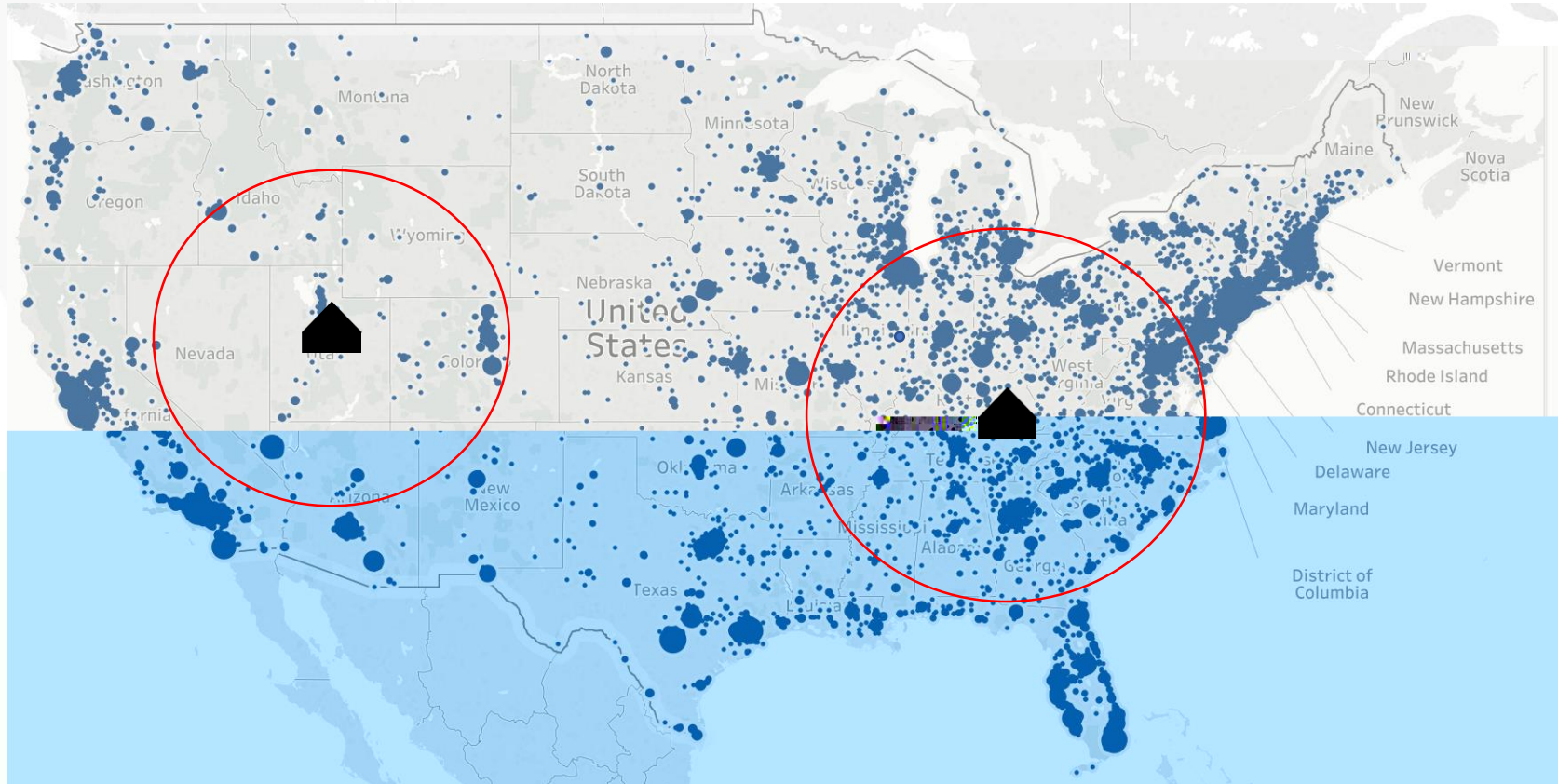




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# Online Order Fulfillment – Changing Business Environment



Market Size

Customer Required  
Delivery Leadtime

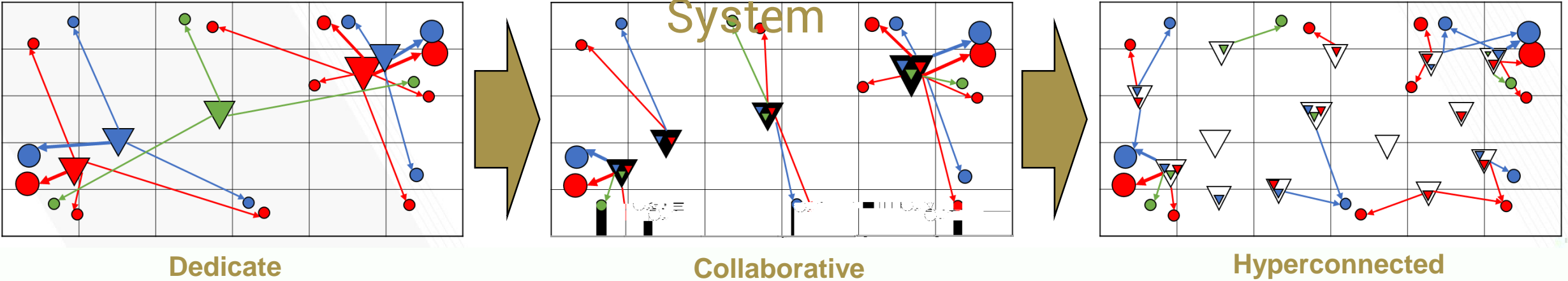
Competition

Service incapability causes customer dissatisfaction — **customer loss**

Can hyperconnected fulfillment system be a solution  
to meet customer needs without tremendous capital investment?

# Hyperconnected Distribution/Fulfillment System (HDS/HFS)

## Transformation of Distribution/Fulfillment System



## Three dimensions of transformation to hyperconnected distribution





# Hyperconnected Fulfillment System (HFS)

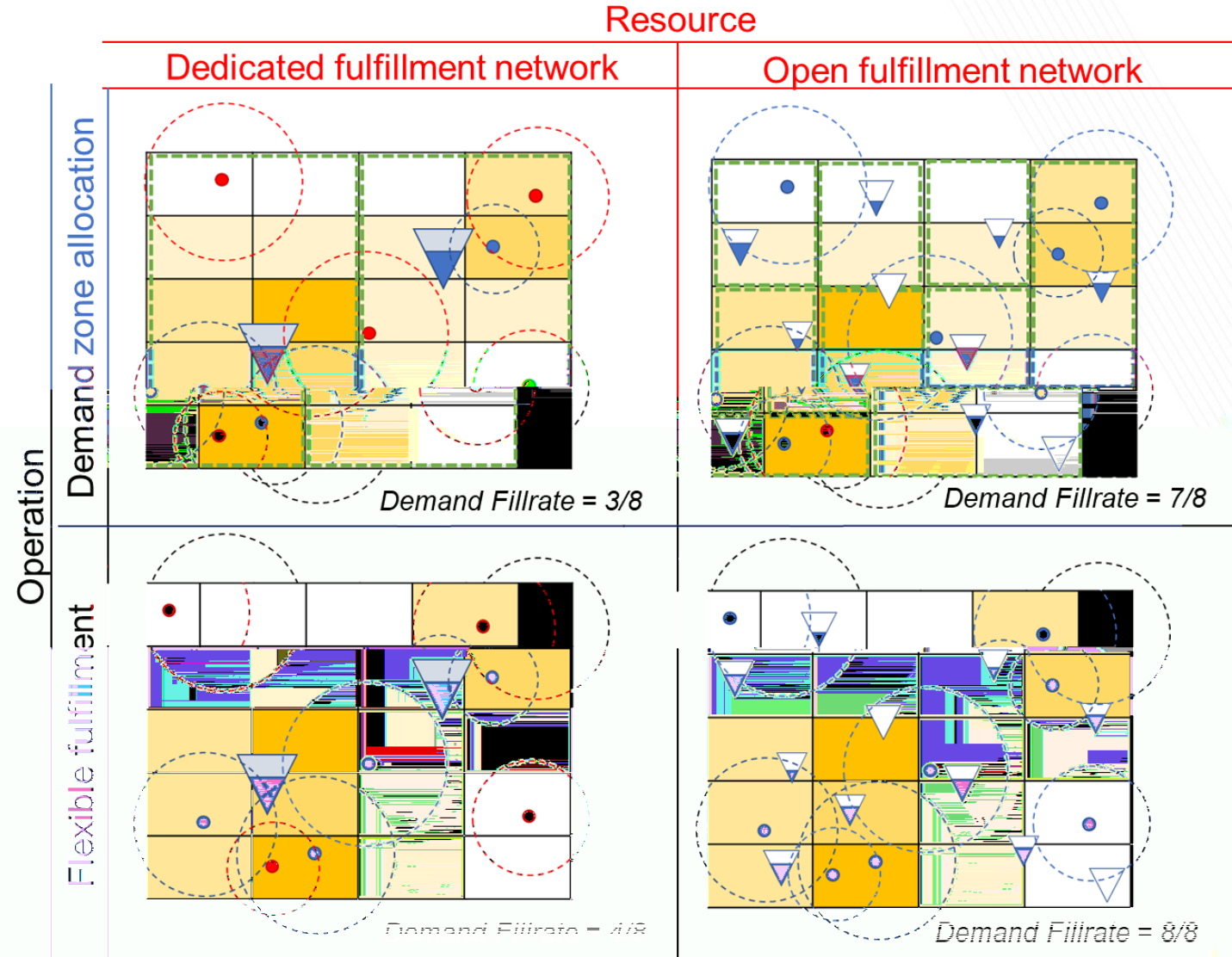
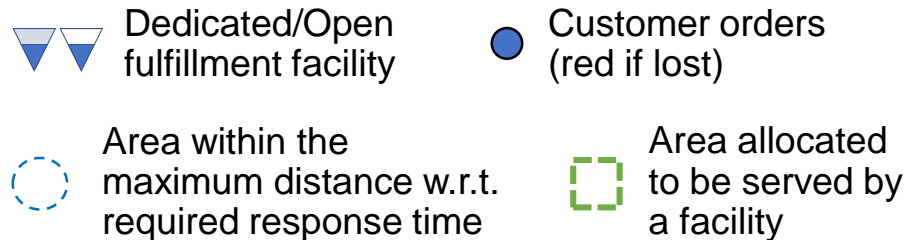
- **Resource**

- Dedicated vs. Open FC network

- **Operation (Sourcing)**

- Demand zone allocation vs. Flexible fulfillment

Demand fillrate can potentially improved by increased **customer proximity** and flexible fulfillment from **pooled inventory**



# Case Study: E-Commerce Manufacturer in USA Market



Assume customer require certain delivery lead time sensitive to area.

Demand will be lost if the lead time cannot be met.

# Case Study: Scenario Design

## Market Environment

Customer requested

delivery leadtime

## Fast vs. Slow



## Resource

## Fulfillment center network

## Dedicated FCs vs. Open FCs



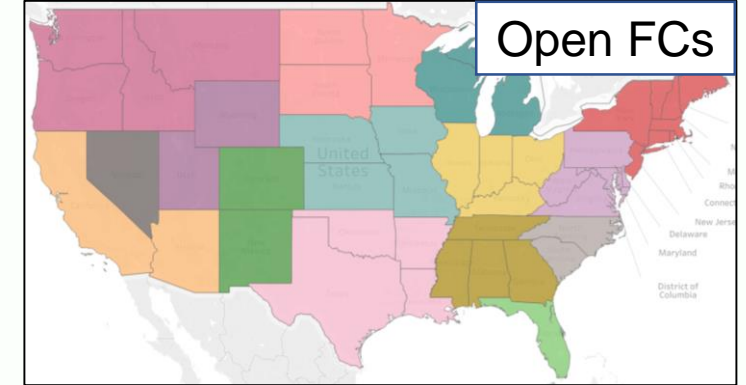
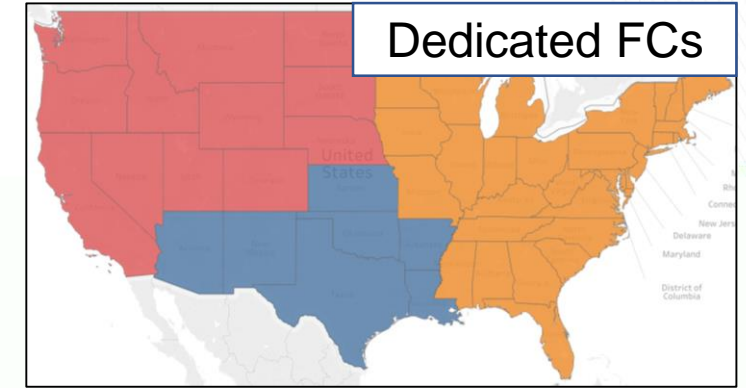
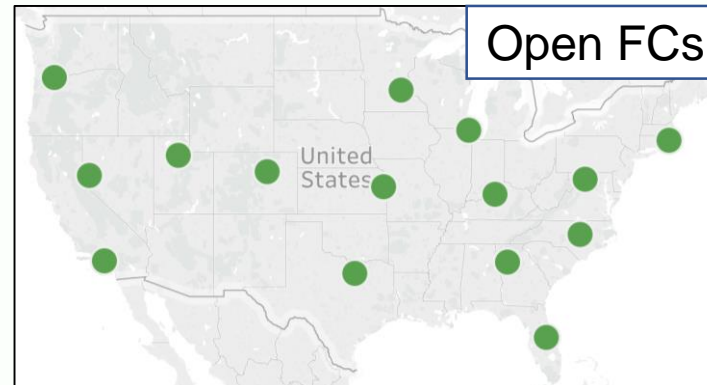
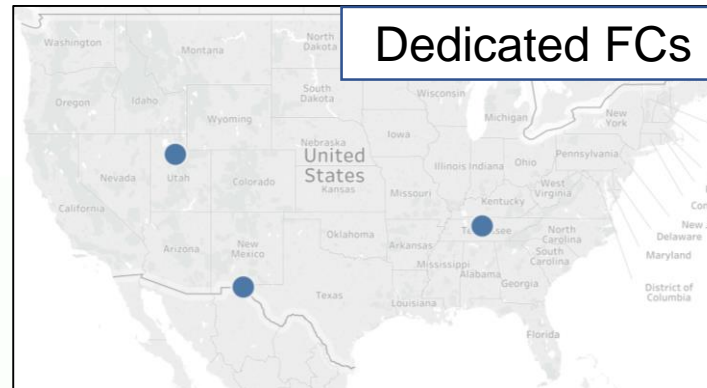
## Operation

## Sourcing (Zone allocation)

## Single vs. Flexible sourcing

## Inventory policy (level)

## Low vs. Lean vs. High

# Case Study Result: Lost Demand – Slow Delivery

Low Inventory

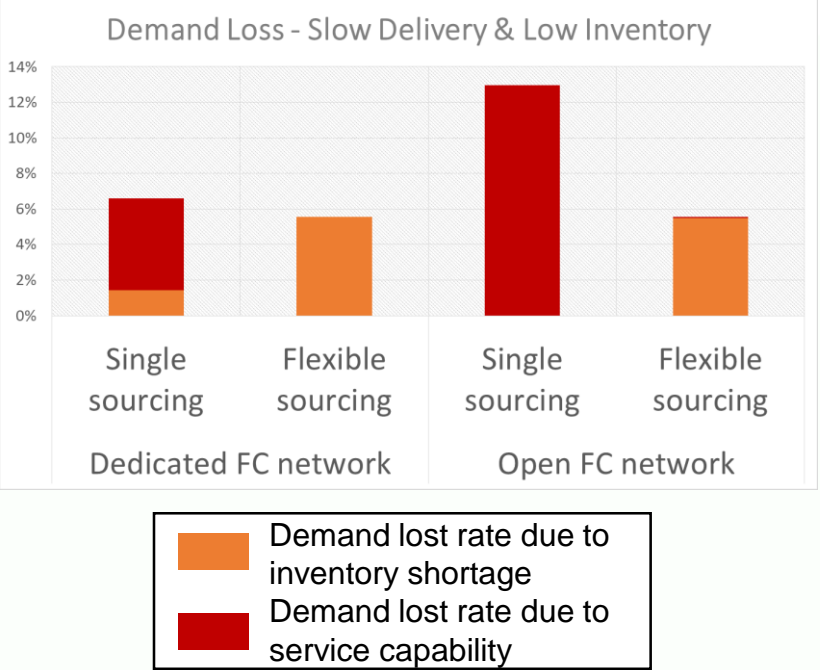
		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			

Lean Inventory

		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			

High Inventory

		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			



- When inventory is low, open FC network with single sourcing (zone allocation) performs worse than dedicated FC network with single sourcing; Smarter inventory allocation strategy is needed
- With flexible sourcing, only inventory shortage itself becomes bottleneck
- With slow delivery, the advantage of hyperconnected fulfillment for basic service capability is not seen

# Case Study Result: Lost Demand – Fast Delivery

Low Inventory

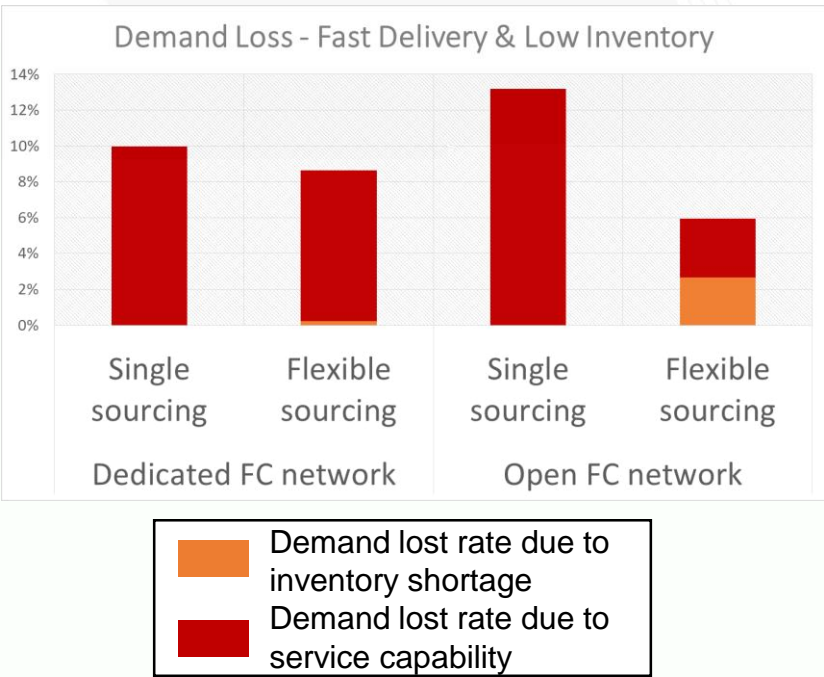
		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			

Lean Inventory

		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			

High Inventory

		Resource		
		Dedicated FC network	Open FC network	Market Gain (%)
Operation	Single sourcing			
	Flexible sourcing			
	Market Gain (%)			



- Service capability becomes critical factor of demand loss
- With lean/high inventory, all demand loss is caused by service incapability and from metropolitan area
- 0.8% demand loss under open FC network and flexible sourcing with lean/high inventory can only be captured with additional FCs located closer to metro area



# Case Study Result: Average Travel Miles Per Order

		Low Inventory			Lean Inventory			High Inventory							
Slow Delivery			Resource					Resource					Resource		
			Dedicated FC network	Open FC network	Reduction Rate (%)			Dedicated FC network	Open FC network	Reduction Rate (%)			Dedicated FC network	Open FC network	Reduction Rate (%)
	Operation	Single sourcing				Operation	Single sourcing				Operation	Single sourcing			
		Flexible sourcing					Flexible sourcing					Flexible sourcing			
Reduction Rate (%)				Reduction Rate (%)				Reduction Rate (%)							
Fast Delivery			Resource					Resource					Resource		
			Dedicated FC network	Open FC network	Reduction Rate (%)			Dedicated FC network	Open FC network	Reduction Rate (%)			Dedicated FC network	Open FC network	Reduction Rate (%)
	Operation	Single sourcing				Operation	Single sourcing				Operation	Single sourcing			
		Flexible sourcing					Flexible sourcing					Flexible sourcing			
Reduction Rate (%)				Reduction Rate (%)				Reduction Rate (%)							

- In most cases, average travel miles per order is reduced by about 70% by utilizing open FC network and flexible sourcing
- With single stop shipping, the travel miles directly represents proximity to customers

# Conclusion and Future Research

Overall, ~6% of market gain and 73% delivery mile reduction potentials are shown with open FC network and flexible sourcing under tight delivery time constraints

- Measure the impact of hyperconnected fulfillment on cost, profit, and service considering deployment, distribution, and production
- Examine impact of transportation e.g. routing
- Optimal network selection:  
select which open FC to use and how much and when to store or redeploy
- Extend to multi-product and/or multi-player operation

# Thank you

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