

ROLE OF TRANSPORTATION IN SUPPLY CHAIN MANAGEMENT

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Abstract: International trade is commonplace where the market shares are increasing in a highly desirable manner. It is therefore safe to say goods are rarely consumed where they are produced, and transportation services are the essential trait union between all of the elements of the Supply Chain. Supply Chain Management encompasses, planning, design, control and implementation of all business processes related to procurement, manufacturing, distribution and sales order fulfilment functions of a business.

Transportation is on wheels mostly. Transportation plays a vital role in the operation of logistic. 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.

The success of any supply chain can be judged from its transportation management.

Transportation is a major contribution and a competitive force in business. It physically connects the business to its supply chain partners, such as suppliers and customers, and is a major influence on the customer's satisfaction with the company. This paper mainly focuses on the Increasing Importance of Transportation, role of transportation in the logistics function, the supply chain etc.

Key Word: Logistics, Transportation, Suppliers, Customers.

INTRODUCTION

The success of any supply chain can be judged from its transportation management. Transportation is a key process in the logistics chain, which is involved at every stage, right from the manufacturing of the product, to its final delivery at the required location.

Another major role that efficient transportation plays in the logistics chain is the globalization of products. This is made possible by facilitating transportation of goods from countries with cheap labour like China and India, not just contributing to their economy, but also helping to create a channel of flow for these products.

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Transportation is an essential and a major sub-function of logistics that creates time and place utility in goods. Transportation is the backbone of the entire supply chain management which makes it possible to achieve 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 in- bound and outbound. A transportation system must fit within other logistics activities.

Transportation is among the more vital economic activities for a business. By moving goods from locations where they are sourced to locations where they are demanded, transportation provides the essential service of linking a company to its suppliers and customers. It is an essential activity in the logistics function, supporting the economic utilities of place and time. Place utility infers that customers have product available where they demand it. Time utility suggests that customers have access to product when they demand it. By working in close collaboration with inventory planners, transportation professionals seek to ensure that the business has product available where and when customers seek it.

When carefully planned, transportation can be a leading competitive strategy for a firm. The two most important factors that need to be optimized are transportation costs and customer responsiveness. Transportation managers are faced with various critical decisions, such as the ratio of outsourced transportation to company-owned transportation; whether or not to own and manage an independent transportation fleet; how to minimize the need for backup inventory by improving customer responsiveness, etc.

The flow of goods flows through a network of transportation by road, rail, air or ship and intermediary warehouses to hold inventories before moving to the forward locations. The entire activity involves multi-tier suppliers, agents, and agencies including freight forwarders, packers, customs department, distributors and Logistics service providers, etc.

MODES OF TRANSPORTATION

Logistics refers to the transportation of goods and merchandise – raw materials or finished products – from the point of production to the point of final consumption. 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 can be used for the effective management of merchandise. Every mode of transportation requires a different set of infrastructure, type of vehicles, technological solutions and regulations. All have different costs, service and transit times.

Rail-Railroads have handled the largest number of ton-miles in the United States to this day. A ton-mile is the standard measure of freight activity. The capability to efficiently transport large tonnage over long distances is the main and most important reason railroads continue to handle significant intercity tonnage.

Highway- Highway transportation has grown fast since the end of World War II. This growth has resulted from the ability to operate door to door. Trucks are very flexible because of the ability to operate on many different roadways. Almost one million miles of highway are available to trucks. Trucks have a small fixed investment in terminal facilities and operate on publicly financed and maintained roads.

Water- Water is the oldest mode of transportation. The main advantage of water transport is the capacity to transport extremely large shipments. Water transport ranks between rail and highway carrier in terms of fixed cost.

Pipeline- Pipelines account for nearly 70% of all crude and petroleum ton-mile movements. Natural gas is also transported using a pipeline system. Pipelines operate on a 24 hour basis and there is no empty container or vehicle that has to be returned at the end of the day. The fixed costs are high but the variable costs are the lowest out of all the modes of transportation.

Air-Air is the newest but least utilized mode of transportation. The most significant advantage of airfreight lies in the speed with which a shipment can be transported. Air shipment can be done in hours while the other modes of transportation may take days.

COMPONENTS OF LOGISTICS SYSTEM

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.

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 fulfil customer requests; and utilizing the network to fulfil customer requests in a timely way’.

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.

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.

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).

LOGISTICS TRANSPORTATION NETWORKS AND THEIR INTERRELATIONS

Logistics is the backbone on which Supply Chains are driven. Logistics refers to the management of the flow of goods and supplies involving information, data and documentation between two entities or points. Logistics plays important role in post procurement function of delivery of raw material from the supplier to the point of production and Finished Goods Supply chain management from the point of dispatch from factory to the point of delivery to the customer.

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 modelling tools attempt to include as much detail as possible but still address the logistics system design problem in an integrated manner. Some of the 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.

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 the following planning:

- 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.

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, transportation is the base of efficiency and economy in business logistics and expands other functions of logistics system.

TRANSPORTATION AND LOGISTICS

Logistics is defined as "that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and

storage of goods, services and related information from the point of origin to the point of consumption in order to meet customers' requirements."¹ Transportation is represented in this expression through the word flow. Transportation provides the flow of inventory from points of origin in the supply chain to destinations, or points of use and consumption. Most businesses manage both inbound and outbound logistics. Inbound logistics involves the procurement of materials and goods from supplier locations. Outbound logistics involves the distribution of materials and goods to customer locations. Therefore, transportation is necessary on the inbound and outbound sides of the business.

Transportation is sometimes to blame for a company's inability to properly serve customers. Late deliveries can be the source of service problems and complaints. Products might also incur damage while in transit, or warehouse workers might load the wrong items at a shipping location. Such over, short, or damaged (called OS&D) shipments can frustrate customers, too, leading to dissatisfaction and the decision to buy from a competitor for future purchases.

Transportation can also represent a substantial cost for the business. The cost of transportation can sometimes determine whether a customer transaction results in a profit or a loss for the business, depending on the expense incurred in providing transportation for a customer's order. Faster modes of transportation generally cost more than slower modes. So although shipping an order overseas by airplane is much faster than transporting by ship, it can cost as much as 20 times more. Such a cost difference might not justify the use of the faster way of transporting the goods. Supply chain managers must therefore carefully consider the cost of transporting goods when determining whether to move product and how to move product in the most economical manner.

Transportation is only one activity responsible for providing time and place utilities through inbound and outbound logistics. Logistics also involves forecasting demand, planning inventory, and storing goods as well as delivering them. Optimized logistics performance means that these activities are working closely together so that the customer of the logistics service is satisfied with the service, yet the cost the company incurs is minimized. This optimal performance requires an understanding of how the various logistical decisions and actions affect service for customers and total cost.

In the case of Finished Goods distribution, SCM strategy will define overall network design for stock holding and other channels of distribution. Logistics deals with the entire gamut of designing transportation network, partnering with 3rd party logistics providers to establish distribution centres and warehouses, planning inventory management and operations process including packing, promotional bundling, etc., primary, secondary distribution network and vendors and at the end the complete documentation and information process for the entire chain of activities.

Supply Chain Management (SCM) can be divided into three main areas: purchasing, manufacturing, and transport. From end to end, this includes decisions about which input materials to use, production quantities, inventory levels, distribution network configuration, and transportation for both the input materials as well as for the finished products. Logistics Management is the component of SCM that focuses on how and when to get raw materials, intermediate products, and finished goods from their respective origins to their destinations. Today, international trade is commonplace and increasing market share in emerging markets is highly desirable. It is therefore safe to say goods are rarely consumed where they are produced, and transportation services are the essential trait union between all of the elements of the Supply Chain. Effective, cost efficient Logistics Management can be a real point of competitive differentiation.

A supply chain is the network of companies that work together to provide a good or service for end users and consumers. Most companies operate within supply chains, relying on outside parties such as suppliers and customers to help them reach the end-user market.⁴ In other words, most companies do not entirely own their supply chains.⁵

Supply chain management encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, or customers. Supply chain management integrates supply-and-demand management.

Global markets are expanding beyond borders and re-defining the way demand and supplies are managed. Global companies are driven by markets across continents. To keep the cost of manufacturing down, they are forced to keep looking to set up production centres where the cost of raw materials and labour is cheap. Sourcing of raw materials and vendors to supply the right quality, quantity and at right price calls for dynamic procurement strategy spanning across countries.

In a global scenario, the finished goods inventory is held at many locations and distribution centres, managed by third parties. A lot of inventory would also be in the pipeline in transportation, besides the inventory with distributors and retail stocking points. Since any loss of inventory anywhere in the supply chain would result in loss of value, effective control of inventory and visibility of inventory gains importance as a key factor of Supply Chain Management function.

Any business organization, the successful operations depend upon visibility and control over the logistics process managed through and with excellent logistics service provider backbone and network.

THE INCREASING IMPORTANCE OF TRANSPORTATION

Throughout the 1980s and mid-90s, many manufacturers began to transition away from a traditional mass production strategy and toward a Just In Time (JIT) strategy. Rather than manufacture large volumes of products and then hope market demand would ensue, JIT allowed manufacturers to produce product volumes more in sync with actual market demand. Consequently, this strategy led to smaller production runs and frequent deliveries of low product volumes, often in a more unpredictable manor.

To execute this new manufacturing strategy successfully, changes to supply chain operations had to be made. The importance of transport in particular increased exponentially, and distribution rocketed to the forefront of discussions on key factors necessary for companies to achieve success in a JIT environment.

At the turn of the millennium, however, many manufacturers began to turn their attention to what they believed were core competencies necessary to achieve competitive differentiation in their marketplace. Logistics, in most instances, was outside of this sphere. As a result, manufacturers chose to outsource logistics operations, and in fact, many manufacturers identified transportation as one of the simplest supply chain components to run via a third party.

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.

CONCLUSION

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.

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.

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

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.

Only 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.

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