Driving Savings via Inbound Logistics Network Design

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Summary: In this study, we studied inbound supply network for a CPG company to find opportunities to optimize both cost and visibility. This report studies three design changes to the CPG company's current inbound supply network, namely: 1) Consolidated Inbound and Outbound Deliveries, 2) Supplier Village, and 3) Reallocated Near-Site Flow and Storage. Design 1 studies reusing inbound delivery trucks as outbound delivery trucks to reduce empty mile costs. Design 2 studies locating suppliers nearer the CPG company's plants to reduce required lead time and inventory levels. Design 3 studies more efficiently allocating raw material (RM), pack material (PM) and finished good (FG) storage to enable better end-to-end product flow via reduced inventory and handling. Models were developed for each design and current costs were compared with costs if these designs were applied.

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KEY INSIGHTS

1. There is an estimated 10% savings opportunity by consolidating inbound and outbound logistics.
2. Re-evaluating current inbound logistic networks designs for Supplier Village will yield further savings, but must be analyzed from a total supply chain standpoint. Savings may be on suppliers' end, but can still be commercialized by CPG company.
3. Reallocating RM/PM with FG can be a decent saving opportunity, under certain constraints. For e.g. if number of outbound pallets is higher than inbound pallets and direct shipment from plant is above certain cutoff.

Design 1

Introduction

Traditionally, inbound and outbound logistics networks are handled separately. The segregation of management of the inbound and outbound deliveries propagates "empty miles" within the system. The proposed redesign to the inbound logistics network aims to reduce the occurrence of "empty miles." The key element to executing the redesign is that a single trucking company will be used to handle most, if not all, inbound and outbound deliveries. To execute, for supplier-managed inbound deliveries, the CPG company will work with its suppliers to engage in collaborative planning between the suppliers, the trucking company, and the CPG company. The trucking company would therefore have visibility of all required deliveries across the inbound and outbound logistics network. The intent is to maximize the cases wherein an inbound truck can be reused as an outbound truck. Figure 1 shows traditional supply chain with segregated inbound and outbound network compared to consolidated inbound and outbound. Aside from reducing

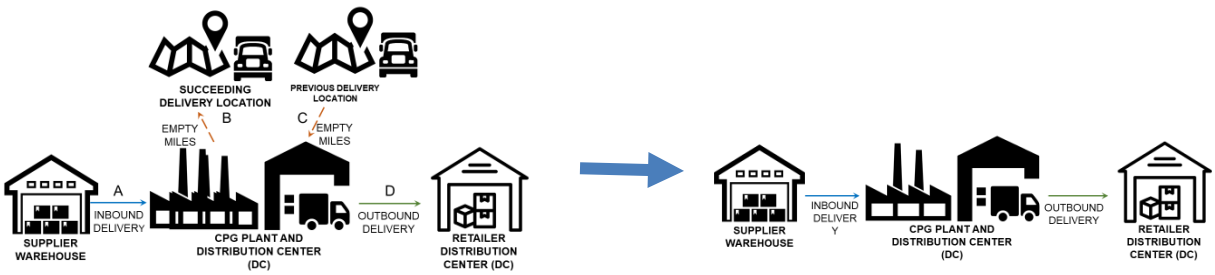


Figure 1 Simplified Supply Chain via Consolidated Inbound and Outbound Logistics

"empty miles", trucking company can also be able to increase their capacity. The CPG company can, in turn, leverage these benefits in its negotiations with the trucking company.

Methodology

A simulation was created to determine the potential savings of consolidating inbound with outbound shipments. For the test site, the daily number of inbound and outbound trucks were randomly generated following the given data on the distributions of these shipments. Based on data on the kinds of loads delivered by inbound trucks, a percentage by which the inbound trucks would be reusable as outbound trucks was estimated. Assuming a discount to be provided by carriers, multiple simulation runs were then executed to determine the expected savings value. A sensitivity analysis was then conducted by altering these parameters.

Result

Using the base case estimates, the model shows potential annual savings in the range of $800K should consolidation be implemented. A very high probability of reusing trucks, and very high negotiated savings rate with truckers would generate the highest savings, even when truck costs are very high. For the generated scenarios, for example, the computed savings averaged at $4.64M.

Design 2

Introduction

For design 2, one of the CPG company's manufacturing plants in Europe was studied. The company evaluates the benefits of moving its suppliers to supplier village financially by calculating the Net Present Value (NPV) of the project. Traditionally, the CPG company has computed the project NPV only for the company. This, however, might not necessarily be true for entire supply chain. Specifically for Supplier Village, savings may be on the side of the supplier, rather than the company. However, this does not mean that the company cannot benefit. By working collaboratively with their suppliers on the Supplier Village model, the company can potentially commercialize or share the savings with the supplier. Therefore, in this study, cost was calculated for the entire supply chain i.e., both for the supplier and the CPG Company, under both scenarios – with and without Supplier Village.

Methodology

In order to calculate the NPV, inventory at each stage of the supply chain under both scenarios was calculated. Inventory was segregated into three components – cycle, safety, and pipeline stock – to understand how changing different factors will influence total inventory in both delivery models. After calculating the total inventory at each stage, cost is calculated for each stage. A cost comparison model was then built to analyze each of these costs for the current supply chain and the Supplier Village supply chain.

	CURRENT SETUP	SUPPLIER VILLAGE	Change
TOTAL SUPPLY CHAIN COST BREAKDOWN	Total Supply Chain	Total Supply Chain	Total Supply Chain
Inventory Holding Cost	$ 913,792.84	$ 399,784.37	$ (514,008.47)
Handling Cost	$ 764,405.76	$ 764,405.76	$ -
Transportation Cost (Truck)	$ 1,670,000.00	$ 1,670,000.00	$ -
Transportation Cost (Shuttling)	$ 250,500.00	$ 250,500.00	$ -
Detention & Demurrage	$ -	$ -	$ -
Storage Costs	$ 644,787.00	$ 272,794.50	$ (371,992.50)
Admin Costs	$ -	$ -	$ -
Fixed Costs	$ -	$ -	$ -
TOTAL	$ 4,243,485.60	$ 3,357,484.63	$ (886,000.97)

Figure 2 Cost breakdown: Current vs Supplier Village

Result

Under the base case, if the test site were to move to a Supplier Village model, there would be a 21% reduction in total supply chain costs, or around $886,000 annually. Figure 2 cost breakdown showed that the Supplier Village model generates significant savings via reduced inventory and reduced storage costs. This is because the supplier and the CPG company would now jointly be managing a single inventory pool at the Supplier Village warehouse, instead of managing two separate piles of inventory.

Design 3

Introduction

Another part of the project was to study one of the manufacturing locations in North America. Under the current scenario for this plant, raw materials (RM) and pack materials (PM) are delivered and stored at an onsite facility. Finished goods (FG) are moved to near site warehouses and the distribution center, which are within the vicinity of the manufacturing plant. Under this supply chain design, most of the plant space is used in storing raw material, leaving less room for FG. This part of the study focuses on the benefits of switching storage for raw material and pack material with that of finished product.

Methodology

To analyze overall benefits of reallocation of inventory, material flow was mapped out for both the supply chains, and cost comparison model was built. This gave a clear picture of how the change in flow of materials will impact different costs such as handling, inventory, transportation and shuttle. To better derive saving opportunities cost benefits were divided into 2 main categories: savings with and without plant-direct-shipment

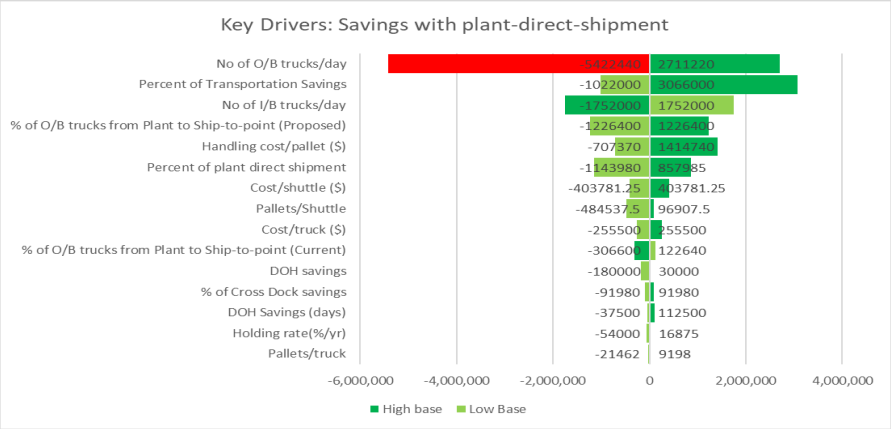
Result

Under the base case, it was determined that relocating FG inventory with RM & PM would bring approximately 5% to 6% savings without plant direct shipment and 8% savings with plant direct shipment. As observed in Figure 3, one of the key drivers bringing savings was the number of finished goods sent from plant directly to the ship-to point. Therefore, if the CPG company tries to bring this percentage up, this will significantly improve the saving opportunities. Another important factor was the percent of plant direct shipment, as it adds to steady flow of deliveries and additional savings. It is therefore a good savings opportunity, if the company implements plant direct shipment along with reallocating inventory.

Conclusions

Saving opportunities exist for company at inbound network, which can be leveraged by company by implementing the changes demonstrated in the model. Design 1 looked at applying a negotiated savings rate on current truck costs, assuming a portion of the inbound trucks could be reused as outbound trucks. It was also determined that to maximize savings, the company should work on jointly: 1) increasing the probability of being able to reuse an inbound truck as an outbound truck, and 2) negotiating with the carrier as high a savings rate as possible.

For design 2 savings was driven primarily by the reduction in total overall inventory, the key driver of costs in the current supply chain. In general, therefore, it would only make sense to implement Supplier Village if the inventory



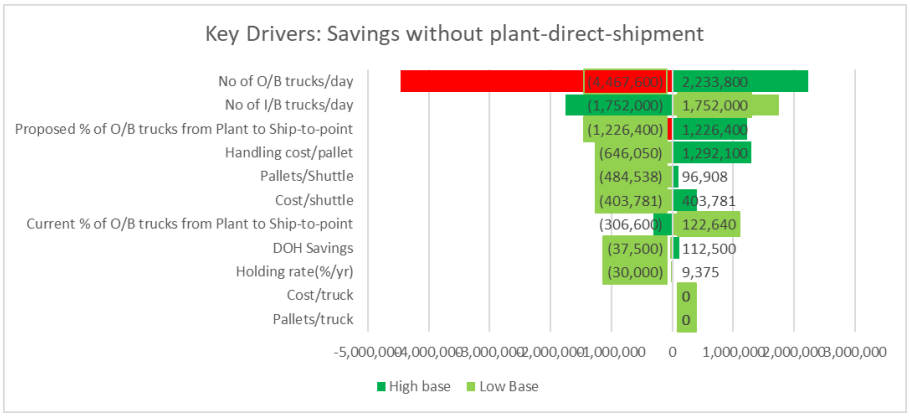


Figure 3 Key drivers for savings with and without Plant direct shipment

reduction were significant enough to outbalance the increased transportation and handling costs. This is most likely to be the case when suppliers have inefficient supply chains with multiple handling and transportation steps.

Design 3 looked at inventory, handling, transportation, and storage costs across the current and proposed storage allocation of materials for the test site. Savings were driven by the reduction of transportation and handling costs. Implementing a Plant-Direct Shipment scheme on top of reallocation could yield additional savings.

This study resulted in models, which can serve as general templates the CPG Company can use to evaluate these designs for any of their sites. These models can also be used by companies across industry. However, each site or company may have additional considerations that have not been incorporated into these models.