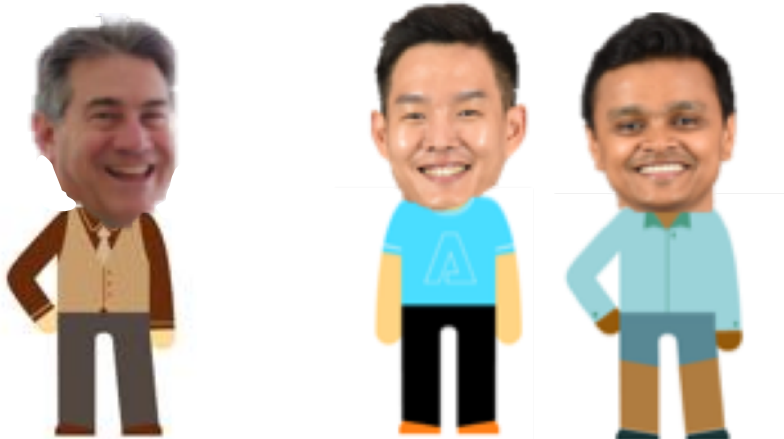


# LEVERAGING E-COMMERCE SITES TO ABSORB RETAIL STORES' EXCESS INVENTORY



By: Hyuk Jin Cho and Ketan Lahoti  
Advisor: Dr. Bruce C Arntzen  
Sponsor: CSV Health

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# CVS Health



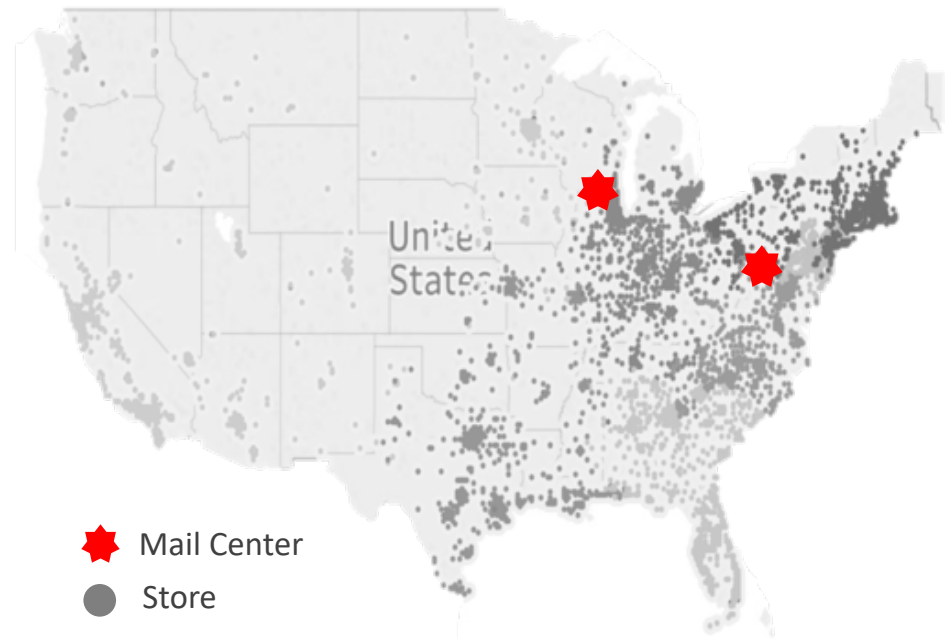
No.1 Retail Pharmacy business in the US



Carries over 3,000 SKUs



9,600 Stores across US









I DON'T FEEL GOOD...I'M GONNA  
PICK UP THE PRESCRIPTION  
DRUG THAT THE DOCTOR WROTE  
FOR ME FROM THE STORE.

**WELCOME TO CVS!  
WE HAVE ALL THE DRUGS YOU NEED.  
HOW MAY I HELP YOU?**



COME TO CVS AGAIN !



***BUT...***



**FORECAST ACCURACY**



**CLIMATE CHANGES**



**PROMOTION**





**EXCESS INVENTORY**



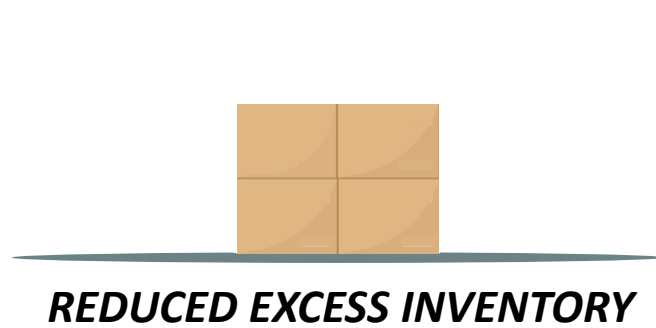
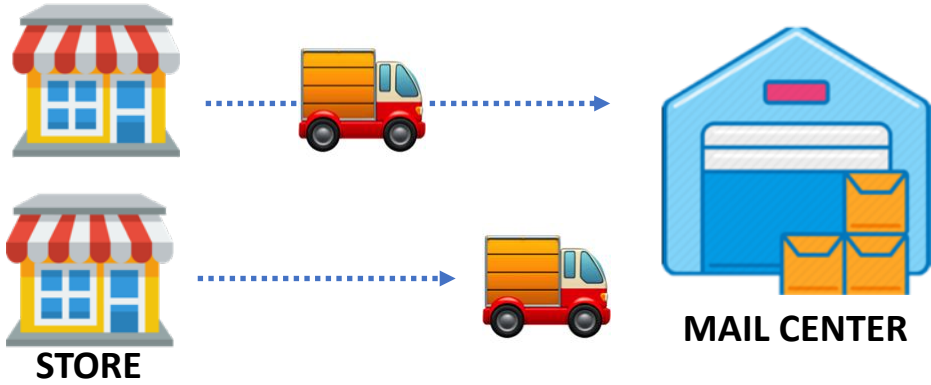
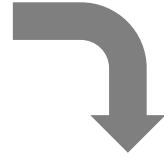
**BACK IN 2015...**



**TOO MUCH EXCESS INVENTORY !!!**

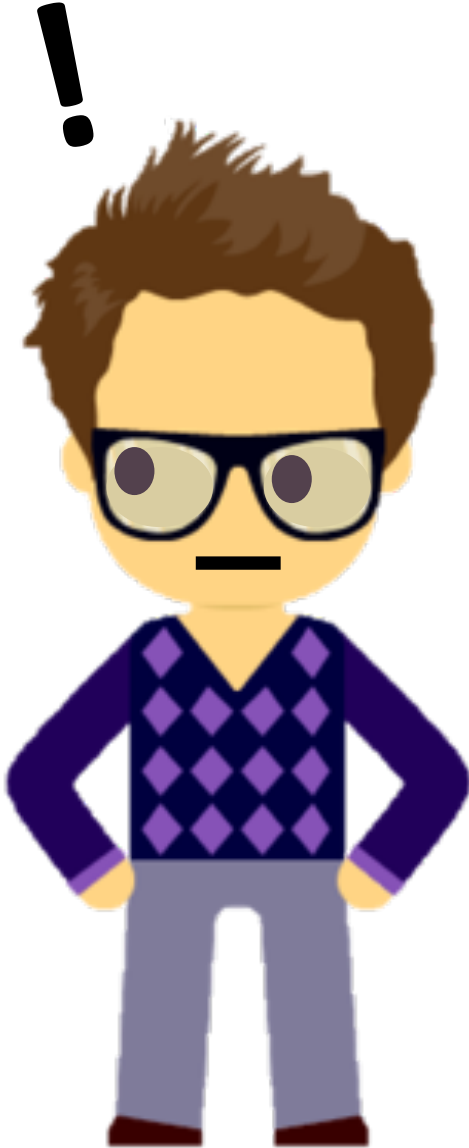
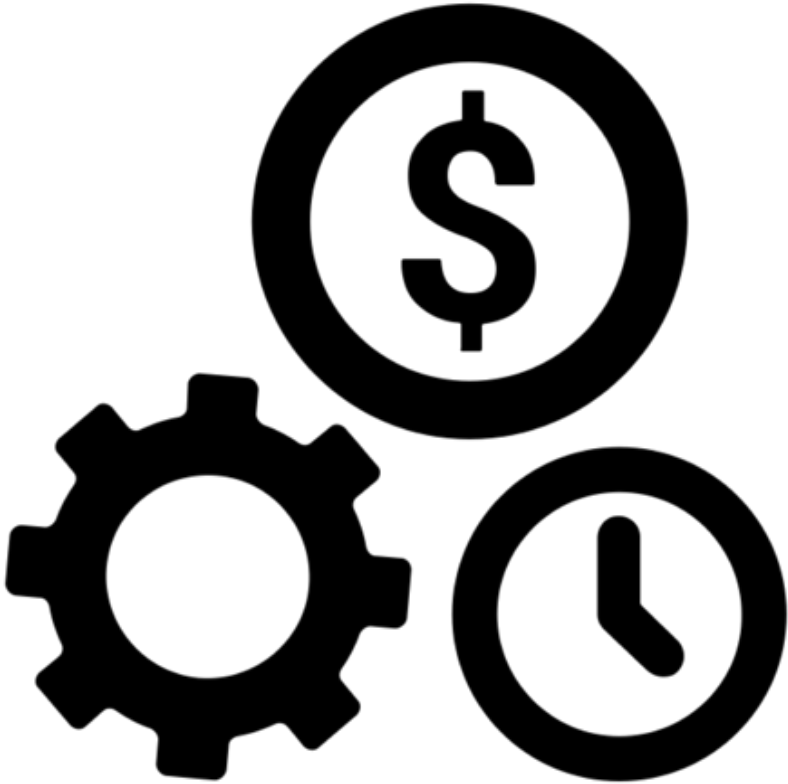


WALL ST





***REDUCED EXCESS INVENTORY...BUT THE COST INVOLVED WAS HIGH...***





**OBJECTIVE**



**AUTOMATED PROCESS**



# METHODOLOGY



**For each SKU at each store (non-controlled drugs):**

1. Calculate Average Weekly Sales (outbound)

$$\text{Average Outbound} = \text{Sum of sales for a SKU in a store across 52 weeks} / 52$$

2. Calculate Weeks of Supply (WOS)

$$\text{Weeks of Supply} = \frac{\text{Inventory on hand at Week 52}}{\text{Average Outbound}}$$

3. Compare with the standard weeks of supply

$$\text{Excess Inventory (weeks)} = \text{Current WOS} - \text{Target inventory levels}$$

4. Convert back to units for excess weeks of supply

$$\text{Excess Inventory (units)} = \text{Excess Inventory (weeks)} * \text{Average Outbound}$$

5. Multiply excess units with Average Wholesale Price (AWP)

$$\text{Excess inventory value} = \text{Excess inventory units} * \text{AWP}$$

6. Sum all excess inventory value across the system

# MODEL

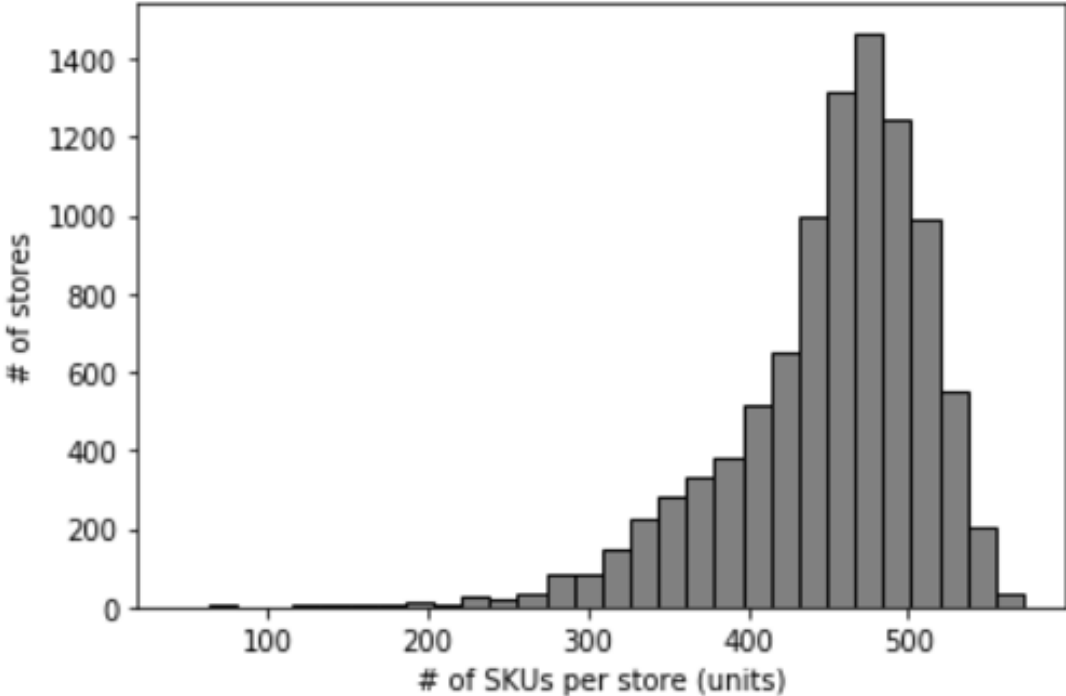


1. Calculate Average Weekly Sales (outbound)
2. Calculate Weeks of Supply (WOS)
3. Compare with the standard weeks of supply
4. Convert back to units for excess weeks of supply
5. Multiply excess units with Average Wholesale Price (AWP)
6. Sum all excess inventory value across the system

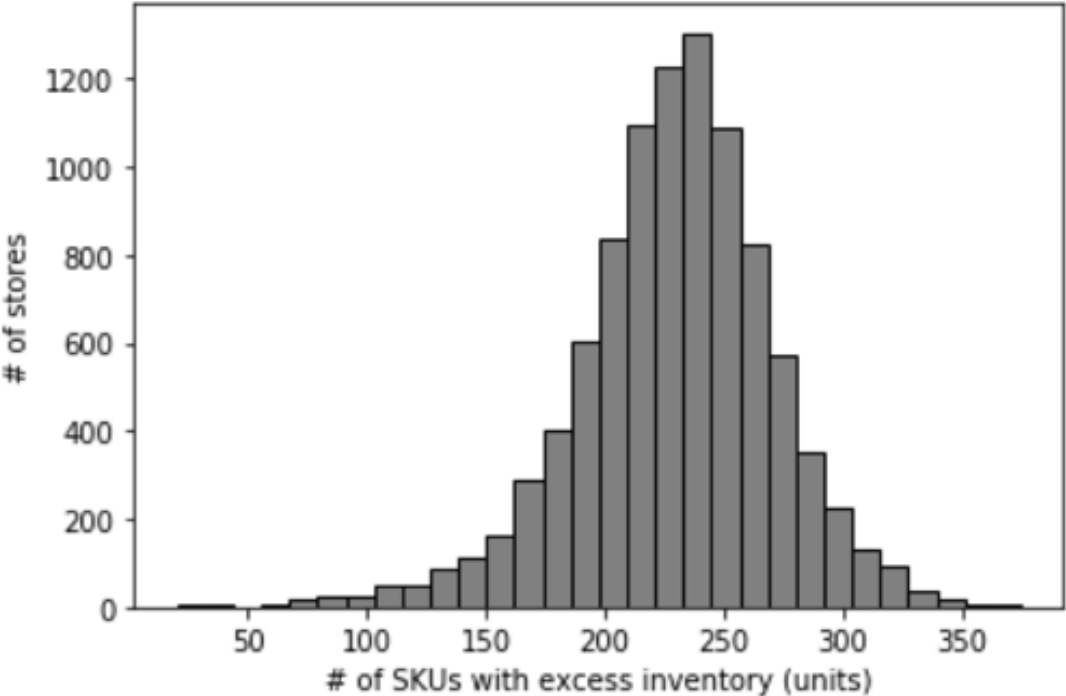


# RESULT

Histogram of # of SKUs per store



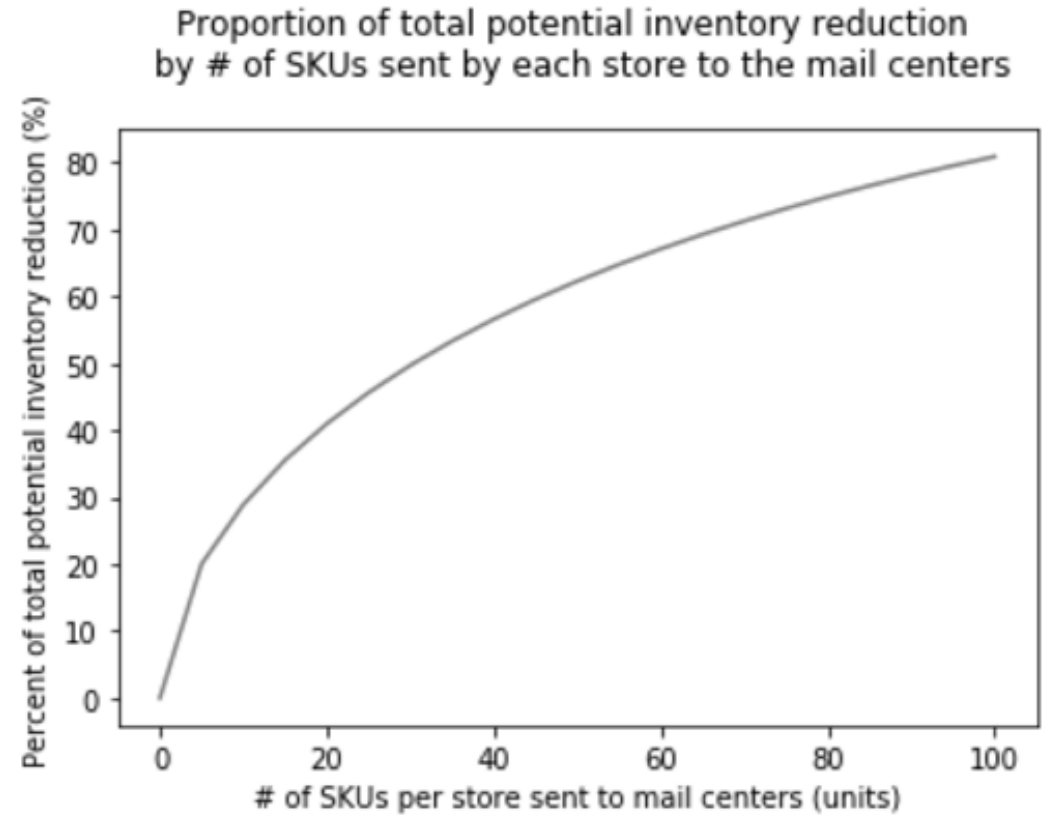
Histogram of # of SKUs with excess inventory



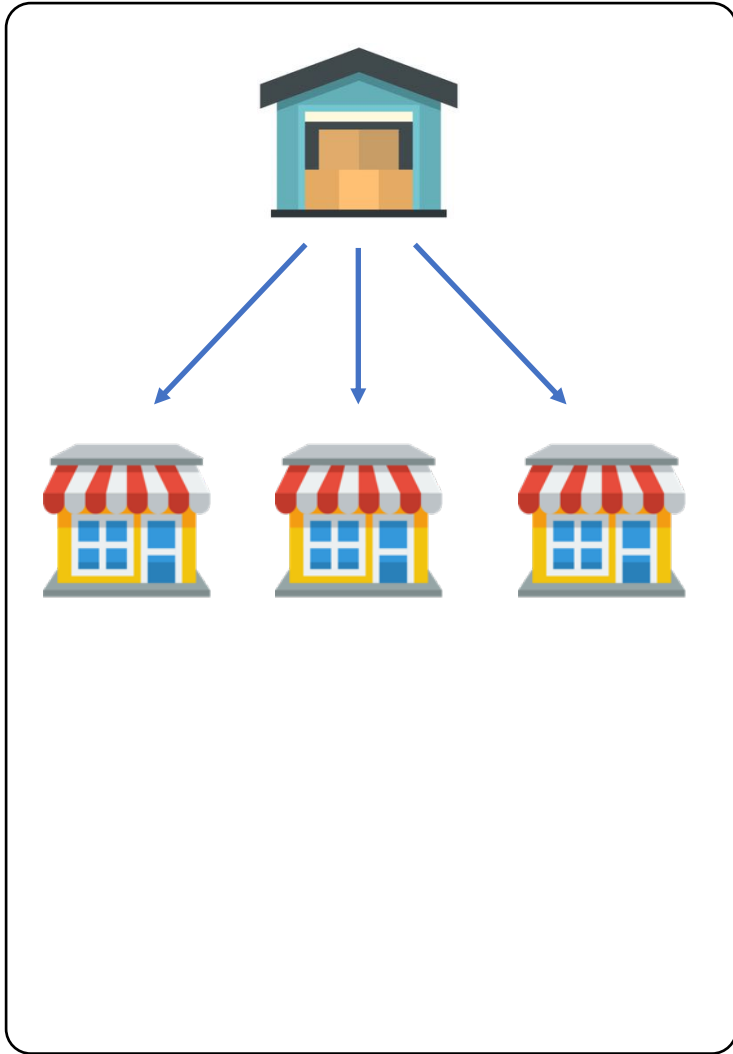


# RESULT

Top X SKUs	Total Savings (\$M)	% Savings
1	84.33	8.11%
5	208.22	20.03%
10	300.46	28.91%
20	426.16	41.00%
30	516.83	49.72%
40	588.49	56.62%
50	647.61	62.31%
60	697.71	67.13%
70	740.93	71.28%
80	778.67	74.92%
90	811.84	78.11%
100	841.08	80.92%

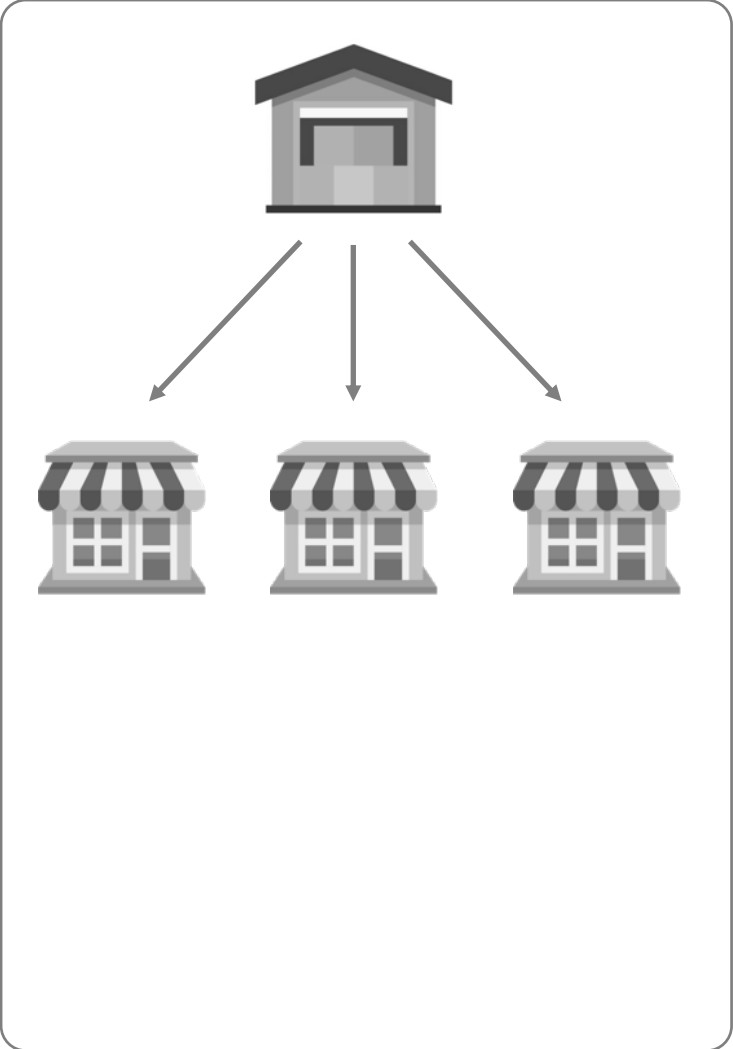


# Traditional

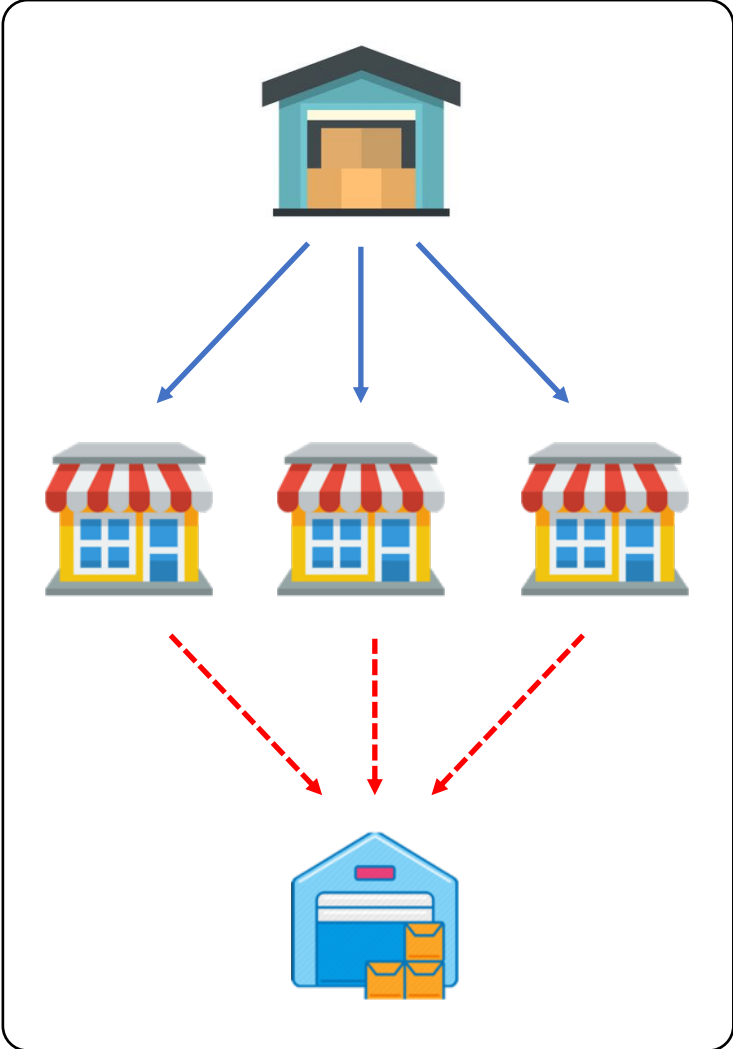


# FUTURE RESEARCH

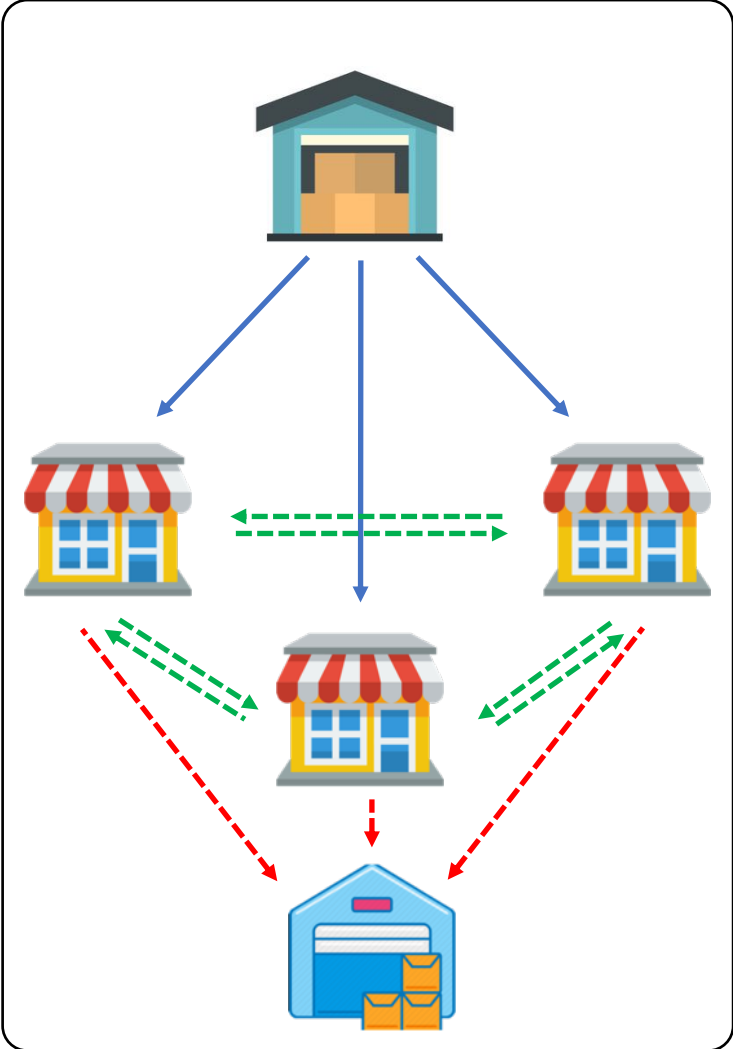
## Traditional



## Leveraging E-commerce



## Lateral Transshipment



# Q&A

