

# **Performance measures and the role of contracts in logistics and supply chain management**

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**1. Introduction:** Shippers who need logistics service providers and firms engaged in logistics services today are grappling with a fairly fundamental issue of business significance. It is the issue of defining service measures and contract parameters that would enable them to operate fairly (vis-à-vis supply chain partners), while being competitive (vis-à-vis other supply chains). This is true world-over, but is of increased significance in the emerging markets of Asia. One reason is that the large, but diversified markets that are emerging in this part of the world are not necessarily very high value-seeking ones and manufacturers and service providers have to provide customized products and services but with lower margins. Added to this is the fact that assets and capital are relatively scarce in this region and infrastructure is comparatively strained and unreliable.

In concrete terms, this means that logistics service providers have to plan for cost optimal asset utilization plans, while at the same time account for the supply chain consequences of poor service parameters. Eventually, this would have to be quantifiably captured and be part of contractual agreements between providers and users of logistical services.

**2. Illustrations of an emerging scenario:** Let us begin by examining a few (big and small) examples that illustrate the importance of this issue.

**Example 1:** An export oriented iron ore trader negotiating with the railways in India for supply of ore from mines to port

In earlier days, if the Indian Railways (IR) were a feasible mode of movement of iron ore, costing was done as per railway classification of commodities. This classification is based on a complex mix of haulage cost for railways, ability of customers to pay, strategic significance of the commodity and finally the lobbying power of the industry in question. In a few cases, there would be a favoured customer status based on volumes provided and some benefits in case the shipper participated in asset creation such as the Own-Your-Wagon scheme. But contracts were on quantities only, and individual shipments would be carried as per traditional order placement, indenting, rake supply as per availability, loading as per siding conditions (partly controlled by IR and partly by the shipper), transit as per operating conditions on that part of the railway network, and finally unloading governed by conditions similar to what is faced in loading (and additionally governed by port conditions in this example). IR would attempt to protect

itself against the risk of inefficient asset utilization (of wagons or rolling stock), by charging demurrage to customers who detained railway rakes beyond a permissible limit, and by charging wharfage to customers who utilized railway storage space.

At one level, these charges (demurrage and wharfage) can be considered simply as asset utilization charges that any service provider would use. But if these assets are used dynamically for many different customers and usage by one customer impacts reliable service offering to others in the system, the equation changes dramatically. Demurrage is then a dynamic quantity reflecting opportunity costs or shadow prices for different customer supply chains. Reflecting this accurately is one challenge facing IR.

A more serious issue is that today, a project investor would ideally like a *two-sided* contract, which would protect it against risks in a quantifiable manner. This would imply that the shipper would be willing to pay a premium in freight, but only for reliable service. The flip side of a premium for reliable service is a penalty for unreliable service. All service providers would have to gear up to be able to compete in such situations.

**Example 2:** Consider an express cargo mover specializing in relocation of household effects. Timing of its movements to enable customers to plan their moves is quite important. Such a “move management” company may not own all the resources required for the activity and may in turn hire assets from the market. While this keeps costs under control and provides flexible capacity, it does provide for occasional unreliability of operations (flexible capacity is inherently unreliable as investments are made with multiple customers in mind and there is occasional pressure on resources). In such a situation, a response of “This very rarely happens!” or even “This has never happened before!” is not reassuring to customers, even if the statements are true. The immediate customer would like evidence of a contingency plan, which could include different types of service.

With modern day customer referral systems and reviews on the internet, it is not convincing to proclaim 100 per cent service, which customers would realize is a pipe dream. More reliable reporting of service levels (hopefully good enough to inspire confidence, and increasing with time), with back up plans in case of failure, can be more effective.

**Example 3:** An owner of a small fleet of trucks receives a request from a larger transportation company to provide resources for an “urgent” shipment, which has got a deadline to meet at a port. The transportation company is liable for costs of movement by a more expensive, express mode, if the shipment is not made on time. It wishes to pass on some of this risk to the trucker. Should the trucker agree or not, and if so, what would be the arrangement?

Note that we are not highlighting the long-term effects of poor service (in the first case, the iron ore company may develop an alternate mode over time, in the second case, the logistics service provider may lose clients and in the third case, the small trucker may lose business with the transportation company). We are trying to see if the short term,

immediate consequences of service can be accounted for in a supply chain transaction and set of activities. To an extent, this is healthy as it aligns short-term incentives for action, with long term goals.

We now briefly explore some conceptual and managerial issues in this context.

**3. Service measures:** There are a number of service measures that can be used to monitor the effectiveness of logistics operations. Type-one and type-two service measures look at the number of shipments or transactions that are on time, and the total quantity of supply that is on time, respectively. Such measures are also used in measurement of distribution efficiency in supply chains moving, for example, consumer goods. The Type-one measures respect each transaction and in a sense protects smaller customers, and the type two measure takes a more aggregate view of service.

A minor modification of service measures of this type is to include an allowance of some kind (such as the punctuality statistics published by Indian Railways). This is actually unnecessary in real terms, as it depends on a self-defined allowance or window of tolerance.

An internal consequence of using such measures in planning is that managers would factor in a safety time in operations, so that time reliability can be attained. An example of this would be the cut-off time announced by courier collection centers for making connections at hubs. When transport and other operations are moving smoothly, customers who miss the cut-off times often find themselves accommodated. Passenger train timetables on IR have considerable slack times before arrival at the destination (which ensures good customer oriented on-time performance) and at key intermediate points (which ensures good utilization of synchronized assets like crew and locomotives, sometimes at the expense of unnecessary waiting on the part of customers). Such safety times and slacks are a part of the premium many people are willing to pay for achieving reliability. One reason is that synchronizing actions across supply chain partners is more expensive than either synchronizing internally or incurring additional asset utilization costs internally.

**4. Penalty costs:** A long-standing difficulty in the analysis and management of supply chains is to quantify the costs of not achieving service targets. Penalty costs, shortage costs and other similar costs are widely used in the analysis of inventory and other strategies, but they are usually too notional and imprecise to form parts of practical planning systems. Conceptually, such costs are clearly recognized at the strategic level of any management. They include cost of express shipments or contingencies, costs of storage of undelivered items, cost of returns, opportunity costs of lost sales and more and more, the loss of customer good-will, reputation and business because of poor service. Managers therefore have increased the notional value of shortages and self-imposed penalties for targets, compared to what they used some years ago.

In retail environments, stock-outs are increasingly visible and given the average rates of sales, one can reasonably estimate direct loss of revenue due to stock-outs.

One challenge of supply chain managers would be to translate perceived penalty costs and shortage costs to meaningful service measures which internal operations managers can factor into their planning. Logistics operations that are time-based are especially suited to measurement through service levels, as they are quick to measure and display. The impact of investments on such a measure is however more difficult to estimate and if required to be done a priori, would require tools such as simulation or somewhat sophisticated stochastic models.

**5. The role of contracts:** Finally, we highlight some of the ways the above concerns could be addressed in a business setting. Contracts are a means of supply chain co-ordination and risk sharing. Over a period of time, contracts have become increasingly meaningful and significant. They first arose in supply chains to facilitate transfer of ownership legally, then acquired commercial significance in booking capacity and assuring business volumes, and subsequently have been used to specify quality norms in service. Today, they play an important role in one the significant areas of value addition and competition, namely logistics services. A complete discussion of contracts of various kinds is beyond the scope of this article, however.

Logistics contracts relevant to the discussion in this article would specify delivery terms of handling and storage, quantities and dates of supply at origin, and desired times of delivery. Penalties, one or two sided, could be part of the contract. Finally, cost per shipment would always remain the most important part of a contract. Risks of many kinds could be covered in contracts, such as price protection against freight rates. Considerable background analysis of operations (in addition to legal implications, which dominated contract preparation in the past) is now required to draw up a meaningful contract between supply chain partners.

Analysis shows that there is considerable scope for a supply chain driver to set reasonable contract parameters that achieve overall supply chain goals as well as incentivise local decision makers to choose “globally optimal” operating parameters. Contracts are finally agreed upon through a process of bargaining, negotiation and co-operation between supply chain players. In some cases, inherently, supply chain goals align with optimal decisions through supply chain contracts that arise naturally through negotiation between supply chain partners. In other cases, incentives outside a single contract may be required to achieve such goals, and these require innovative measures. There is thus plenty of creative work to be done by management professionals, analysts and academics in this challenging area.