E-Commerce Drop Shipping: Building a CPG Supply Chain

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MIT SCM Research FEST

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Thesis Background

Drop Ship Puzzle

Drop Ship Cost Model

Drop Ship Channel Cost Allocation

Potential Lost Sales

Delivery Times

Key Takeaways

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The Rise of e-Commerce

➤ **E-commerce has grown significantly in the last decade**

  ➤ In 2013, 191.1 million people classified as online shoppers in the US

  ➤ Increase to around 215.1 million users expected by 2018

➤ **Many retailers have moved from traditional brick-and-mortar to omni-channel retailing models**

Who should hold all that inventory?
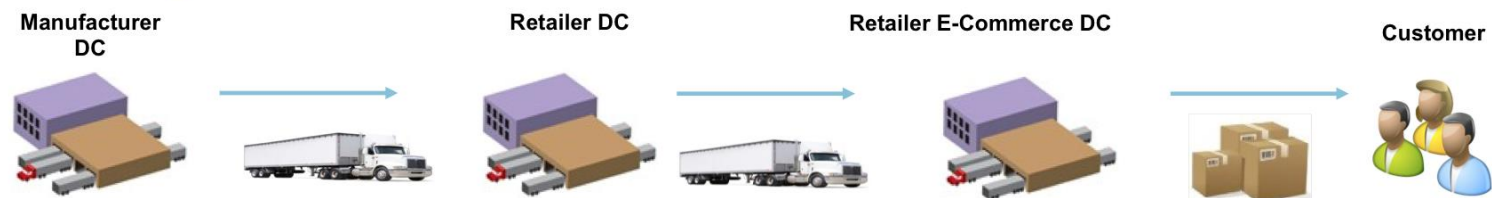
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What about Drop Shipping?
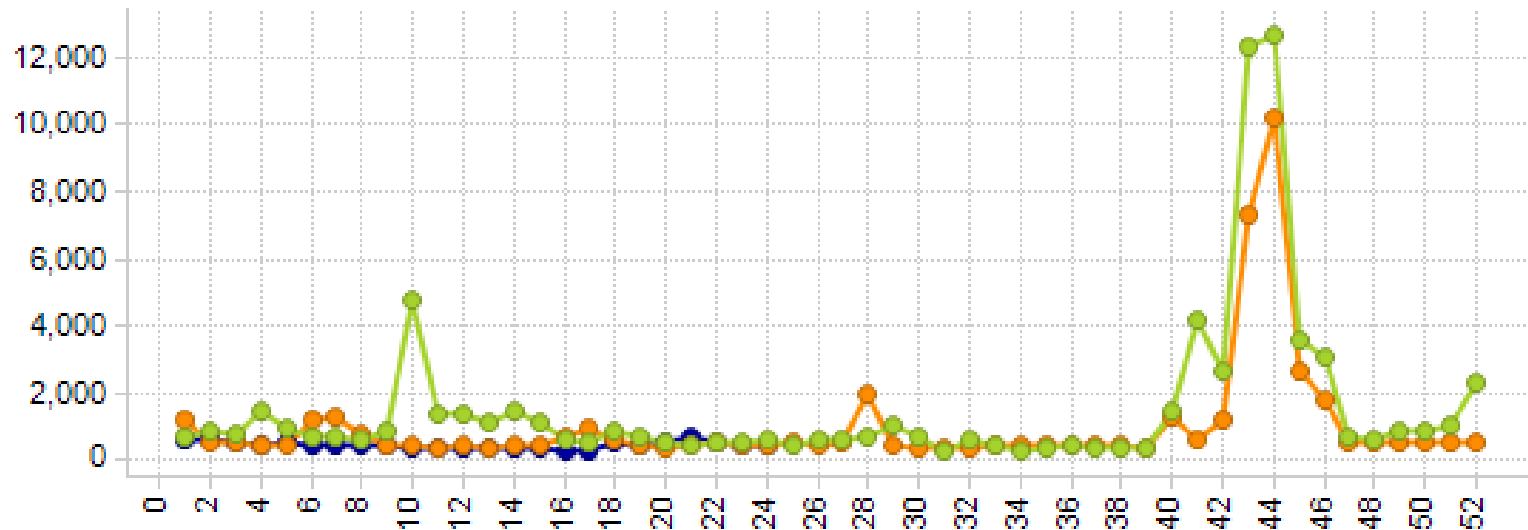
When might CPG Drop Shipping make sense?

➤ Partner with large CPG company with small existing direct-to-consumer operation

➤ Focus on online orders for two personal appliance product categories

➤ Two key characteristics

    ➤ Long lead time

    ➤ High value

    ➤ Highly seasonal demand

Existing Distribution Channel

| Manufacturer DC | | Retailer DC | | Retailer E-Commerce DC | | Customer |

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Huge Spikes in Demand for High Value SKUs

▍Unit Sales Trend

➢ Are retailers holding enough inventory to fully serve demand spikes?

➢ Could drop shipping capture extra sales currently lost during stockouts?

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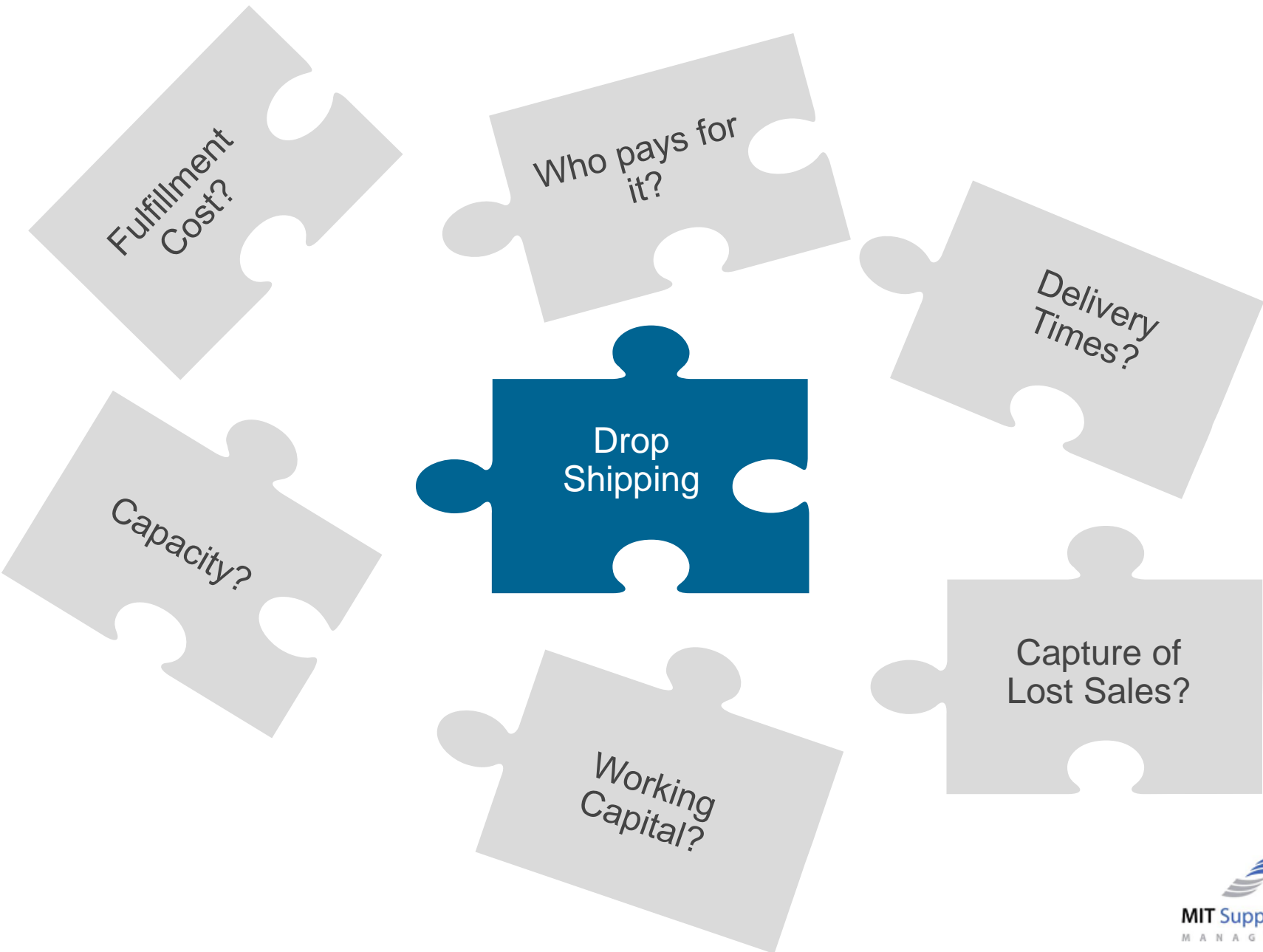
Drop Shipping Cost Model : Base Model

- ➢ **Aim:** Calculate incremental variable cost for Drop Shipping

- ➢ **Method: A**ctivity **B**ased **C**osting (ABC)
  - ➢ Allocates indirect costs based on distinct cost drivers for individual processes/ activities.

- ➢ **Base model assumptions:**
  - ➢ 1 Line per Order
  - ➢ 2.58 Inbound Pack Size
  - ➢ 100% transfer of online volume to Drop Ship
  - ➢ Complete labor flexibility (can hire at any time for any amount of hours)

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Base Model Results

➢ Variable incremental cost of **$2.66** per unit shipped
➢ Largely driven by **Material** cost followed by **Audit & Manifest** and **Receiving/Putaway** cost

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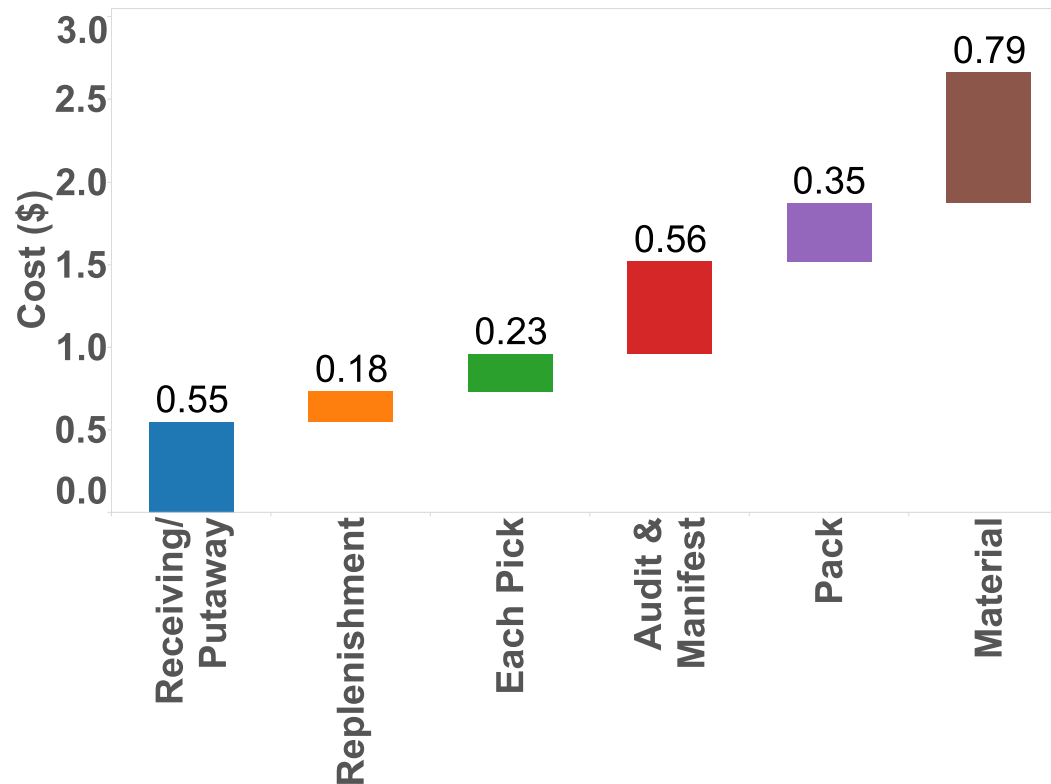
Drop Ship Cost Model: Sensitivity Analysis

- **Line Items**: Increase in line items to two drives labor and overall cost down by **30 percent**

- **Labor Flexibility Restrictions:**

  - Ability to only hire part-time labor at 20h per week (50% utilization) results in **4 percent** total labor cost increase

  - Ability to only hire part-time labor at 30h a week (75 % utilization) results in **10 percent** labor cost increase

- **Volume Change**: Capacity constraint only at **38%** of current December holiday volume

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Channel Cost: Base Model

➢ **Aim:** Estimate each party's order fulfillment costs before and after drop shipping

➢ **Base model assumptions:**

 ➢ Use CPG data for many estimations (DC Labor, transportation data, parcel rates)

 ➢ Holding Costs (Capital Cost)

  ➢ Manufacturer- Inventory turns data and total outbound shipments

  ➢ Retailer- Combined POS data with inbound shipment data to calculate average on-hand inventory

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Channel Comparison
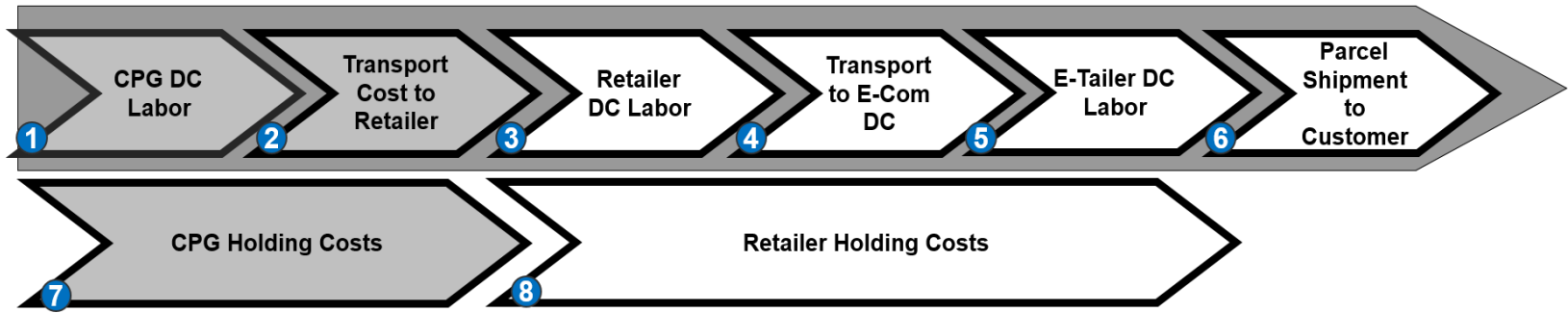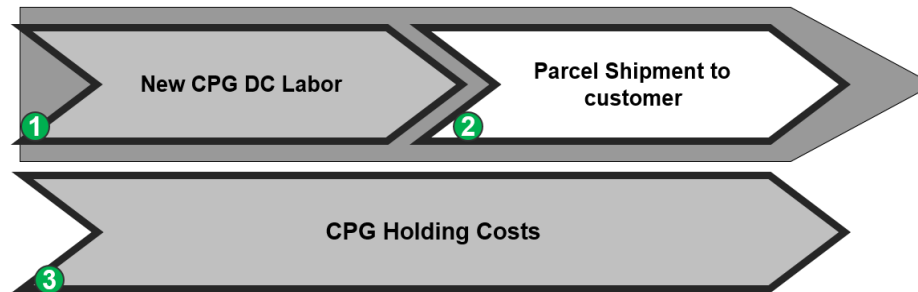
Channel Cost dominated by Parcel Shipment Cost

	Existing Model	Drop Ship Model
CPG DC Labor	$0.79	$2.66
Transport to Retailer	$0.20	-
CPG Holding Cost	$0.39	$0.98
Retailer DC Labor	$0.80	-
Transport to E-Com DC	$0.11	-
Retailer e-Commerce DC Labor	$1.00	-
Parcel Shipment to Customer	$5.00	$6.30
Retailer Holding Cost	$1.53	-
Model Total Cost	**$9.82**	**$9.94**

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Large shift from retailer to manufacturer

Existing Distribution Cost Split

$1.38
14%

$8.44
86%
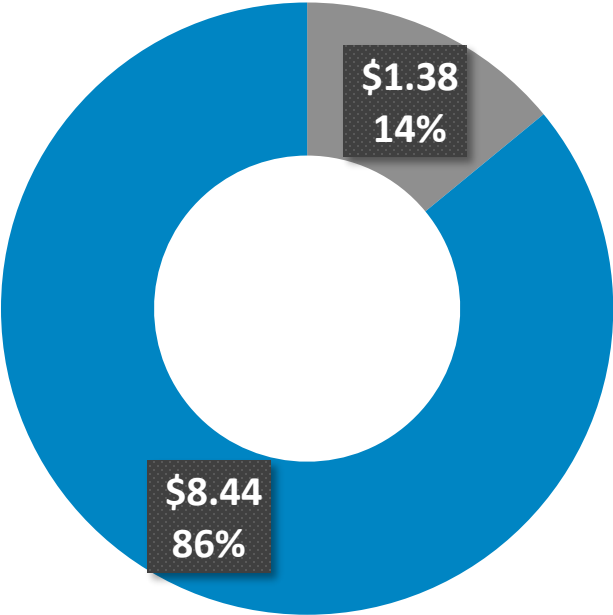
- Manufacturer Costs/unit
- Retailer Costs/unit

Drop-Ship Model Cost Split
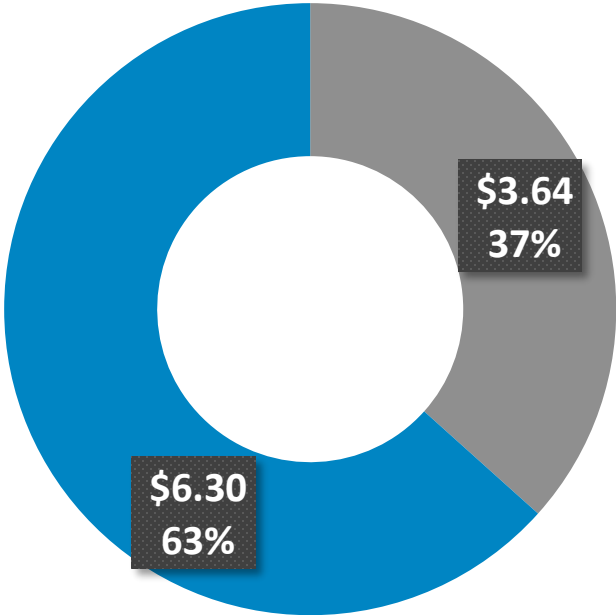
$3.64
37%

$6.30
63%

- Manufacturer Costs/unit
- Retailer Costs/unit

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Are we losing out on sales?

➤ **Aim:** Understand the online availability of selected SKUs during holiday season

➤ **Method:** Web Extraction System data paired with POS data

➤ **Web Extraction System:**

  ➤ Designed to automatically scour the internet accessing pages with dynamic content

  ➤ Target specific data types and extracting from individual page
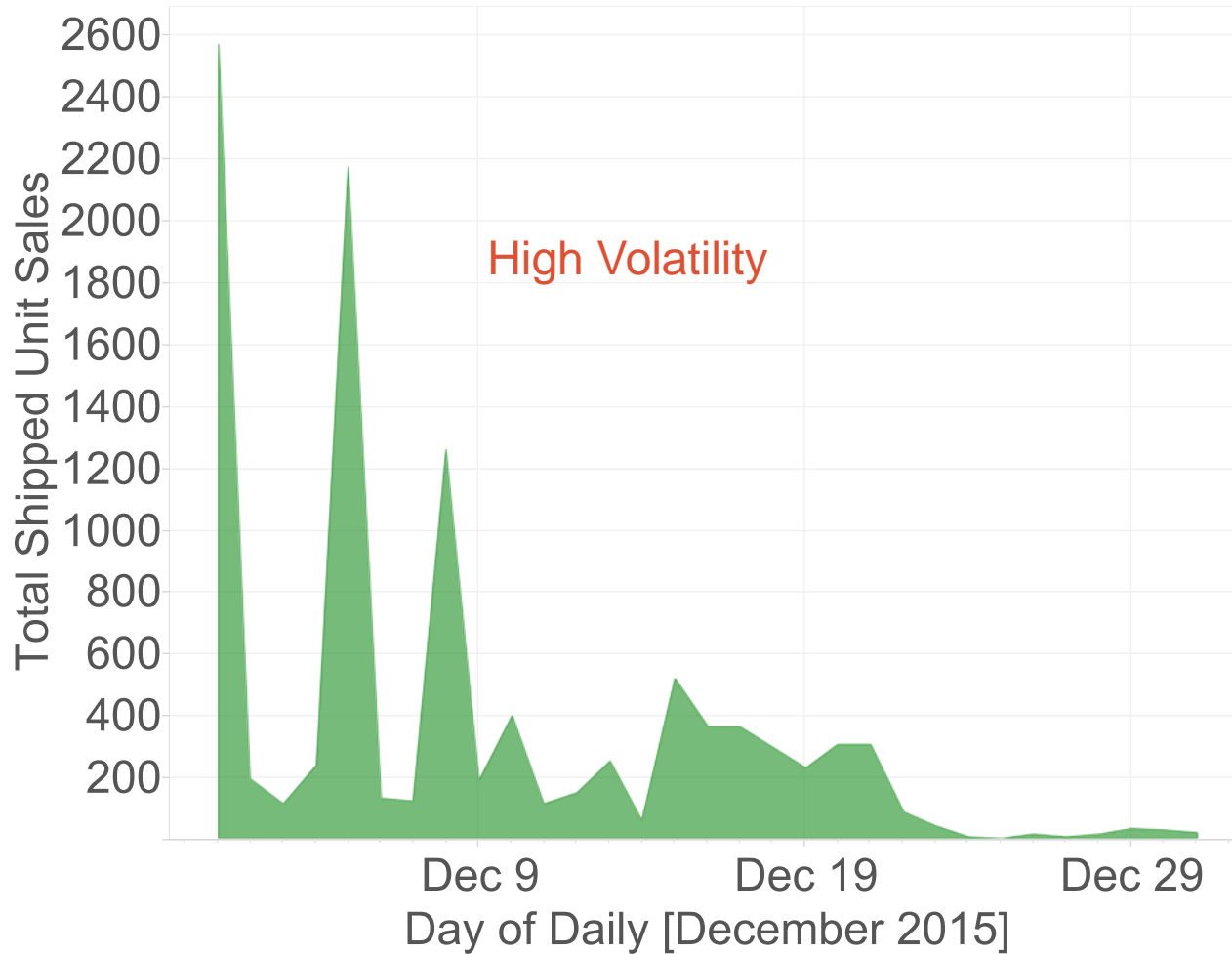
  ➤ Creates database with desired information

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High volume – High availability
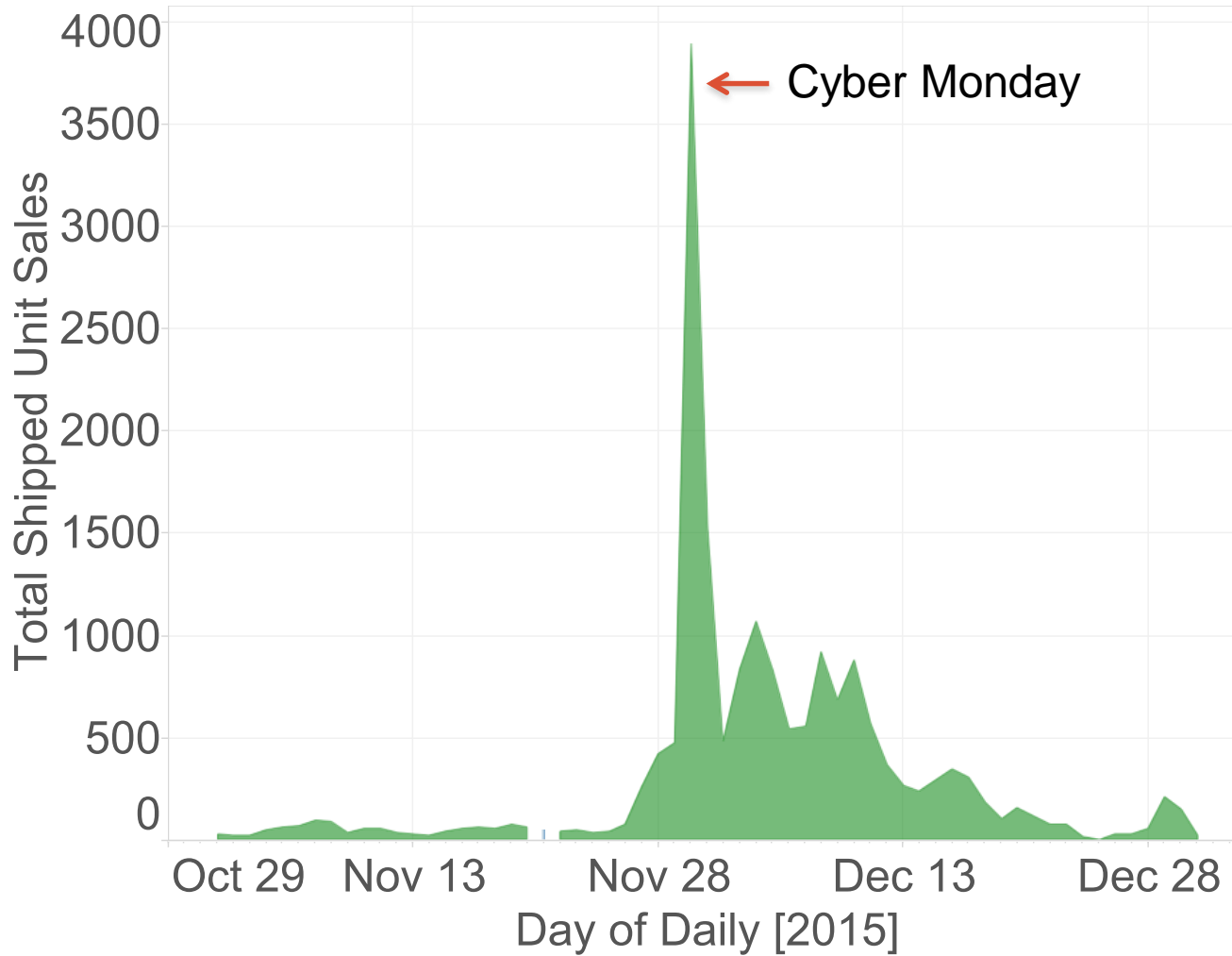
Website Availability
- ■ Null
- ■ In Stock

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High volume – High availability

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High volume – High availability

One Size Fits All?
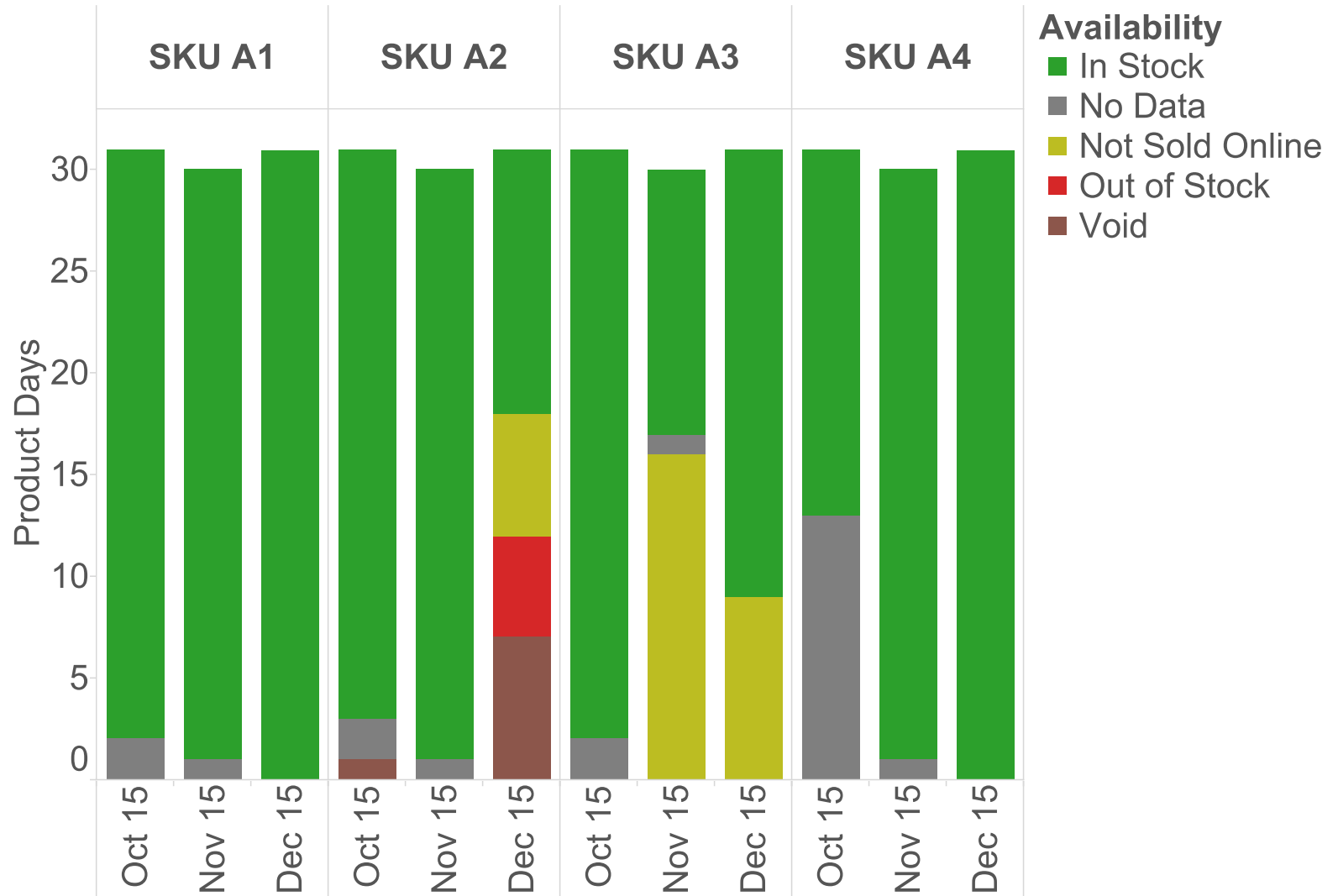
Some potential for capturing lost sales
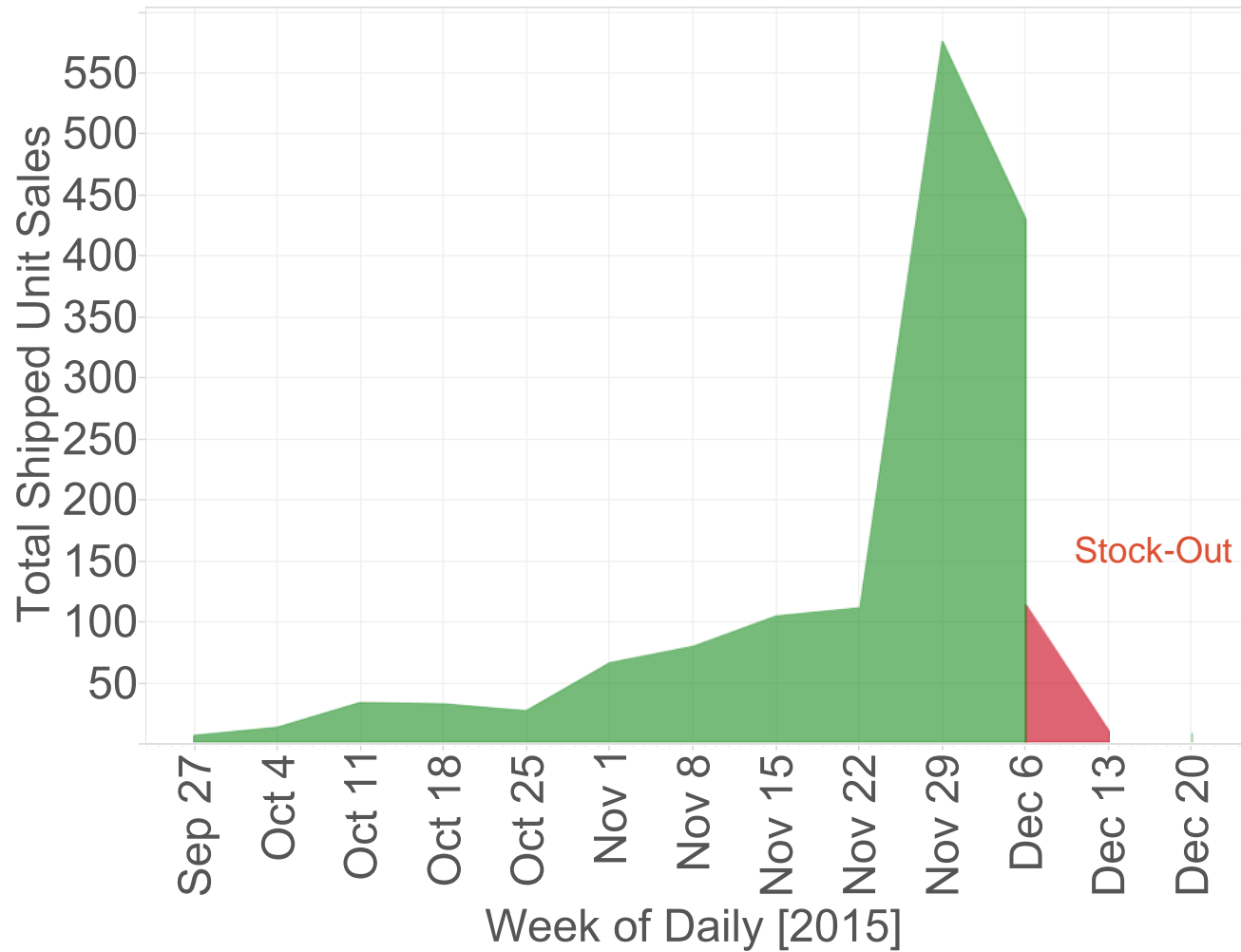
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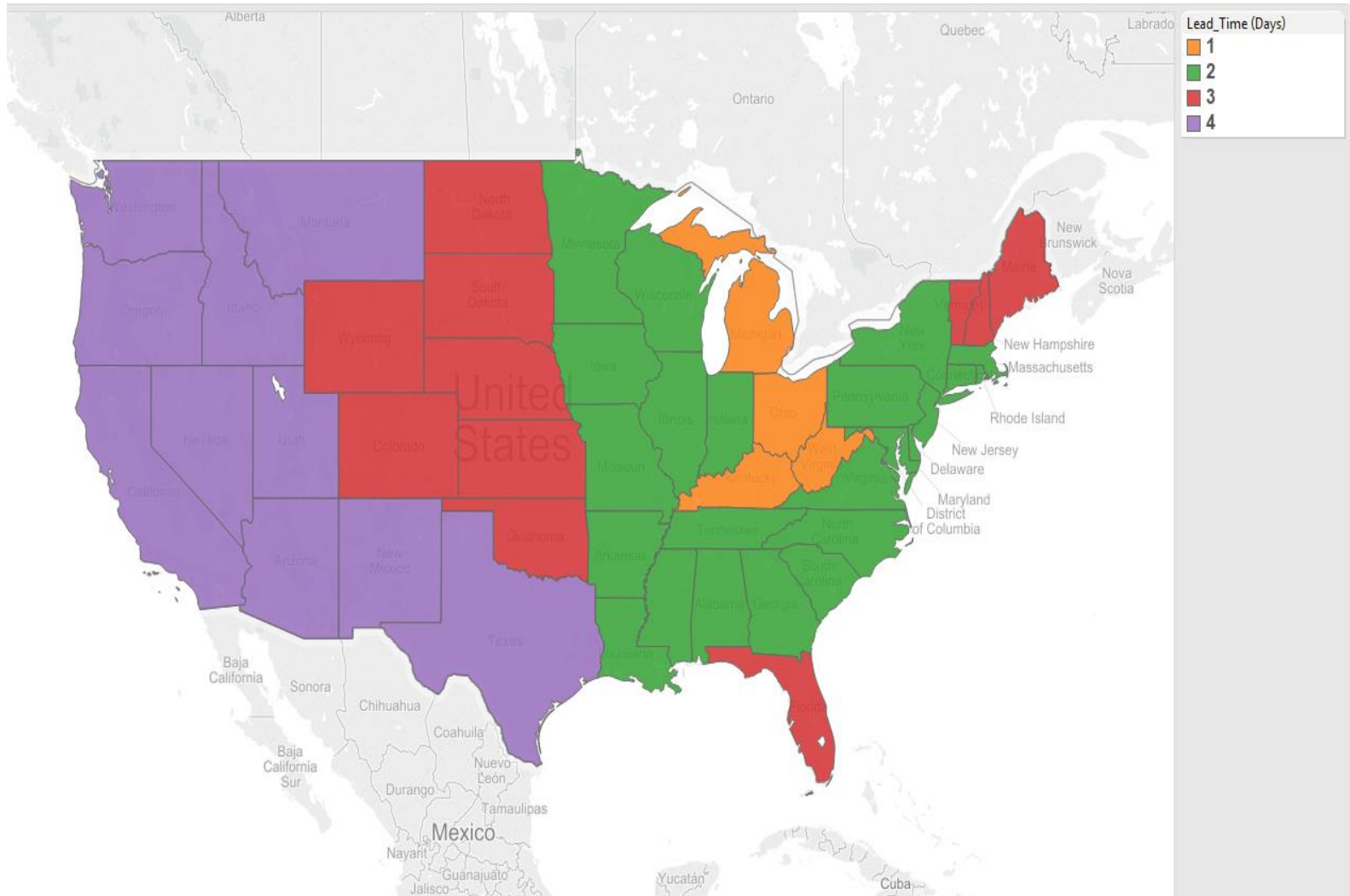M A N A G E M E N T

Delivery Times

➤ **Aim:** Understand impact on service level in terms of delivery times

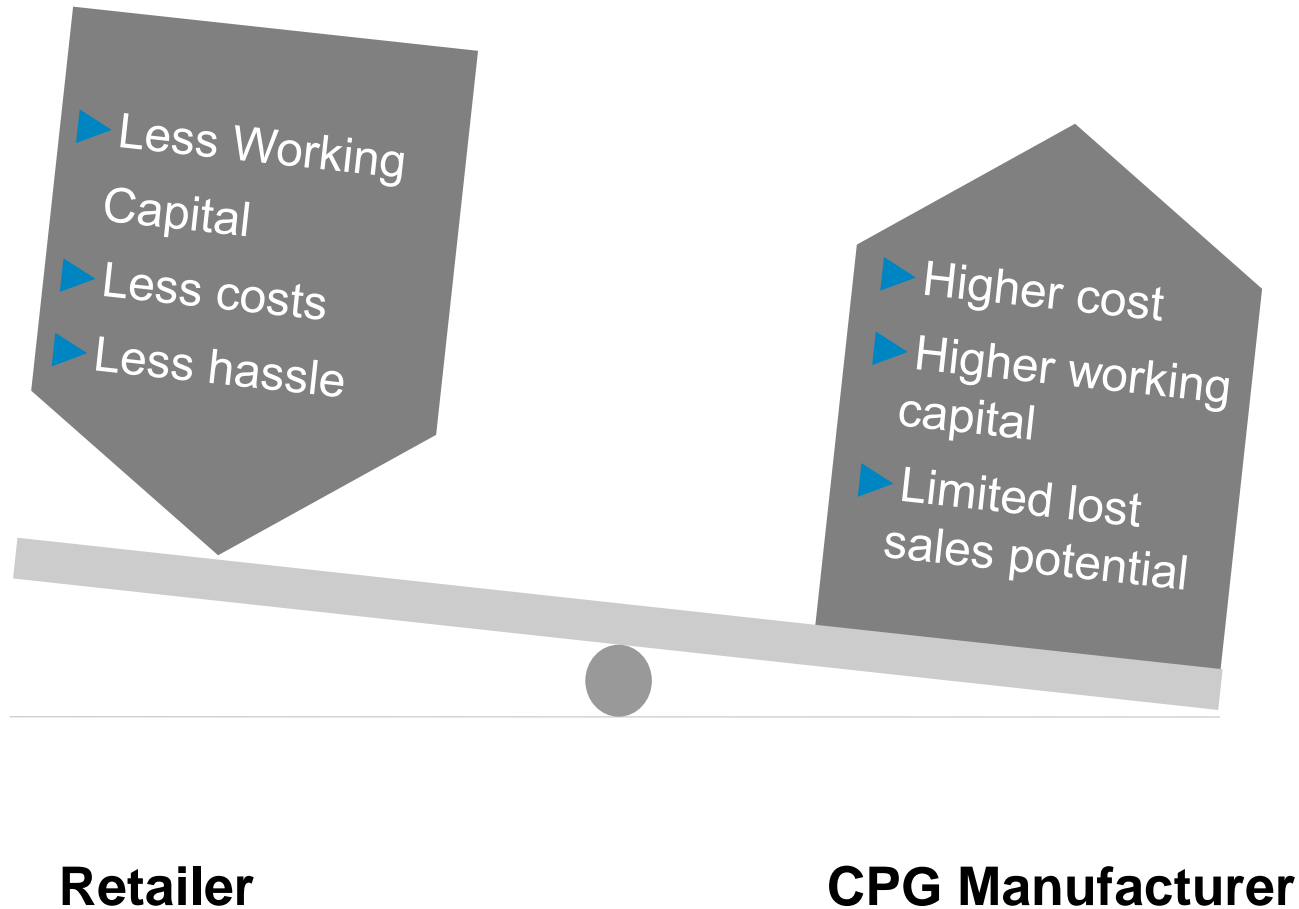➤ **Method:** UPS ground shipping calculator paired with population density data

Current Retailer Delivery Times on average 1.51 Days
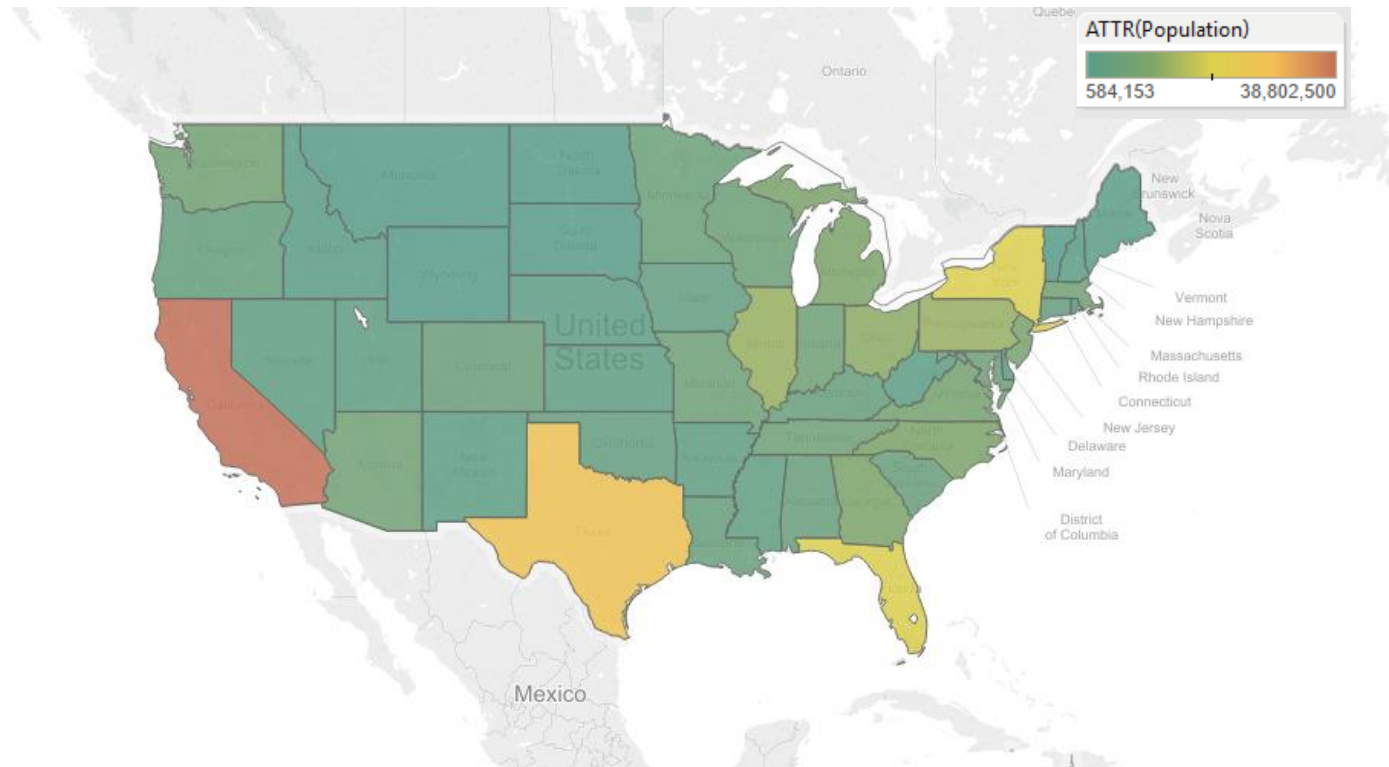
Delivery Times for Drop Shipping on average 2.67 Days

Our Case Takeaways

➢ **Switching to drop shipping is only marginally more expensive for the channel**

   ➢ Significant shift in costs from the retailer to the manufacturer

   ➢ Possible to come to contractual solution

➢ **Drop shipping frees up working capital at the retailer and significantly reduces total system working capital**

➢ **Lost sales didn't show significant opportunity for these products**

   ➢ The retailer is actually holding large amounts of inventory

   ➢ Explains some of their motivation to request drop shipping

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Does drop shipping make sense for the CPG manufacturer?

▶Less Working Capital
▶Less costs
▶Less hassle

▶Higher cost
▶Higher working capital
▶Limited lost sales potential

Retailer

CPG Manufacturer

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Broad Takeaways

➢ **Drop shipping can reduce the total working capital in the system**

  ➢ How these benefits are recognized needs to be agreed to through a contractual method

➢ **Web Extraction Systems can be used to help manufacturers understand their retailer's inventory position and lost sales opportunities**

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