The relationship between transportation and logistics

In this paper, we consider the relationship between transportation and logistics. The basic purpose of this paper is (a) to make a theoretical analysis on the study of logistics and transportation, (b) to review the estimation and measurement of transportation. In the manipulation of logistics transportation plays a crucial part. In the later half we have focused on the environmental effect and the key challenges in the transportation/logistics. Reviewing the current conditions, the recent technological development has made possible the trading of formalized options around transportation and logistics.

This paper aims to propose a framework that transportation is more than just moving goods from one place to another. In order to meet the needs of the customers, there is still need to do a lot to improve the delivery of transportation and logistics services.

KEY WORDS – Transportation, Logistics, City Logistics

INTRODUCTION-

On the threshold of the new millennium, we are observing the major changes in the business practices. In today’s world companies are gaining competitive advantages from the execution of the powerful, information technology driven logistic solution in their dispersion system. Coordination between different firms in the supply chain is very vital for its efficient implementation.

The task of a logistics firm in a supply chain involves shippers at the input side and consignees at the output side. The aim is to fulfill the needs of

various peoples involved, in the supply chain more effectively than one's competitors. (Lai, Ngai, Cheng, 2003)

" We are and will be going through something of a logistic revolution in next 10-20 years. A few inexorable trends related to market growth and global transportation/ logistics challenges will shape this big, growing world and will tax our logistics management skills."

(Neuschel and Russell, 1998)

The supply chain process-

Third party logistics provider Flow of Information

Flow of Goods

Distributors

Suppliers

Customers

Retailers

Manufacturers

Inbound Logistics Outbound Logistics

Material Management Physical Distribution

Fig. 1

(Min and Zhou, 2002)

According to the Global Supply Chain Forum, “ Supply Chain Management is the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders.”

(Lambert and Cooper, 2000)

Basic Supply Chain Model-

(Alvarado and Kotzab, 2001)

THREE ESSENTIAL SUPPLY CHAIN STRATEGIES

Transportation strategy

*Transport fundamentals

*Transport decisions

Inventory Strategy

*Forecasting

*Inventory decisions

*Purchasing and supply

*Scheduling decision

*Storage decision

Customer Service goal

*The product

*Logistics service

*Information systems

Location strategy

*Locations

*The network planning process

Fig. 2

(Mentzer, 2001)

OVERVIEW OF LOGISTICS-

DEFINATIONS-

Logistics includes the wide set of activities involved in the transformation and circulation of goods, for example, the core distribution, the material supply of production and transport function, retail and wholesale and they also cover the provision of households with customer goods also with the related information flows. (Hesse and Rodrigue, 2004)

The function responsible for all movement of materials through the supply chain is called Logistics.

Logistic is the function responsible for moving materials through their supply chains.

A supply chain is the series of activities and organizations that materials-both tangible and intangible-move through on their journey from initial suppliers to final customers..

Inbound logistics- The movement of materials received from suppliers.

Material management-The movements of materials and components within a firm.

Physical Distribution-The movement of goods outwards from the end of the assembly line to the customers.

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.

(Hesse and Rodrigue, 2004)

“ Supply chain management extends much further than simply a concern with the physical movement of material. In addition to the issues of transport and physical distribution, supply-chain management is also concerned with;

Supplier management

Purchasing

Material management

Manufacturing management

Facilities management

Customer service

Information flow”

(Stevens, 2007)

Evolution of Logistical Integration (1960s-2000s)

1960s 1980s

Materials Management Demand Forecasting

Purchasing

Requirements Planning

Production Planning

Supply Chain ManagementManufacturing Inventory

LogisticsWarehousing

Materials Handling

Packaging

Physical DistributionInventory

Distribution Planning

Order Processing

Transportation

Customer Service

1990s

2000s

Strategic Planning

Marketing

Information Technology

Fig . 3

(Hesse and Rodrigue, 2004)

The key reason for logistics development is the recession of America (1950’s) which made people focus on goods circulations.

TRANSPORTATION-

The Role of Transportation-

The movement of any product from one place to another is referred as Transportation. As a growing share of the global population lives in cities, one of the prevalent processes has been urbanization. Taking this into consideration, urban transportation becomes an essential to support the passengers and freight mobility requirement of huge urban agglomerations. The term Global Urbanization is a process of:-

Transition from a rural to a more urban societies ,

It’s a trend reflected in the growing size of citieshttp://www. people. hofstra. edu/geotrans/eng/ch6en/conc6en/img/15largestcities. gif

(Rodrigue et al, . 2009)

Cities with more than 10 million inhabitants, 2007 (in millions)

http://people. hofstra. edu/geotrans/eng/ch6en/conc6en/img/evolurbanform. gif(Rodrigue et al., 2009)

LOGISTICS: TRANSPORT PRINCIPLES-

“ Transportation can be seen not only as part of the logistics function within the supply chain but also, on another level, as a mechanism to deal with three dimensional movements in space and time. This latter perspective addresses the time and place utilities of getting goods to the right place at the right time in response to the customer requirements and values while keeping in mind competitive factors and the need for profits.” (Mentzer, 2001)

Traditional and Non-Traditional Perspective to Transportation in Supply Chain-

The spatial and place utility is a traditional look at the transportations function . Another traditional aspect of transportation function is the temporary storage when used in the context of , for example, in lieu of storage facilities holding bulk goods in private rail car.

There are some non-traditional approaches and perspective to transportation. Enterprises through there wide systems can forecast the demand information and as transportation services are dependable, so the goods in transit may have the potential to replace the goods traditionally held in supply chain . The function of time and place utility is not new for

transportation, however the focus, stress and potential impact of transportation on supply chains is changing. (Mentzer, 2001)

Six generations of container shiphttp://people. hofstra. edu/geotrans/eng/ch3en/conc3en/img/containerships. gif

Figure: Six generations of container ship (Rodrigue et al., 2009)

Economy of Scale – large capacity transportation vehicle are less costly per unit of freight than smaller quantity vehicle.

Avenues for Transport Cost Reduction

Cost Reduction

Areas

Traditional Methods

Competitive bidding,

Optimization of networks,

lane and node decision

Non -Traditional Methods

Critical Logistic Planning of Outbound Transportation,

Inventory Management,

Production Planning,

Warehousing Distribution and Purchasing.

(Olayinka and Somuyiwa , 2010)

Key Issues in Urban Freight Transportation

Issue

Challenge

Freight Volumes

Capacity of urban freight transport systems (congestion).

Lower driving speeds and frequent disruptions (reliability).

Passengers / freight interferences (conflicts).

Distribution sprawl (space consumption).

Nature of Freight Distribution

Smaller volumes and time sensitive freight (frequency and repetitiveness).

Cold chain (shipment integrity).

E – Commerce (home deliveries).

Environmental Issues

Mitigate environmental externalities (emission, noise)

Growing demand for reverse logistic flows, (waste and recycling).

Policy and Regulation

Competition and conflicts (access and zoning).

Access (allowable vehicles, streets and time windows).

Zoning (land use, freight distribution clusters, urban consolidation platforms).

(Rodrigue et al., 2009)

TRANSPORTATION MODE-

SMALL PACKAGES

AIR CARGO

TRUCKLOAD

RAIL / ROAD/ TRAIN

PIPELINE

INTERMODEL (combination)

CITY LOGISTICS-

Council of Supply Chain Management Professionals (CSCMP)

According to the CSCMP, “ Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related

information between the point of origin and the point of consumption in order to meet customers' requirements." (Cscmp, 2010)

As a distribution Strategy City Logistic can take many forms depending on the concerned supply chain as well as the urban setting in which it take place.

City Logistics is a new field of investigation . It thus concerns urban freight distribution. While cities, particularly since the industrial revolution, have always been important producers and consumers of freight, much of these activities were taking place in proximity to major transport terminals. (Rodrigue et al, . 2009)

http://www. people. hofstra. edu/geotrans/eng/ch6en/appl6en/img/motortransition. png

The " motor transition" in urban freight distribution

(Rodrigue et al, . 2009)

Cities and Connectivity –

Function

Main Mode

Nexus

Trade City

Water transport

(maritime and fluvial)

Waterfront (Heavy industries , intermodal terminals)

Industrial City

Railway

Central stations. Rail Terminals and railyards.

Mobile City

Highway. Transit.

Shopping Districts. Distribution Clusters.

Network City

Telecommunication

Financial / Management districts. High Technology clusters.

(Rodrigue et al., 2009)

ENVIRONMENTAL IMPACT-

Long distance freight transportation is less polluting than urban freight distribution.

The main reason are-

Urban delivery vehicles are older on average for example, trucks.

http://www. dmicrm. com/images/truck. jpg

(dmicrm, 2010)

Congestion and traffic lights results in constant acceleration and deceleration.

Traffic restrictions are responsible for lowering the vehicles operating speed, because engine runs consistently lower than optimal speed (75 km per hour on average).

Vehicle idling is common at stops and deliveries.

(Meade and Sarkis, 2002)

Figure above shows the operational life cycle chain of a product. Many environmentally conscious business practices aim at the reduction of the waste. The basic idea is to keep all the materials within the operational lifecycle, thus reducing the flow to the external environment with the help of various reverse logistics channels.

(Meade and Sarkis, 2002)

KEY CHALLENGES-

An understanding of urban geography as well as supply chain management is essential for addressing city logistics/transportation. As a multidisciplinary field, urban freight distribution carries unique range of challenges. The most prevalent challenges include-

Commuting and Peak Hours

Congestion (vicious circle)

viciouscircl. jpg (65558 bytes)

http://people. hofstra. edu/geotrans/eng/ch6en/conc6en/img/brusselsparking. jpg

(Rodrigue et al, 2009)

Parking

Cargo Load Contradiction

Land Use Pattern

(Rodrigue et al, 2009)

INTERRELATIONSHIPS BETWEEN TRANSPORTATION AND LOGISTICS

1. Integrated Transport Demand and Logistics- The more integrated the supply chain is, it becomes harder to differentiate between physical distribution and materials management. These days the responsibility for transport and warehousing is distributed between retailers, wholesalers and manufacturers . The distribution channels have extended from suppliers to customers. (Rodrigue et al, 2009)

http://www. people. hofstra. edu/geotrans/eng/ch5en/conc5en/img/integrateddemand. gif

(Rodrigue et al, 2009)

TRANSPORTATION COST-

Transportation system faces requirements to decreases the costs of movements and to increase their capacity. These days it is not rare for transport costs to account for 10% of the total cost of the product. It includes-

Fixed (infrastructure) and variable (operating) costs-

Modes

Fixed/ Capital Costs

Operating Costs

Rail or Highways

Land, Construction , Rolling Stock

Maintenance, Labour , Fuel

Pipeline

Land , Construction

Maintenance , Energy

Air

Land , Field and Terminal Construction, Aircraft

Maintenance, Fuel, Labour

Maritime

Land for Port Terminals, Cargo Handling Equipment , Ships

Maintenance, Labour , Fuel

(Rodrigue et al, . 2009)

Components of Transportation Cost-

http://people. hofstra.

edu/geotrans/eng/ch7en/conc7en/img/componentstrspcost. gif

(Rodrigue et al., 2009)

In the assessment of the transportation cost, movement between A and B involve these three cost components.

Calculation of Transportation Unit Cost – To calculate the aggregate cost of transportation, following elements needs to be determined.

Transportation Unit Factors- Distributers should firstly select the normal unit of transportations by which their products will be shipped. Units for example, pallets, storage volume and weight.

Calculation of Transportation Unit Costs- For the shipment of goods, costs should be calculated from supplying warehousing to each stocking warehouse in the distribution channel.

Product Group Transportation Profiles- A value must be assigned to the transportation element of each product group in the procurement plan.

(Ross, 2000)

Total logistics costs tradeoff-

http://www. people. hofstra. edu/geotrans/eng/ch5en/conc5en/img/tlc. gif

(Rodrigue et al, 2009)

Cost related with logistics, like transport and warehousing costs, but also inventory carrying, administration and order processing cost, are included under total logistics costs. The graph above shows a simple relationship between total logistics costs and two vital components; warehousing and transport. A balancing act takes place between transport cost and warehousing cost, based on the growth in the shipment size or the number of warehouses. The lowest total logistics costs is represented by a cutting point, implying an optimal shipment size or number of warehouses for a specific freight distribution system.(Rodrigue, et. al., 2009)

COST AND TIME COMPONENT-

Followings are the factors affecting the transportation cost –

Conditions

Factors

Examples

Geography

Distance, Physiography, Accessibility

Shipping between France and England vs.

Shipping between France and the Netherlands

Type of product

packaging , weight , perishable

Shipping coal

shipping flowers or wine

Economies of Scale

Shipment size

A 747 compared to 737 (passengers)

A ULCC compared to VLCC freight.

Trade Imbalance

Empty travel

Trade between china and United States

Infrastructure

Capacity , limitations, operational conditions

The Interstate

Mode

Capacity, limitation, operational conditions

A bus compared to a car

Completion and Regulation

Tariffs, restrictions, safety , ownership

The European union , The Jones Act

DIFFERENT MODES OF TRANSPORTATIONS ARE CHARECTERIZED BY DIFFERENT COSTS-

http://people. hofstra. edu/geotrans/eng/ch7en/conc7en/img/shipmentsize. gif

(Rodrigue et al, 2009)

The principle of economies of scale in transportation applies to freight distribution as cost tends to be inversely proportional to shipment.

(Rodrigue et al., 2009)

For example-

Logistics Costs and Average transit time of a 20 foot container, Mombasa – Nairobi (Kenya)

http://people. hofstra. edu/geotrans/eng/ch7en/conc7en/img/costs_Mombasa_Nairobi. png

(Rodrigue et al., 2009)

Conclusion

I have made an attempt to ascertain the role of transportation in transport systems and logistics. The major part of the literature includes a review of the development of city logistics and improvement in the efficiency of transport, can alter the overall performance of the transport system and supply chain management. Transportation plays an important role in the activities appears in the various sections of supply chain management. Successful carrier firms have recognized that transportation is more than just moving goods from one point to another. It involves the delivery of transportation/logistics services that meet the needs of the customers. In order to make full use of resources, we have to make proper use of Transportation and Logistics. To overcome the disadvantages of the present we need to review the transport and Logistics in a broad sense which will provide a clear idea on their application.

In the coming years, there lies a huge scope for the development of logistical services. “ The internet helps to manage supply chain activities by offering information about what kind of product is demanded, what is available in the warehouse, what is in the manufacturing process, and what is entering and existing the physical facilities and customer sites.”(Overby and Min, 2001)

As companies strive to become more competitive in the world, there lie greater opportunities for the unprecedented growth in international trade. As we look at growth opportunities in all six continents and with the advancement of E-Commerce, mastering logistics and transportation will be the critical requirement for attaining success in the global markets of the future.

There will be a need for quicker processing of order on a Just in Time (JIT) basis as a strategy for tapping, new, large, emerging markets such as, India, Brazil, Malaysia, South Africa, etc. Thus enhancing the territorial reach of carriers and shippers, and in effect enhancing logistics.

“ This rapid world growth will present rich opportunities to U. S. corporations both carriers and shippers as well as to corporations in other developed nations.”

(Neuschel and Russell, 1998)