. Rather top management should utilize logistics as a way to integrate these corporate activities and keep them focused on the customer rather than on internal processes.
Logistics Transportation Networks and their Interrelations

With well developed transportation systems only the logistics could bring its advantages into full play. Moreover, a good transport system in logistics activities could provide better logistics efficiency, reduce operation cost, and promote service quality. The improvement of transportation systems needs the effort from both public and private sectors. A well-operated logistics system could increase both the competitiveness of the government and enterprises.

Design Of Logistics Network For The Transportation

The changing requirements and environment have created the need for logistics as a competitive tool to improve customer service and reduce the total cost of providing customer service. The changes have also created the need to constantly review and redesign the various logistics systems and tools used by companies.

The design of a logistics system is based on four major planning as:

a) Customer services in logistics include product availability, lead time to obtain the product, condition of the product when received and accuracy of filling an order.

b) Location decisions relate to the placement of facilities such as warehouses, terminals, stores and plants and the assignment of demands to supply points.

c) Inventory planning encompasses setting up inventory levels and inventory replenishment schemes.

d) Transportation management deals with transportation mode, fleet size, route selection, and vehicle scheduling and freight consolidation. All four areas are economically interrelated and should be planned in an integrated manner to achieve maximum benefit. Methodologies and systems that deal with integrated planning typically are at an aggregate level and do not include detailed problem definition. Systems and procedures that are more detailed do not address all four areas simultaneously. The primary reason is size and complexity.

Logistics network modeling tools attempt to include as much detail as possible but still address the logistics system design problem in an integrated manner. Some of the questions answer by an integrated logistics network is as follows:

a) The number of warehouses, their location, ownership (private or public) and their size, the allocation of customer demand to supply points (warehouses or plants); allocation to single or multiple supply points, The amount of inventory to be maintained at various locations,
b) The type of transportation services to use;
c) The level of customer service to be provided;
d) Determination of the optimal logistics network configuration is a fairly complex task because of the large number of vendors and customers, the hundreds of candidate locations for warehouses and plants and the extremely large number of transportation options. Before you start building up such a network, you should calculate the different determinations of the logistics network configurations.

Impact of Transportation on Logistics Activities

In the name of the ultimate consumer conversion of resources into useful goods takes place through transportation in connecting production process steps in the various organizations. Usually these steps engage to divide companies for production, storage, transportation, wholesaling, and retail sale, however basically, production/manufacturing plants, warehousing services, merchandising establishments are all about doing transportation. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics. Production or manufacturing plants required the assembly of materials, components, and supplies, with or without storage, processing and material handling within the plant and plant inventory. Warehousing services between plants and marketing outlets involved separate transport. Merchandising establishments completed the chain with delivery to the consumers. The manufacturers limited themselves to the production of goods, leaving marketing and distribution to other firms. Warehousing and storage can be considered in terms of services for the production process and for product distribution. There have been major changes in the number and location of facilities with the closure of many single-user warehouses and an expansion of consolidation facilities and distribution centers. These developments reflect factors such as better transport services and pressures to improve logistics performance.

Enhanced Service Quality through Various Forms Of Logistics

The function that transportation plays in logistics system is more composite than carrying goods for the proprietors. Its complexity can take effect only through highly quality management. By means of well-handled transport system, goods could be sent to the right place at right time in order to satisfy customers’ demands. It brings effectiveness, and also it builds a association between producers and consumers. Therefore, transporta-
tion is the base of efficiency and economy in business logistics and expands other functions of logistics system. In addition, a good transport system performing in logistics activities brings benefits not only to service quality but also to company competitiveness.

Supply Chain Management
Supply Chain Management is the concept for handling the production procedures in broad sense. An effective SCM application could promote the industry to satisfy the demand of new business environment.

It displays the details of the whole processes from purchasing, management, production, and distribution to customers. The information flow is like an individual system to link the whole supply chain from supplier and manufacturer to consumer. Unimpeded information flow could increase the operation accuracy for costs saving and promote the competitiveness of firms. The product flow proceeds through the whole production processes from material supply via manufactories till providing the finished products to consumers. The items in vertical direction show the various management tasks within the supply chain. Particularly, the return flow, or reverse logistic, is one of the elements in the system but with converse direction from the others.

Reverse Logistics
The concept of reverse logistics has been applied in promoting customer service and resources recycling. Concerning quality control, the defective components and finished products will be returned to their producers through reverse logistics systems. Nowadays, reverse logistics has been developed rapidly for increasing industries’ competitiveness, promoting customer service level, and recycling the reusable material. Meanwhile, the demand of reverse logistics brings out a new market for the third-party logistics industries.

Maritime Logistics
Maritime industry plays an important role in international freight. It can provide a cheap and high carrying capacity conveyance for consumers. Therefore, it has a vital position in the transportation of particular goods, such as crude oil and grains. Its disadvantage is that it needs longer transport time and its schedule is strongly affected by the weather factors. To save costs and enhance competitiveness, current maritime logistics firms tend to use large scaled ships and cooperative operation techniques. Moreover, current maritime customers care about service quality more than the delivery price. Thus, it is necessary to build new logistics concepts in order to increase service satisfaction, e.g. real-time information, accurate time windows and goods tracking systems. The operation of maritime transport industry can be divided into three main types:

1. Liner Shipping: The business is based on the same ships, routes, price, and regular voyages.
2. Tramp Shipping: The characters of this kind of shipping are irregular transport price, unsteady transport routes, and schedule. It usually delivers particular goods, such as Dry Bulk Cargo and crude oil.
3. Industry Shipping: The main purpose of industry shipping is to ensure the supply of raw materials. This sometimes needs specialized containers, such as the high-pressure containers for natural gas.

- Air Freight Logistics

Air freight logistics is necessary for many industries and services to complete their supply chain and functions. It provides the delivery with speed, lower risk of damage, security, flexibility, accessibility and good frequency for regular destinations, yet the disadvantage is high delivery fee. The characteristics of air freight logistics are that: (1) airplanes and airports are separated. Therefore, the industries only need to prepare planes for operation; (2) it allows to speed delivery at far destinations; (3) air freight transport is not affected by landforms. Given the trend of global markets, air freight logistics also has to change their services. The future tendencies of air freight development are integration with other transport modes and internationalisation and alliance and merger between air transport companies. The future pattern of air freight logistics is cooperative with other transport modes, such as maritime and land transport, to provide a service base on Just-In-Time, and door-to-door.

Land Logistics
Land logistics is a very important link in logistics activities. It extends the delivery services for air and maritime transport from airports and seaports. The most positive characteristic of land logistics is the high accessibility level in land areas. The main transport modes of land logistics are railway transport, road freight transport and pipeline transport. Railway transport has advantages like high carrying capacity, lower influence by weather conditions, and lower energy consumption while disadvantages as high cost of essential facilities, difficult and expensive maintenance, lack of elasticity of urgent demands, and time consumption in organizing railway carriages. Road freight transport has advantages as cheaper investment funds, high accessibility, mobility and availability. Its disadvantages are low capacity, lower safety, and slow speed. The advantages of pipeline transport are high capacity, less effect by weather conditions, cheaper
operation fee, and continuous conveyance; the disadvantages are expensive infrastructures, harder supervision, goods specialization, and regular maintenance needs. The excessive usage of land transport also brings many problems, such as traffic jams, pollution and traffic crashes. In the future, to improve the land transport in transport efficiency and reliability, a revolution of transport policies and management is required, e.g. pricing.

Express Delivery
As the increasing demand of time accuracy and decentralization of production, the need to reduce stock costs has led to the Just-In-Time (JIT) delivery principle, which involves more frequent delivery of materials at the right time and at the right place in the production process.

The characteristics of express delivery are:

a) Door-to-door service;
b) Efficiency;
c) Traceability;
d) Just-In-Time (JIT);
e) Growing various delivery demands.

The trend toward increasingly compact products is expected to improve the cost-benefit ratio of express delivery by decreasing the transportation cost share. Smaller products will enlarge the market for express delivery services. Also, the increasing value of products requires rapid transportation, because companies want to reduce the interest costs bound up in stock and inventories. For future development, the industries should consider integrating the services with 24-hour stores so that customers could choose a certain shop as the pick-up station. Meanwhile, the services would become more efficient and controlled due to more regular routes to those shops instead of personal houses.

E-commerce
E-commerce is the future trend of business style. It brings many benefits for both companies and consumers:

a) E-commerce expands the market area from regional to global;
b) Ecommerce uses electronic techniques instead of traditional paper works, which promotes the industries’ efficiency and competitiveness;
c) The number of trips is increased. On the other hand the average load of single trip is reduced, which means it needs higher carriage if using the same means of transportation;
d) E-commerce will impact on transport system due to the increased trips;
e) E-commerce might reduce the number of warehouses and the stock cost.

Recent Developments in City Logistics
The concept of City Logistics has been proposed to address these challenges. City Logistics has been defined as “the process for totally optimizing the logistics and transport activities by private companies with the support of advanced information systems in urban areas considering the traffic environment, its congestion, safety and energy savings within the framework of a market economy.”

City Logistics is a concept trying to integrate the existing resources to solve the difficulties caused by the impacts of increasing population and vehicle ownerships in the urban area. Many cities, such as Delhi, Bombay, and Hyderabad, have suffered from these problems due to traffic congestions, environment impact, low transport efficiency, and consequently the competitiveness of business decreased. This kind of condition not only reduces the quality of life in urban areas but also the future city development. City Logistics provides an opportunity for innovative solutions to be developed for improving the quality of life in urban areas. It contains several advanced techniques, such as Geographic Information System (GIS), Global Positioning System (GPS), logistics knowledge, Intelligent Transport System (ITS) and modelling, to optimise the city environment. Moreover, it helps to reduce both transport cost and negative environment impact. Cities are the main locations of business activities. Hence they play an important role in economic development. However given the high concentrated development in urban areas, many cities have serious traffic problems and negative environmental impacts, such as noise and air pollution, this is the cost in both developing and developed countries. These negative factors reduce the economic competitiveness of a city and make its life quality declined. The residents become the victims in the highly developed cities. The way to solve and balance the condition became a demanding issue in the recent years.

City Logistics is a new and innovative concept which aims to solve this complex problem. Three necessary targets that could be achieved by applying City Logistics: (1) mobility; (2) sustainability; (3) liveability.

Future Projection Of Logistics
Facing the worldwide competition, the improvement of logistics system should be advanced by both private companies and government. Weeld and Roszemeijer (Ho, 1997) discerned three revolutions in business that have substantial impacts on the purchasing and supply strategies of the manufacturing sectors. These three revolutions are: (1) the globalization of trade; (2) the coming of the information era; (3) more demanding consumers and continuously changing consumer preferences.
The main characteristics of future logistics development are:

a) **Growth of international goods transport:**
   i. The blossoming of E-commerce pushes ahead the international business activities.
   ii. The change of production strategy needs international cooperation, e.g. importing the semi-finished products from countries with cheaper human resources to those with higher technology to assemble the final goods.
   iii. The pressure of globalised market, such as World Trade Organization (WTO), pushes local industries to promote themselves to reach an international standard and face the worldwide competition.

b) **Improvement of services:** Efficient Consumer Response (ECR) and Quick Response (QR).

c) **Revolution of logistics operation:** IT techniques and its products bring efficiency and fluency to the logistics systems. Radio Frequency ID (RFID) is one of these techniques. The main difference between the bar-code system and RFID is that RFID does not need the action of scanning the barcode on goods. RFID could save manual operation time dramatically. RFID systems could sense the amount of goods input in the tags automatically and immediately when the costumers push their trolley through the exit.

d) **Channel cooperation between companies:** In order to save the logistics costs, a key concept is to maximize the usage of available transport capacity. Integrating the logistics demands between numerous departments helps achieve this purpose. In practice, a conglomerate could develop its own logistics service for the branches. For some medium size companies, they could cooperate transport channels with others.

e) **Specialized logistics delivery:** One of the notable trends of logistics industries is specialized delivery service. For instance, delivering fresh food from the place of origin needs low-temperature containers. Computer chips, gases and petroleum need particular conveyances to carry. These demands are rising since the products became more and more delicate.

f) **Logistics centres:** The development of logistics centres is good for industry promotion and the development of national economic system. Logistics centres could successfully shorten the distance between production and marketing vertically and also integrate various industries horizontally, and thus decrease the costs. Governments can propose special areas for storehouses and logistics to reduce land acquisition. The future logistics will cooperate e-commerce, the Internet and the newly door-to-door service to create new business prospects.

g) **Freight transport:** The alliance between middle-small size delivery companies is an important trend in the future. The strategy could help to expand service areas and increase service quality, and meanwhile raise the loads of single trips to reduce delivery costs.

**Discussions**

Transportation costs, which represent approximately 40 to 50 percent of total logistics costs and 4 to 10 percent of the product selling price for many companies, may represent logistics management’s major concern. The present problems and crises facing the transport sector, to a great extent, are the results of lack of integrated thinking of the government from the beginning. India was one of the few countries that attempted to evolve a cohesive transport policy. Transportation decisions directly affect the total logistics costs, and cost in other functional areas of the firm. Transportation management encompasses the day-to-day functions of the transportation process. Considerable knowledge is required of transportation pricing, services, and regulation, both domestic and international, to manage the transportation process and to operate the logistics system efficiently.

Integration of logistics and e-business is the future trend. In order to get more advantageous position and build a complementary and dependent relationship, networking industries, such as Snap deal, Jabong, Flip kart, naaptol e-bay etc and, usually cooperate with logistics industries. The integration could reduce the middle-level procedures. The producers could immediately give the products over to the terminal customers. This could reduce expenses and also administer sources more efficiently. Companies do not have to take the costs of inventory and warehouse, and therefore they become modernized industries of low cost, more efficiency and division of speciality. For example, customers could get ordered goods from convenience stores. Through e-logistics, the competition condition of industries could be promoted in knowledge economics.

The integration and promotion of business activities have to involve transportation systems at various stages. The integration of various applications brings the convenience through promoting the system of information flow and business operations. Customers and firms could make business more efficient and easier through the help of e-commerce and the Internet. However physical delivery still relies on the transportation system to finish the operations. The cost of transportation operation may be one-third of logistics costs. Meanwhile, transportation systems and techniques are needed in almost every logis-
tics activity. Thus the reform of business patterns has to consider transportation systems.

Conclusions

a. Transportation management embraces a proactive philosophy to identify and solve transportation problems.

b. Transportation plays an important role in logistics system and its activities appear in various sections of logistics processes. Without the linking of transportation, a powerful logistics strategy cannot bring its capacity into full play.

c. Carrier performance quality is measured with a carrier evaluation technique that uses a rating scale to rate carrier performance.

d. Common carriers are liable for all loss and damage, with limited exceptions.

e. Freight rates vary with distance and weight. Rates increase with distance and weight shipped.

f. Transportation rates are bases on either cost of service or value of service. Cost of service reflects the carriers' costs, while value of service considers how much the shipper is willing to pay.

g. Since transportation contributes the highest cost among the related elements in logistics systems, the improvement of transport efficiency could change the overall performance of a logistics system.

h. International documentation consists of financial, customs, and transportation documents.

i. Economic regulation of transportation placed controls over carrier entry, prices, and services. Today, economic deregulation of transportation emphasizes the marketplace, not government, as the mechanism for control.

j. Transportation and logistics systems have interdependent relationships that logistics management needs transportation to perform its activities and meanwhile, a successful logistics system could help to improve traffic environment and transportation development.

k. The development of logistics will be still vigorous in the following decades and the logistics concepts might be applied in more fields.

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