

# Transportation and distribution

[Literature](#)



Transportation is a key logistics function. Efficient and effective management of transportation at each stage of the supply chain is crucial for both cost management and service level guarantees. We have already looked at the incidence of transportation costs on overall supply chain performance in chapter 3 when we discussed the design aspects of logistics networks. Cost remains one of the key concerns regarding transportation management. The 12th Annual State Of Logistics Report ( USA ) provides a figure of total business logistics costs of US\$1. 006 billion or 10. 1 percent of nominal US GDP.

Transportation costs alone were 5. % of GDP (Wilson & Delaney, 2001). At the level of the firm, transportation costs are considered to be between 6 to 12% of final revenues (Purchasing 2001). Apart from the aspect of costs, transportation and distribution management affects the order fulfilment cycle time and is one of the main determinants of the service level and costs associated with the supply chain. The following figure shows the well known concepts of inbound logistics, processing or manufacturing and outbound logistics. The management of the supply chain requires a coordinated approach to manage all activities to provide the greatest value to the customer.

Figure Flow of product along the supply chain Supply chain management is concerned with both inbound logistics and outbound logistics In general terms, we can refer to outbound logistics as management of distribution and it covers both transportation and warehousing decisions. ransport Modes Transportation is the physical activity which provides the time and place

utility of a product. We are familiar with the various transport modes and how each differ from the other in terms of service and cost characteristics.

Without repeating what we have already learned in transport systems and logistics, we only recall that any or a combination of several modes of transport can be used for inbound transportation and distribution of the product. Chopra and Menidl (2001) provide the following list of different transport modes: \* air \* package carrier \* truck \* rail \* water \* pipeline \* inter-modal In most cases, trucking or road freight provide the most flexible means of distribution of finished products to retail locations, which are usually close to urban demand centres.

The supply chain, however, would utilise several of these modes to effect the transportation function at various stages of the supply chain. Traditionally, sea or water transport have been the backbone of international trade and sea transport remains the major mode of transport for both inbound and outbound goods when the supply chain extends spatially overseas. In recent years there has been a tremendous growth in air freight and products with short shelf lives and high value are increasingly moving by air. One supply chain which is very much dependent on time definite air freight services is the high tech industry.

The rationale of using a quick and reliable, time definite service as opposed to a long sea voyage should be readily apparent to you when you consider the focus of modern supply chain management. Inbound Transportation Inbound transportation decisions are often neglected in supply chain management literature. There could be several reasons for this. The principal

reason appears to be connected with the nature of the product usually related with inbound transportation. These are usually raw materials and components with very little unit value compared to the final finished product.

The total incidence of inbound cost on the final revenue is usually lower than that of outbound freight. A KMPG survey on consumer markets reveals inbound costs to be less than 5 percent for 66 percent of respondents with 35 percent reporting a cost of less than 1 percent. This including international sourcing (KMPG 2002). The same report says that outbound transport costs are generally higher. Nevertheless, the management of inbound transportation can be quite crucial for firms trying to achieve a JIT manufacturing process when the source of the raw material or components is located very far away.

An integrated approach is required which seeks the minimum cost solution with transportation and inventory decisions taken in concert with the required level of product availability for the manufacturing and processing line. The following reading provides the business logic for an integrated transportation and inventory decision. The main reason for outbound transport and distribution attracting more attention is due to the fact that finished products are usually of greater value compared to the raw material and the availability of these products to the customers determines the service level associated with the supply chain.

Distribution The challenge of distribution of finished goods appears to be more onerous compared to the management of inbound transportation. Firms are more concerned about distribution and there are numerous

reasons for this. These are: \* Most large manufacturing firms are in control of the distribution of their products and find it logical to implement plans to streamline distribution to decrease cost and to improve service. \* The quickness with which a firm can respond to customer orders is greatly dependent on the firm's distribution ability. It is therefore a measure of the firm's customer responsiveness.

The finished products are usually of greater value compared to raw materials. Centralised Versus Decentralised Control We have already seen the potential of centralisation in reducing the system wide cost. Centralised decision making can reduce the aggregate level of inventory in the supply chain. The net affect is reduction in cost while the level of service is maintained. The physical centralisation of inventory and the implementation of risk pooling techniques will be feasible, apparently, when the inventories in question are owned by a single owner.

But the benefits of centralised decision making, including those related with the required level of inventories at different business units within the supply chain, need not be constrained by the concept of common ownership. It is possible to bring independent business units under the umbrella of a centralised control mechanism so long as each party appreciates the benefits achievable and if a mechanism is in place to share this benefit among the parties in an equitable way. The first step towards centralised decision making is sharing of real time information which enables firms to upgrade heir forecasts and to make better decisions.

We have already studied the concept of CPFR, which allows firms to share information and plan for replenishment in a way which benefits all firms in this collaborative network. When we are concerned with distribution, we will need to look at the way centralised information and control can help firms in reducing costs and in improving service levels. As stated often, the concept of benefit has to be considered with respect to the supply chain as a whole and this must address the question of system wide cost and service level.

**Distribution Strategies** Distribution strategies are concerned with making goods available to customers at the least cost while maintaining a high level of service. The strategies are concerned with that part of the supply chain which typically originates from the manufacturer and ends up with the retail outlets. In principle and in practice, any mode or a combination of transport modes can be employed to manage distribution. The predominant mode in use for distribution is, however, road.

Road vehicles provide the flexibility of door to door transportation and are absolutely essential for distribution management. At the same time, it must be appreciated that rail and waterways play an important role in distribution of many products, and that air freight of time sensitive high value products is increasingly used for distribution in markets where the intervening distances are great. We need to be mainly concerned with distribution and the integrated role of warehouses and transport units, mainly road vehicles.

We are aware of the basic inventory decisions and role of warehouses in supply chain management. The capacity and use of warehouses and the average inventory level in each is dependent on the distribution strategies.

Effective distribution strategies must cater to emerging trends in the industry. Recent trends in the industry suggest that companies are, in an effort to reduce their inventory levels, pushing inventory back to the suppliers with more frequent and smaller size orders. Another recent trend is e-commerce or Internet-based sales of such products as books or CDs.

These direct to consumer orders require a distribution centre designed and arranged for individual item picking and systems to effectively manage large numbers of small orders. These trends are driving shipment size even smaller and increasing frequency of shipment (Huppertz 1999). Huppertz (1999) states that the impact of smaller order quantities is measurable and has caused the rise in overall transportation expenditure of 57% of total logistics costs in the USA in 1995 compared to 44% in 1980.

One reason for this rise is the shift of firms to more costly LTL (less than truck load) shipments to manage the distribution of these smaller and more frequent shipments. These new trends present considerable challenge to transportation management as these imply increasing costs of transportation and distribution due to more transactions, increased handling and smaller freight moves. There are several strategies available to offset some of the cost increases.