Loss Reduction and Cost Optimization in Transportation

Antriksh Kumar, Jithin Thomas, V.B. Khanapuri (vbkhanapuri@gmail.com)
National Institute of Industrial Engineering, Mumbai

Abstract
The logistics cost in India is around 13-14% of the GDP (CSO, 2002) which is staggeringly high as compared to the developed nations. On an average transportation constitute around 35% and maverick expenses (including losses) contribute to around 30% of the end to end supply chain cost. Due to very high logistics cost and losses, the products manufactured in India have low profit margins. The purpose of this paper is to propose a framework that enables companies to identify the processes involved in their logistics that could be optimized to reduce the overall cost.

This paper focuses on developing a qualitative framework that would help firms to strategically reduce their overall transportation cost. The transportation cost being discussed here refers to the expenses incurred in the physical movement of goods from owner to owner. It broadly comprises of following Planned Expenses and Losses. Planned Expenses can again be categorized into the following components – Line haul expenses, Terminal expenses, Capital expenses.

Organizations often focus on reducing the logistics expenditure without analyzing the effect on losses and vice-versa. However, any method adopted for reducing loss may incur additional expenditure and methods to reduce expenses may augment losses. Hence, the ultimate aim is to devise a strategy that would reduce the overall cost.

A 2x2 matrix has been evolved which takes into consideration the Planned Expenses on one axis and Losses on the other.

Keywords: Loss Reduction, Cost Optimization, Transportation

Introduction:
Supply chain management, in the recent time, has gained significant importance in the global industrial sphere. Most of the companies which are known for their exclusive business practices around the world, have been able to do so by improving their supply chain. Reduction in expenditures and targeting redundant costs have enabled companies to compete at the global front. These savings have then been invested by the companies in building a more robust organization structure, hence, delivering operational excellence.

With developing markets, companies have to adhere to competitive prices. Due to this, the only scope for companies to earn higher margins is to reduce their costs. On an average, logistics cost forms around 12.3% of the GDP, of which, transportation accounts for around 44.29 % (See Appendix Table 1).

Any reduction in logistics cost hence directly reduces the total cost incurred by a firm. Modern technology, to some extent, has enabled movement of resources to be eliminated altogether. For instance, meetings can be conducted today without all the members coming to a common place, using video conferences. However, logistics can’t be done away with completely. Whenever goods or services are produced at one place and consumers are at some other place, then either the goods or the consumers have to be moved. Reducing logistics cost hence becomes the
next strategic frontier for supply chain management. However a reduction in cost could adversely affect the risk involved in the process. Hence, it becomes imperative to have a strategic approach towards reducing both cost and risk. The losses incurred in the process are a measure of the risks involved. Hence, loss and risk have been used synonymously in this paper. The usefulness of the strategic cost v/s risk approach can be seen in the experience of various companies, one of which has been discussed here.

Not long ago, a Tyre manufacturer based out of Southern India found its profitability squeezed due to high logistics cost. Their main customer was a Car OEM based in Northern India. Setting up a plant closer to the customer wasn’t a feasible option for the firm, hence it decided to increase the utilization of trucks used in transportation and reduce the logistics cost involved. For this, they planned to shift the value adding activities, like packaging of tyres into bundles of four, near to the OEM site with the help of a third party. This enabled them to carry more load of tyres per trip, since unpackaged tyres could be stacked densely. However, the third party didn’t conduct proper inspection while packaging the tyres into bundles of four, which consequently increased risk of non-compliant (different types of) tyres being packaged together. This resulted in a lot of batches being rejected by the OEM. This case shows how steps to reduce cost increased the risk of entire lot being rejected.

(The scope of this paper is limited to developing transportation strategies for the movement of goods from owner to customer. It doesn’t focus on inventory management or warehousing.)

Terms and Definition:
The Council of Logistics Management (CLM, 2000) has defined SCM as “the systematic, strategic coordination of the traditional business functions and tactics across these business functions within a particular organization and across business within a supply chain for the purpose of improving the long term performance of the individual organizations and the supply chain as a whole”.

The Council of Supply Chain Management Professionals (CSCMP) defines logistics 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 between the point of origin and the point of consumption in order to meet customers' requirements”.

Factors affecting Logistics Strategy:
There are two primary dimensions that affect what kind of logistics channel a firm decides to use. These two dimensions are:

Cost: It is the nominal amount incurred by a firm in the transportation of goods from source to destination. It is expected cost of transportation assuming no loss or undesired expenses are incurred during transportation.

These costs could fall into any of the below mentioned categories (The list is not exhaustive):

• Terminal Cost
  ◦ Loading/Unloading cost
  ◦ Trans-shipment cost
  ◦ Packaging cost

• Line haul cost (Operational Cost of vehicle)
  ◦ Fuel & Lubricants
  ◦ Repair & Maintenance
  ◦ Administrative & Operational overheads
  ◦ Driver wages
• Capital Cost
  ◦ Infrastructure (Like Ports, Terminals etc.)
  ◦ Vehicles
• Environmental Cost
• Transaction cost
  ◦ Legal (Tax)
  ◦ Insurance

Risk: It is an aggregation of potential losses that are or could be incurred due to undesirable and suboptimal performance of any of the dimensions associated with transportation of goods. For instance, any pilferage is not desirable during transportation and it results in loss for a firm, hence it is a kind of risk that a firm faces while transporting goods. Some of the risks involved during transportation of goods have been described below (This list is not exhaustive):
  • Theft/Pilferage
  • Accidents/Collision
  • Risk of loss due to environmental factors (Temperature variation etc.)
  • Demurrage and Detention
  • Damages due to improper handling
  • Delays in shipment (Due to various reasons like poor infrastructure, customs process etc.)

In general, any effort to reduce any of the risk factors would increase logistics cost and a reduction in logistics cost might increase the risk of loss, hence an integrated strategy needs to be devised to achieve an optimal solution. The decision of choice, between the acceptable levels of these dimensions and subsequently the transportation strategy, is dependent on the following determinants:
  • Product being transported
  • Source & Destination of goods being transported
  • Customer Service Levels

This paper focuses on developing a strategic approach towards reducing the overall cost and risk incurred by a firm in its supply chain by optimizing its logistics function.

Determinants of Logistics Channel:
• **Product being transported**: The parameters related to the products/goods being transported that influence a logistics framework have been described below:
  o Category of the Product: Different types of products would have different types of requirements for transportation. For instance: electronic goods would require good quality protective packing while being transported whereas pharmaceutical products would require controlled temperature during transportation.
  o Volume and Weight of Product: Based on the volume and weight of the product, some of the transport modes may be more suitable than others. For example transporting coal which is a low value, high volume product, through railways and waterways is more economical than through road or air.
  o Perishability: Goods that are perishable in nature have more risk of getting damaged and hence incur additional expenditure for either keeping such products in good condition or transporting them faster.
  o Toxicity/Flammability: Toxicity or Flammability of a product dictates the infrastructure needs required for transporting goods, since a product that is highly toxic or inflammable in nature could cause huge damage to environment or may undergo physical loss during movement. For example: substances like chemicals, radioactive
metals etc. require totally different types of transportation infrastructure for safe movement.

- State of the product: Infrastructure needs for transportation are again largely determined by the state of the product i.e. whether they are solid, liquid or gaseous in nature. For instance, fluids can be economically transported using pipelines whereas solids can’t be.

- **Source & Destination of Goods:**
  - The geographic factors determine the kind of transport modes that may be feasible for transportation. For example, on a mountainous terrain roads or airways may be a feasible means of transport compared to waterways or railways.
  - The environmental/climatic factors also play an important role in determining the facilities used for transportation. For example usage of pipelines in very cold places may not be suitable for certain fluid products.
  - Trade Laws & other economic factors: Laws of the land form another barrier towards usage of certain facilities or infrastructure for transportation. For example: movement of heavy carriers with a city may be restricted to certain time limits.

- **Customer Service Levels:** Service levels play a pivotal role in determining the transport modes and facilities used for movement of goods. For example: Transportation of medicines require a very controlled environmental conditions which cannot be compromised in order to meet safety standards.

**Strategic Framework for minimizing Risk and Cost:**
The framework proposed in this paper tries to identify the As-Is state of the system and suggest strategies for the To-Be state which is to minimize cost and risk involved in the transportation process (Figure 1).

![Figure 1: Logistics Cost v/s Risk Framework](image-url)

Each dot in Figure 1 encapsulates information about the following parameters (determinants):

- **Source-Destination**
  - Geographical Factors
  - Trade Laws or other economic factors
  - Environmental Factors

- **Product**
  - Category
  - Volume and Weight
  - Perishability
  - Toxicity
  - Flammability
  - State – solid, liquid or gas

- **Expected Customer Service Levels**
Concept of Cost v/s Risk approach

- **Adopting economic means of transport**: When the cost of transportation is very high, it could be due to various reasons like vehicle cost, fuel cost, handling charges etc. Apparently, the factors contributing the most to the transportation cost are influenced or determined by the mode of transport used. Hence choosing an economic means of transport would help in drastically bringing down the costs.
  
  For instance: In India, if goods transported by road are transported by train then the logistics cost would come down dramatically (Annual Review, CRISIL Research, 2010).

- **Implementing efficiency improvement methods**: If the transportation is being carried out through most economical means of transport available, yet if the costs are high then the focus should be to reduce the cost by improving the efficiency and utilization of the system.
  
  For instance: If a firm transports goods from one city to another through roadways, (which might be the most economical means available) then using fuel efficient vehicles would help in bringing down the variable cost involved. (This may require higher capital investment, however on a long term, the benefits through fuel cost reduction would outweigh the addition in cost of capital required provided the vehicle is fully utilized.)

- **Adapting advanced technological solutions**: If the risk involved in transportation is very high, then the focus should be on adapting advanced technological solution.
  
  For instance: If goods being carried are highly sensitive to temperature and has a high risk of getting damaged due to a change in temperature, as in case of seafood being transported over long distances, then instead of using salted ice for preservation, deep freeze containers could be used to reduce damage to a large extent.

- **Preventive measures**: In case if the risk involved is not too high, then the system can be further improved by incorporating preventive measures to reduce losses.
  
  For example: Palletization can help prevent the damage of goods kept at the bottom of the containers during transportation.

There are various solutions or methods available for implementing each of these strategies. Feasibility and efficiency of any method would be decided by the determinants discussed above. Some of these methods have been described below:

Preventive Measures
- Driver Certification Programmes
- Product Packaging
- Material Handling
- Security Procedures

Advanced Technological Solution
- Telematics
- RFID and Acousto-Magnetic Tags
- ERP and Cloud (Software as a Service) for logistics management

Implementing Efficiency Improvements
- Hybrid Trucks
- Double-Deck Cargo
- Horizontal Collaboration
- Flexi Tanks

Adopting Economic Means of Transport
- Inland Waterways
- Railways
• Pipelines

Conclusion
Several factors such as technology, economy, multiplicity of demand points, etc. have led towards a pressing need to relook at the current practices being applied in industry for logistics. Improving the logistic system has been a major concern for most of the manufacturing as well as lot of service firms. Any reduction in logistics cost and the risk of loss involved in transportation would directly result in an improved profitability for the company. However, any decision about the channels used in logistics would have an impact on cost and the risk involved in transportation. Often, a reduction in cost has an adverse impact on risk and vice-versa. Hence, an integrated approach needs to be taken such that both cost and risk involved in transportation are reduced.

The framework discussed in this paper tries to address similar kind of issues by incorporating a holistic approach for reducing cost as well as risk involved in logistics. This concept addresses the issues in a broad manner by taking into consideration most of the aspects involved in logistics management, such as choosing the right means of transport, using the correct technologies, as well as employing methods that could target at mitigating risk and optimizing cost.

References:
Appendix:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Logistics Cost (Rs Billion)</th>
<th>GDP (Rs Billion)</th>
<th>Logistics Cost/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-96</td>
<td>1201.27</td>
<td>8995.63</td>
<td>13.4</td>
</tr>
<tr>
<td>96-97</td>
<td>1206.03</td>
<td>9700.83</td>
<td>12.4</td>
</tr>
<tr>
<td>97-98</td>
<td>1261.01</td>
<td>10163.99</td>
<td>12.4</td>
</tr>
<tr>
<td>98-99</td>
<td>1282.04</td>
<td>10824.72</td>
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<td>99-00</td>
<td>1388.93</td>
<td>11485</td>
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<td>00-01</td>
<td>1464.75</td>
<td>11939.22</td>
<td>12.3</td>
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</table>

Source: CSO, 2002

<table>
<thead>
<tr>
<th>Logistics activity</th>
<th>Trade-offs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td>Increased package information</td>
<td>Decreases shipment delays; increased package information decreases tracking of lost shipments</td>
</tr>
<tr>
<td>Increased package protection</td>
<td>Decreases damage and theft in transit, but increases package weight and transport costs.</td>
</tr>
<tr>
<td>Increased standardisation</td>
<td>Decreases handling costs, vehicle waiting time for loading and unloading; increased standardisation; increases modal choices for shipper and decreases need for specialised equipment transport</td>
</tr>
<tr>
<td>Inventory</td>
<td></td>
</tr>
<tr>
<td>Increased product protection</td>
<td>Decreased theft, damage, insurance; increases product availability (sales); increases product value and carrying costs.</td>
</tr>
<tr>
<td>Warehousing</td>
<td></td>
</tr>
<tr>
<td>Increased package information</td>
<td>Decreases order filling time, labour cost.</td>
</tr>
<tr>
<td>Increased product protection</td>
<td>Increases cube utilisation (stacking), but decreases cube utilisation by increasing the size of the product dimensions.</td>
</tr>
<tr>
<td>Increased standardisation</td>
<td>Decreases material handling equipment costs.</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>Increased package information</td>
<td>Decreases other communications about the product such as telephone calls to track down lost shipments.</td>
</tr>
</tbody>
</table>
**Driver Certification Program:** In more developed economies, as an Industry best-practice, it has been observed that vehicle drivers of third party logistics providers need to possess minimum qualifications to be deemed fit for logistics services. These certification programs deal with basic assessments ranging from techniques for fuel management, vehicle maintenance, measuring fuel performance, fuel efficiency through developing skills and other best practices. Companies in India should make it mandatory for their logistics partners to appear and qualify such certifications, in order to achieve best fuel and vehicle performance, thereby reducing overall logistics cost. Fuel accounts for about 30% of operating cost; using simple fuel management, up to 5% fuel cost can be saved (FBP1002, 2006).

**Product Packaging:** Product packaging decisions are a mid-way of marketing and logistics requirement. A product that scores well on a marketing scale, might not necessarily do well when taking the logistics aspect into consideration. Here, the concept of packaging logistics comes into picture. The various packaging cost decisions and tradeoffs can be seen in Table 2. Using the best packaging decision as per the product, packaging cost and logistics cost can be saved.

**Material Handling:** Appropriate material handling practices and equipment can help reduce overall costs for the company. This can be due to the fact that correct material handling practices would account to fewer damages and decrease in product returns.

**Security Procedures:** Cost savings for the companies (by virtue of decreased thefts) can be achieved by facilitating surveillance activities in areas where material handling is done.

**Telematics:** Telematics, in a typical sense, is a combination of telecommunication and informatics. In its simplest form, telematics can be seen functioning as the navigation system found in modern day automobiles. It comprises of sending, receiving and storing information via telecommunication devices in conjunction with the ability to control a device remotely. Companies can use the telemetric information available from the vehicles to avoid traffic congestion by re-routing the vehicles. The same information can also be used by companies to keep a check on the driving behavior of the personnel (A Goel and V Gruhn, 2006). The potentials of commercial vehicle telematics have been studied by C. Janker and R. Lasch, 2001.

**RFID and Acousto-magnetic tags:** Radio Frequency Identification and Acousto-magnetic tags have enabled organizations to fetch real-time supply chain data for optimization purposes (H Baars, 2008). This data combined with Business Intelligence have helped organizations cut costs and improve resource utilization (V Agarwal, 2001).

**ERP:** Enterprise Resource Planning systems have helped organizations to achieve effective control over various resources. Modern ERP systems provide services such as the Transport Management System Module, which, along with telematics, give real-time information about the consignment being transported, hence providing better control over them. The advent of supply chain management in organization and competition on a global front has required them to improve information flow, both internally as well as externally. Integration of Logistics information systems have enabled organizations to achieve this (S.M. Rutner et al., 2003).

**Horizontal collaboration:** Horizontal Collaboration allows companies in the same industry to share resources for cost savings and improved customer service. This approach is characterized by
manufacturers sharing supply chain assets for mutual benefits. It is collaboration across rather than along the supply chain. Often, horizontal collaboration is between companies in the same industry that, while not competing directly, market and sell to similar customers and consumers. A high-profile example of horizontal collaboration involves the Hershey Co. and the Ferrero Group in North America. Late last year, the two companies announced plans to collaborate on warehousing, transportation and distribution, furthering proof that this supply management practice is gaining in popularity (Inside Supply Management).