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Driving costs out of the Supply Chain: Inbound Logistics

Best Practices: Inbound Logistics Programs

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Abstract

One of the most neglected areas of the manufacturing (and retail) supply chain is the inbound logistics segment. Managing outbound logistics has always been the strength of the Supply Chain organization (at manufacturers and retailers). The Marketing department has identified different logistics requirements for the finished goods segment. Customizing outbound logistics requirements (various distribution models are the outcome) based on the needs of specific customer segments is today a routine requirement. Similar to the Marketing department, the Purchase (Procurement) department has its own unique set of requirements for inbound raw materials/ work-in-progress and other inbound material. In addition, modern JIT manufacturing methods push the Procurement Manager to aim to achieve lowest inventory models - often at the expense of higher inbound transportation costs. There is an inherent conflict in balancing the Just-in-time manufacturing practices (low inventory, shipment sizes, frequency of shipments) with inbound logistics and transportation needs (low cost, visibility of goods). The manufacturing or Retail organization needs to ask itself: Is it seeking the lowest integrated total logistics cost, the streamlined (and lowest) JIT inventory for its manufacturing needs or to strike a balance between the inherent conflict between the two aforementioned goals aimed towards achieving an optimally balanced and efficient supply chain?

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The trend of manufacturer and retailer organizations outsourcing non-core functions (like ransportation and logistics) introduces the third party logistics service provider (3PL) into this equation. 3PLs must master the specifics of the industry supply chain by analyzing supply-and emand flows and matching them with the cost and performance (speed, flexibility and reliability) of various (warehouse) consolidation centers and cross-dock options. Savings can be had by managing a complex, labor-intensive and fragmented supply base and by getting a grip on the supplier.s lead times. IT systems that enable the flow of information (visibility prior to and after shipping of physical goods, resources and available capacity in the supply chain) may provide Logistics Managers with just the right tools for this task.

This paper discusses best practices observed from the most successful Inbound Logistics Programs of manufacturing organizations in the automotive industry and Consumer Packaged Goods (CPG) manufacturer. It also discusses the role of a 3PL services provider (focusing on transportation and warehousing services) in this equation.

Inbound Logistics Programs: Best Practices

Understand and Analyze the costs headings/ items in the overall unit cost of product/ service

Inbound logistics spend for unit costs for a product/ service can be divided into 3 major categories:

1. Inventory carrying costs
2. Transaction costs
3. Basic unit cost of product/ service

With the global interest rates near an all time low, inventory-carrying costs today are negligible. At 2% p.a. weekly inventory carrying cost is a lowly 0.04% i.e. if the item costs $100 the interest cost is around 4 cents per week.

Transaction costs can be broken into the following components:

- Shipment documentation
- Invoicing costs
- Receipt documents (GRN, BOL, etc.)
- Payment and supervision costs
- Receiving costs
- Loading and unloading costs (multiple in case of multi-modal, multi-carrier delivery)
- EDI costs
- Personnel costs

While deciding the frequency and lot size, a comparison of inventory carrying costs vs. transaction costs should be made. These costs need to be added to the basic unit cost of product/ service to arrive at the total unit cost till point of sale. An analysis of the basic unit cost per product/ service gives an idea of the annual consumption value of the product.

Analyzing the total unit cost of product/ service with the classification of raw material/ inventory classifications (ABC type material classification) over a period of time allows a temporal comparison of the inbound logistics cost structure.

Most procurement managers don't have an in-depth understanding of transportation needs. Their mantra is inventory reduction and they typically want an all-inclusive price from their suppliers. A review of the number of inbound shipments at a plant of a JIT manufacturer (in the automotive industry) revealed an enormous number of small LTL shipments (sometimes from the same supplier) arriving throughout the day.

A joint analysis by the procurement and logistics personnel aimed towards determining the potential value of freight conversion (from LTL to consolidated FTL) should include and be cognizant of the relative transportation pricing leverage between suppliers and the manufacturing organization. Freight conversion would imply changing net prices of items being bought (from suppliers) hence treating this process as a negotiation process with suppliers is important.

In general, some industries (like the automotive and the hi-tech industries) have larger information related logistics costs (lost sales, inventory financing, no-shows or late shows at promotions, plant shutdowns, hi-tech machinery downtime) than other industries (for example, the Cement industry) where bulk transportation (asset related logistics cost like freight trucks and warehousing are high) is the most compelling need.

Some industries are more amenable (by nature of commodities involved) to freight conversion opportunities (and associated benefits) as compared to others. For example, the hi-tech industry and the automotive industry have a large range of components needed for manufacturing the end product. These large diversified ranges of components lend themselves well to component classifications based on a set of criteria (need, inventory stocking cost, transportation cost, ABC classification). In other industries, for example the bulk commodities industries (cement, asphalt, chemical) commodities do not lend themselves well to potential information and asset related logistics costs reduction opportunities.

Understand and analyze the optimization problem for inbound logistics practices. Do not create an optimization problem you cannot solve. Pick your constraints and your optimization time buckets judiciously.

Different types of industries face different logistics management problems. For example, the chemical industry spends anywhere between $60 and $80 billion on bulk logistics management. Other industries with large bulk logistics requirements, such as Agriculture and Petroleum, present a comparable opportunity.

- Bulk logistics management is characterized by limited options and limited leverage
- Limited options and limited leverage result in inaction

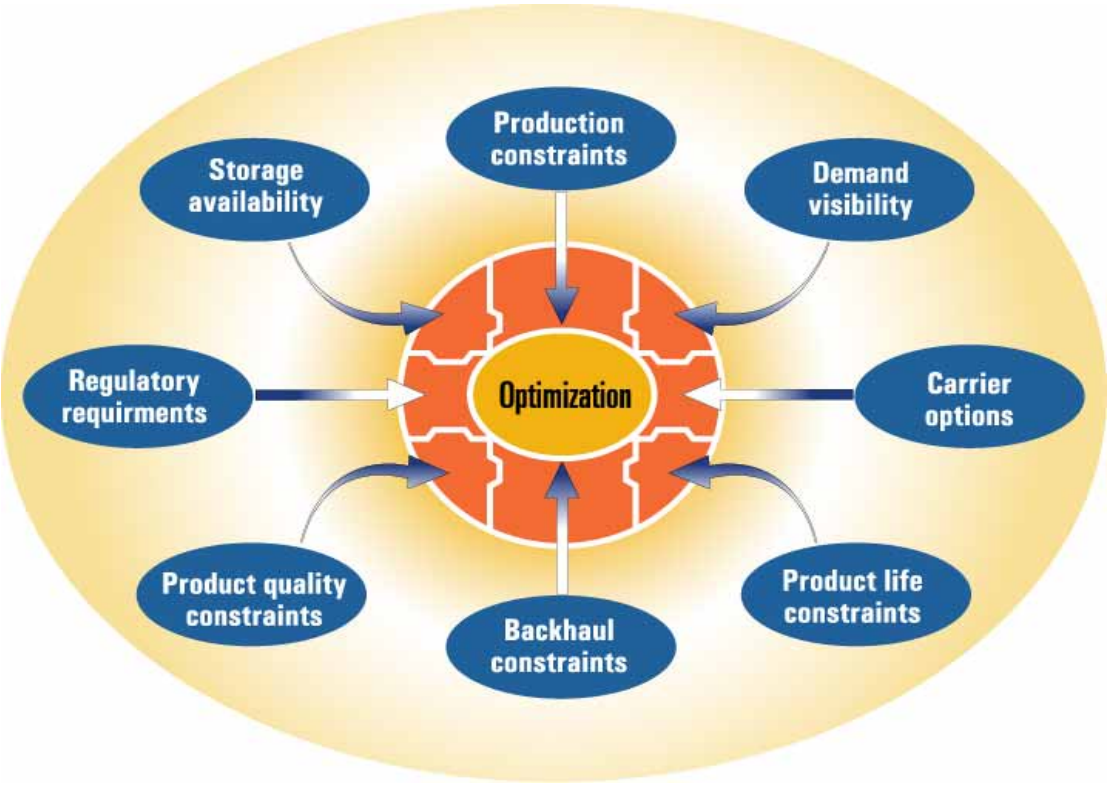


Figure 1 - Bulk Logistics Optimization constraints

Understanding the optimization paradigm for each type of industry helps formulate the scope of constraints on logistics optimization. For example, Figure 1 illustrates the scope of constraints on bulk logistics optimization. Such constraints include:

- Many bulk products, including some chemical and most agricultural products, are perishable and must be delivered to customers within a fixed time. The allocation of freight resources to ensure timely delivery is less a question of cost than it is of customer service
- Many bulk products are produced in continuous 24*7 production processes in which plant shutdowns are costly, and in some instances, create health and safety risks. For instance, the shutdown of large petrochemical plants may cost as much as $500K to $1M daily - far more than the cost of extra hopper cars used to store product
- Purity and quality considerations require that hopper cars and tank cars can be used for one product unless thoroughly cleaned between shipments. For example, one midsize manufacturer of both industrial and pharmaceutical chemicals is not sharing transportation resources between the 2 groups for health and safety reasons
- Certain hazardous chemicals, such as chlorine, are produced right into tank cars and tank trucks
- Tank cars and trucks filled with hazardous chemicals must take circuitous routes to minimize risks of public exposure in the event of an accident

Put enough constraints on a problem and the constraints tend to result in inaction. Bulk logistics is a classic example. Shippers justify building excess inventory, holding excess distribution

assets, and, in general poor supply chain planning because of the inefficiencies in the transportation system. For example:

- Most shippers simply return railcars and trucks empty back to their point of origin and make little or no effort to look at network optimization. For example, a major chemical manufacturer with a $100 million annual freight bill estimates that its fleet utilization is only at 30% capacity
- When comparing bulk options, shippers rarely take into account internal costs associated with each shipment option. For example, railcars are often spotted using the shipper's own personnel and equipment because the rail companies are not reliable enough - and the costs are not factored into the total shipment cost
- Demand planning and inventory management are not integrated with distribution management at most companies, yet significant inventory often sits in railcars, barges and ocean going vessels
- Not enough consideration is given to distribution issues surrounding mergers, acquisitions and adding new plants. For example, a major manufacturer of forest product chemicals has 30 plants scattered throughout North America, but does not use distribution network analysis in its strategic planning
- Production resources are optimized against orders, but transportation resources rarely are. For example, a large petrochemical plant optimizes its reactor run based on the mix of products ordered, but shipment schedules are not factored into the optimization problem

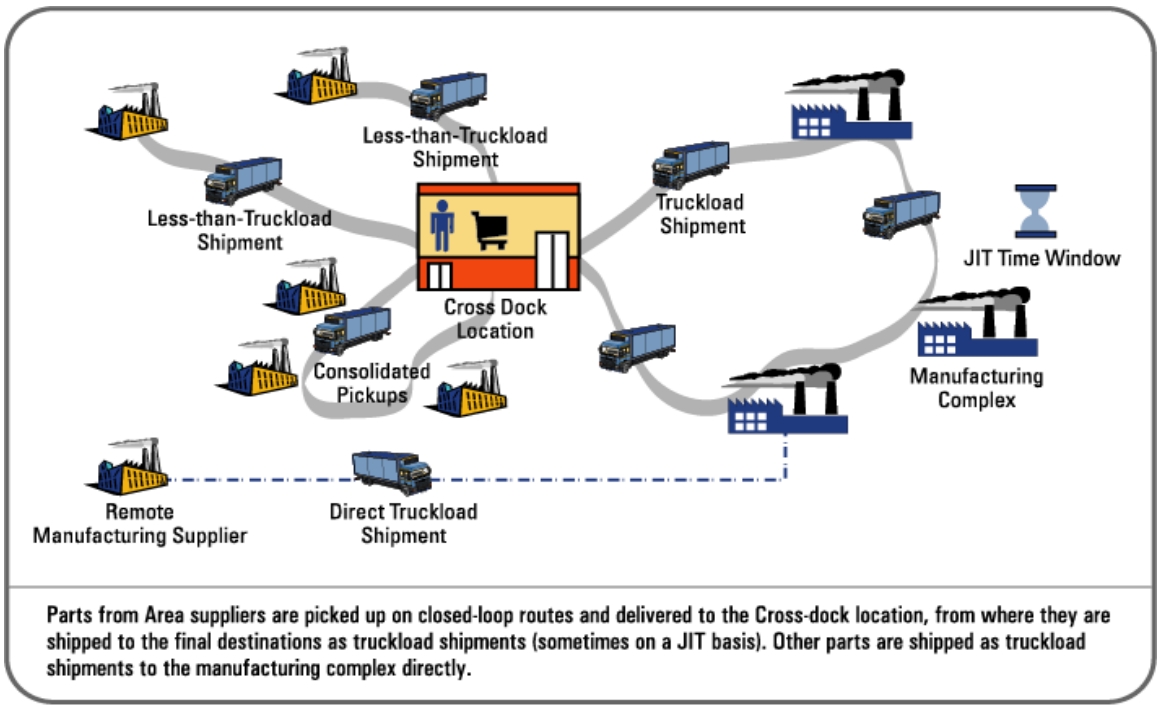
Get complete control of inbound shipments from suppliers and review all inbound shipments for consolidation opportunities

In many cases suppliers have control over shipments coming into production facilities in terms of arranging for transportation carriers, setting appointment times, actual material loaded into trucks and the actual pickup/ delivery times. Working with suppliers to iron out some of these process flaws is the first step in gaining control over inbound shipments. Retailers have tried changing the freight payment terms from pre-paid to collect, but this may harm the overall supplier relationship. Instead, working in a collaborative mode with the supplier, to gain control over inbound shipments is the way to go. If this not done, the cost savings achieved by gaining control over inbound shipments would be offset somewhere else on the supplier side. Internet based inbound transportation tools (for example the Inbound Planning engine from Viewlocity and a similar tool from ELogex) help in terms of visibility into which supplier is actually ready to ship, how much quantity and web based appointment scheduling capabilities.

The ultimate aim to achieve total control over inbound shipments would allow the retailer to eke out cost advantages from the supply chain.

In many manufacturing organizations that have purchasing/ procurement de-centralized (as well as a mixed structure), there are varying criteria used for deciding truckload shipments. For example, at a leading food manufacturer based in Wisconsin, there were at least 6 different weight breaks for deciding truckload shipments and other criteria like warehouse location only added to the in-consistency. In addition, because of the problem of not having the correct information, an analysis revealed that a good percentage of shipments moving as FTLs were actually LTL shipments. This pointed to potential consolidation opportunities (of LTL shipments) gone a begging. Lack of visibility into which suppliers are ready to ship and the actual quantity

being shipped was one of the main reasons for the above problem. In part, the problem can also be traced to lack of education/ training on the benefits to be realized from freight consolidation. An interesting scenario is created by the use of cross-docking locations used as inbound supply chain network solutions. The flow is depicted in the Figure 2.



Parts from Area suppliers are picked up on closed-loop routes and delivered to the Cross-dock location, from where they are shipped to the final destinations as truckload shipments (sometimes on a JIT basis). Other parts are shipped as truckload shipments to the manufacturing complex directly.

Figure 2 - Inbound Logistics Flow

One of the strategies is to bring in full loads of products into a regional consolidation center (or a cross-dock center) and consolidate these into full truckloads to be sent out to multiple destinations.

There are several visibility problems associated with this flow:

- The initial freight movement need is created at the end destination (plants, facilities) and the cross-dock location as well as the carrier would not know of the possibility of the shipment being cross-docked until well after it has been created (in the system) and picked up (dispatched)
- The cross-dock location would not have complete visibility into which shipments are scheduled to come into the cross-dock center until they land up at the door-steps
- The activity of dynamic switching of freight at the cross-dock location (shifting a shipment from one truck to another truck at the premises of a cross-dock location, without even unloading it at the cross-dock center) creates even more severe issues of freight visibility and tracking
- The visibility of freight leaving the cross-dock location and when it is supposed to arrive at the end destination allows production schedules to fine-tuned to the last detail - relating what came into the cross-dock location and what came away is one of the reasons this flow is problematic

The best inbound logistics programs worked on getting their hands around the visibility issues created by a Cross-dock situation. The cross-dock/ consolidation center inbound supply chain network design is an innovative way of consolidating inbound shipments, however, the above mentioned issues create a visibility (lack of) situation more often as compared to direct inbound movements.

Study the 3PL (Core carrier) concept and evaluate its impact on your business

Most manufacturing organizations today work with multiple carriers in different lanes, geographical regions and based on different rate schedules. More importantly, they also work with different warehouse operators in most of these regions. There are multiple carriers that a manufacturer would work with in the truckload space and LTL space. For example, a Foods manufacturer (based in Rochester, NY) worked with 7 different warehousing operators at 7 Pool consolidation locations and 65 different carriers (LTL as well as TL) in different geographies and lanes. This places the burden of having to negotiate the carrier contractual agreements with a host of carriers on the manufacturer. In addition, warehouse operators and freight forwarding organizations also negotiate freight contracts with the manufacturer (for their warehouse, regions), which means that the organization negotiates with a complex bunch of carriers, freight forwarders and intermediaries on rates, appointment times, equipment types, differing information flow requirements, building IT interfaces with multiple organizations, different EDI standards requirements and on promised freight volumes.

Using a single carrier (Core carrier) and eventually a 3PL organization that is able to leverage economies of scale by providing complete transportation services as well as warehousing, inventory management and distributed order management capabilities allows the 3PL to pass on the savings (accrued from economies of scale) to the end customer.

The Core carrier handles all the freight requirements of the manufacturer and is responsible to handle relationships (freight rate negotiations, capacity requirements, setting appointment times, tracking information) with a bunch of other carriers (in geographic regions, specific lanes).

Manufacturers would work with a pre-decided rate schedule (for example annually revised rate schedule) with the Core carrier and get billed as per the pre-decided rates. The Core carrier would need to handle settlement and payment transactions with the 3rd party carriers. Most successful core carriers have evolved 3rd party carrier evaluation techniques that help monitor carrier performance of on-time pickup/ delivery and appointment times setting.

Another important reason why developing relationships with a Core carrier makes sense is to avoid/ minimize handling transactions between multiple carriers. In the global supply chain context, handoffs between multiple modes (for example ocean and trucking) cannot be avoided. However, minimizing such handoffs results in minimum transactions costs and better visibility across the supply chain. Exceptions can also be better defined and managed due to lesser number of parties involved in moving a shipment.

Most Core carriers (freight forwarders, consolidators) in the market today have built freight consolidation expertise by handling freight movement for multiple organizations over a period of years. The economies of scale are a compelling argument in favor of utilizing the core carrier concept.

The move from utilizing the Core Carrier concept to evolve into a larger and more mature relationship with a Lead Logistics Provider (LLP) organization (offering the complete range of

outsourced logistics and transportation services like warehousing, inventory management, transportation, order management) is a logical move and shortens the learning curve in managing outsourced relationships in order to harness the full benefits from an outsourced relationship.

Understand how the JIT manufacturing method is affected by Inbound transportation

An important trend in the US Manufacturing industry over the past decade has been the adoption of the JIT manufacturing concept. A broad definition (among companies adopting the JIT manufacturing method) of the JIT concept (as pertaining to the Inbound supply chain/ logistics and manufacturing) that we found is a system of production and inventory management in which inbound raw materials and/ or parts arrive at the production site from the suppliers just in time to be used in the production process.

Especially in a JIT manufacturing setup, the transportation (and logistics) of inbound materials (raw materials, inter-plant raw material transfers, inter-plant raw material WIP transfers, pallet accounting, dunnage) and the Supply chain planning concept of postponement directly affects the ability to produce when little or no buffer inventory exists.

To gain the most of an Inbound logistics setup for JIT manufacturers, it is important to analyze who controls the inbound transportation, size and frequency of shipments, lengths of haul, mode and carrier choice and the utilization of the core carrier concept. The Core carrier concept, if applied correctly in this kind of a setup has immense benefits to be achieved. However, understanding the IT systems capabilities of the core carrier is an important criterion to be used in such an information-sensitive/ critical inbound supply chain. The information related logistics costs (plant shutdowns due to critical raw materials not arriving - leading to lost sales, inventory financing, detention costs, truck ordered but not used) in an Inbound supply chain model aimed at JIT manufacturing methods should be carefully analyzed before deciding on the utilization of the Core carrier concept.

Analyze the overall inbound supply chain structure to understand the nature of shipments (inbound, re-supplies, inter-plant transfers, cross-dock movements). A study conducted for a $.2.6 billion automotive manufacturer based out of Minnesota revealed that a large percentage of inbound shipments (from suppliers) are continuous, repetitive in nature. An IT system that allows Schedule management capabilities for such freight movements and reports on the variations on the actual immensely benefits the manufacturing organization.

Conclusion

Companies are turning their attention to their inbound supply chain operations and realizing that there is a lot of money that can be saved. Most manufacturers and retailers have realized that advanced Purchasing practices (supply chain concepts) have resulted in suppliers arranging for the transportation of inbound shipments. A company often ends up paying high freight costs for LTL shipments from multiple suppliers who are close to one another. Implementing a successful inbound logistics program requires a transportation management system (TMS) with proven capabilities to consolidate/optimize shipments via a Optimization engine, strong visibility capabilities/ tools, transportation schedule management, tendering and booking capabilities. However, embarking on an inbound logistics program requires more than just a good TMS solution. It is important for the manufacturer or retailer to look internally and align the goals of the purchasing department and the goals of the operations (logistics and transportation managers)

of the business. A successful program that was run for a leading Foods manufacturer and distributor aligned purchasing and logistics with an incentive structure, metrics to measure the overall success and buy in from both sides. The program created a collaborative environment by involving suppliers because it affected their revenues and operations.

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