

Student: Pai Peng, SCM 2022
 Student: Karoline Rueckerl, SCM 2022
 Advisor: Dr. Matthias Winkenbach
 Sponsor: COYOTE Logistics LLC.

Designing A Resilient Supply Chain

Motivation / Background

- COVID has accelerated numerous existing trends, which retailers and manufacturers must address in making network design decisions today
- Optimizing supply chain networks will affect transportation and other logistics related costs which must be minimized
- 3PL companies such as COYOTE have many customers that are focusing on supply chain network resiliency to support their competitive strategies in their respective markets:

> Customer 1

National retailer

- Significantly increase national retail locations
- Support growth in omnichannel demand

> Customer 2

Packaging manufacturer

- Expecting ~8%-12% increase in CAGR
- Small supplier base for raw materials

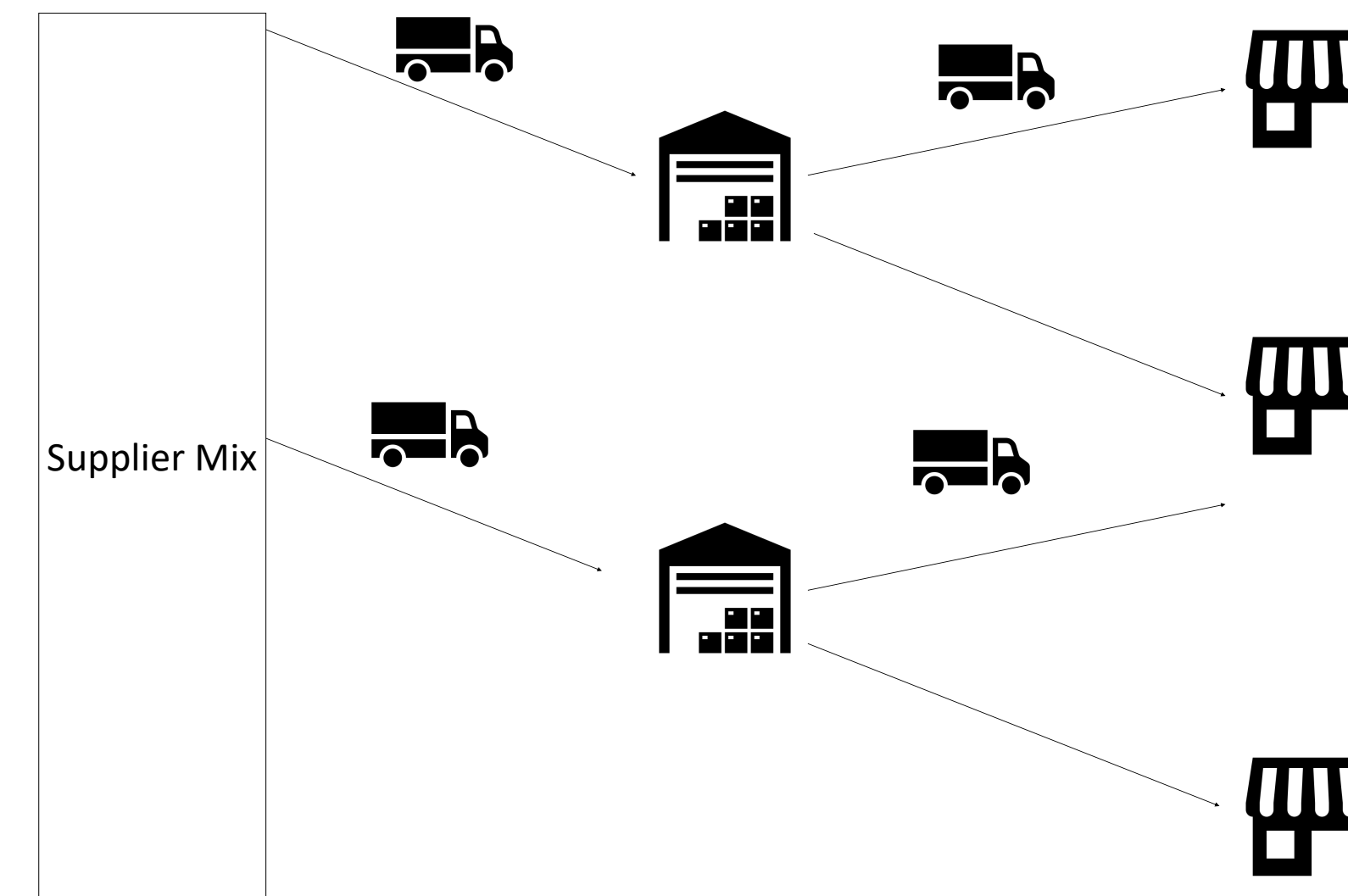
Key Question / Hypothesis

Considering the location of distribution centers, production facilities and customers, what is the optimal supply chain network design that minimizes transportation costs and optimizes supply chain resiliency?

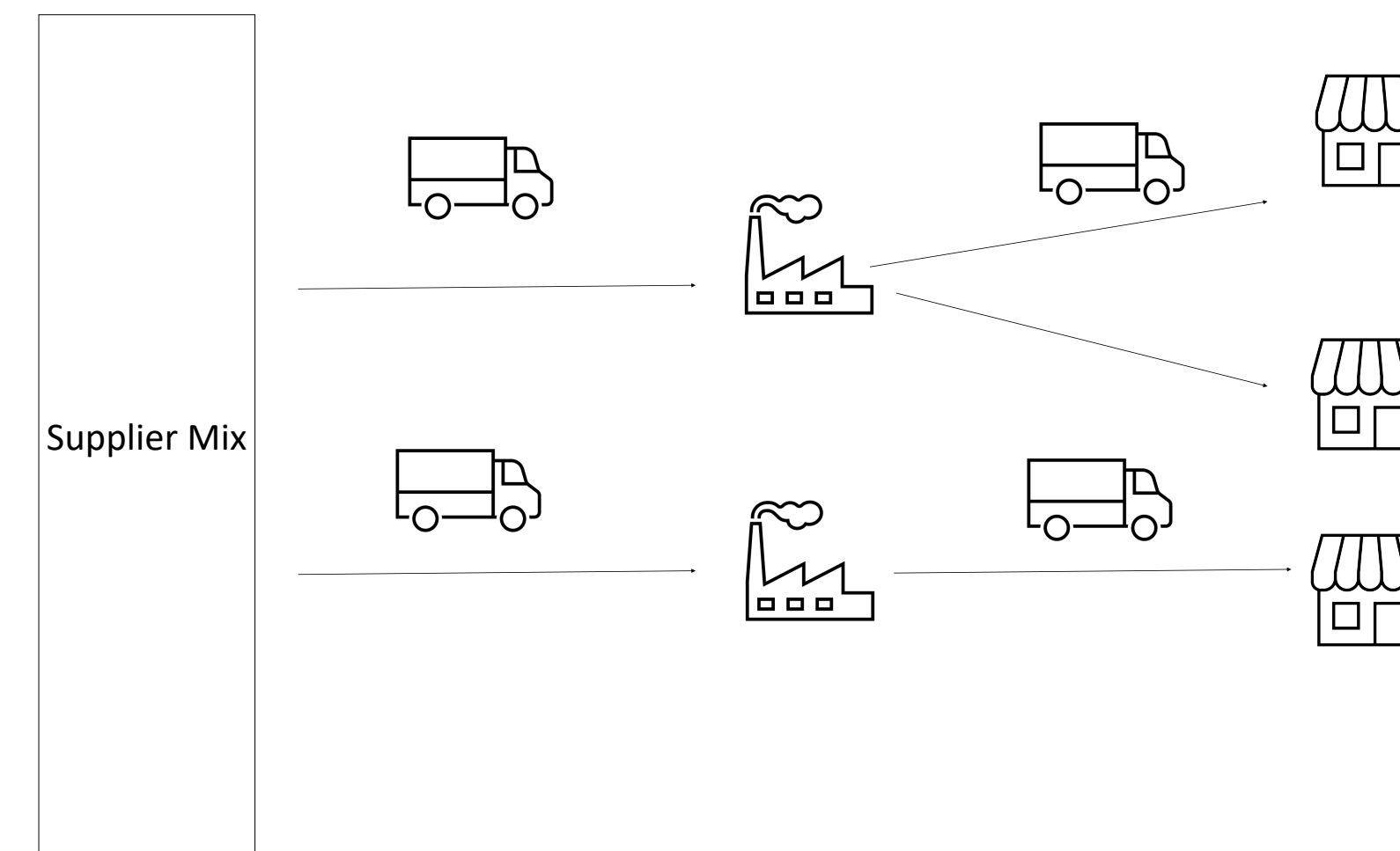
Relevant Literature

- Melo, M. T., Nickel, S., & Saldanha-da-Gama, F. (2009). Facility location and supply chain management – A review. *European Journal of Operational Research*, 196(2), 401–412. <https://doi.org/10.1016/j.ejor.2008.05.007>
- Supply chain network design under uncertainty: A comprehensive review and future research directions | Elsevier Enhanced Reader. (n.d.). <https://doi.org/10.1016/j.ejor.2017.04.009>

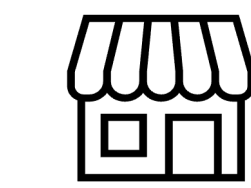
Customer 1



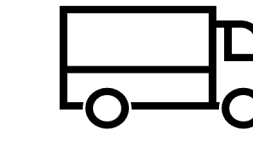
Customer 2



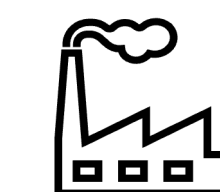
Legend



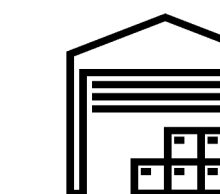
Customer



Transportation mode: Truck



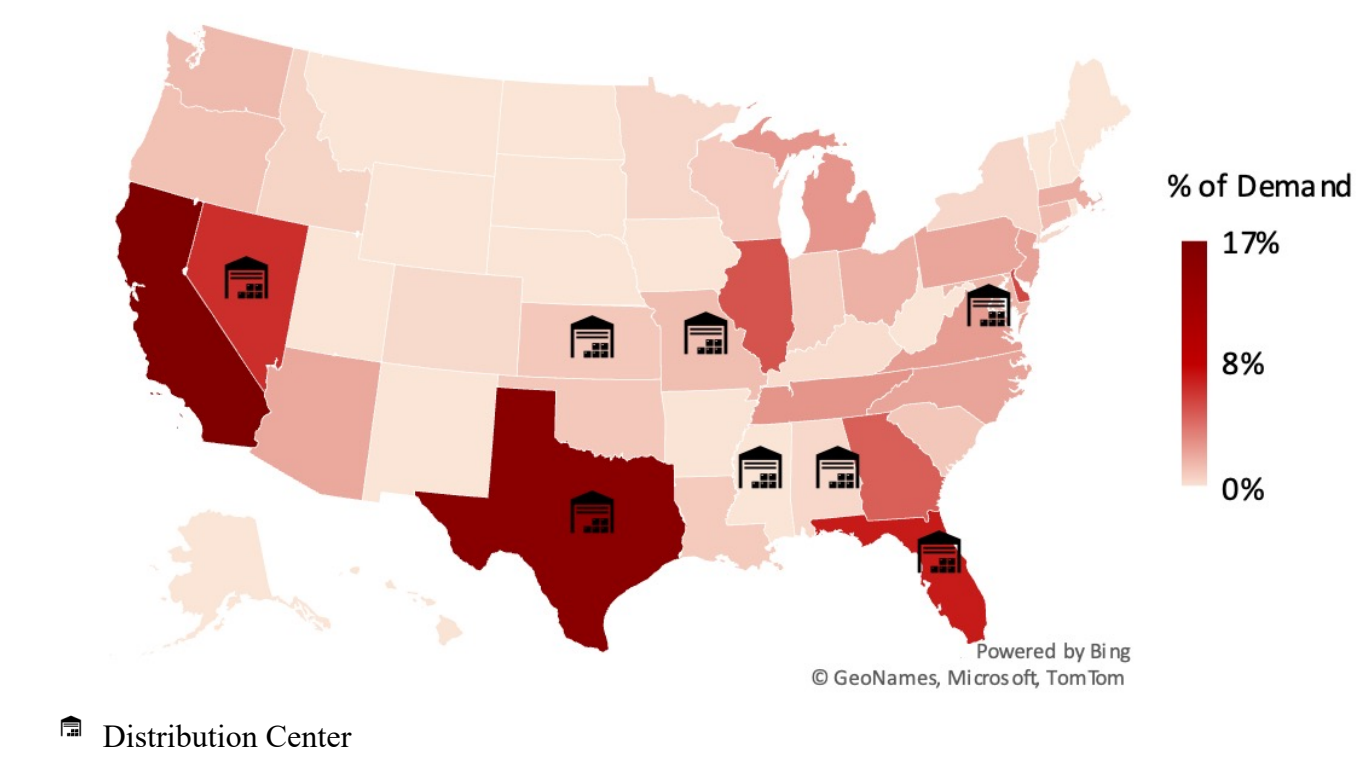
Production Facility



Distribution Center

Key Insights

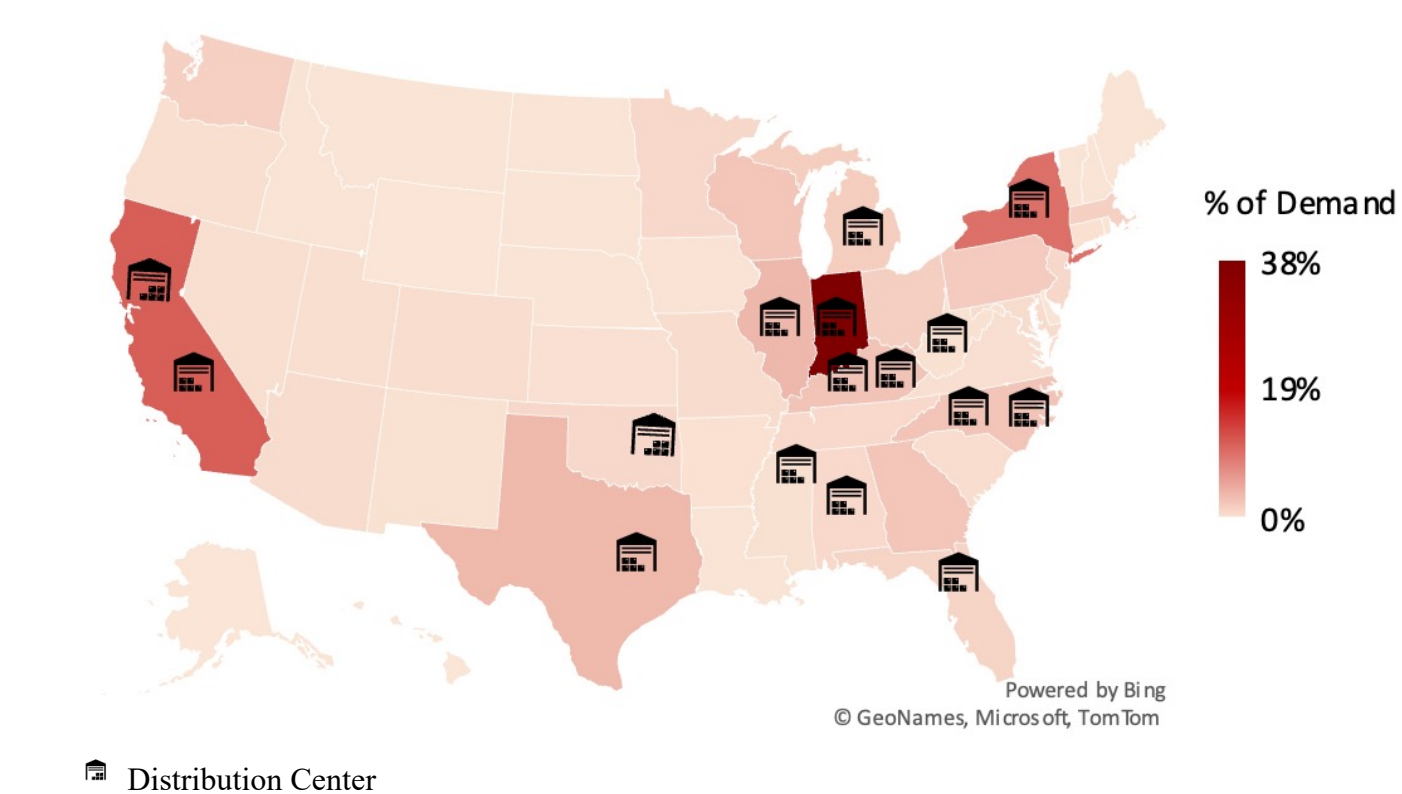
Customer 1 - '20 Demand Distribution



→A resilient network does not result in a significant transportation cost increase when compared to a cost optimized network.

→This was evident as the customer with more DCs and less customer locations had a more resilient network.

Customer 2 - '20 Demand Distribution



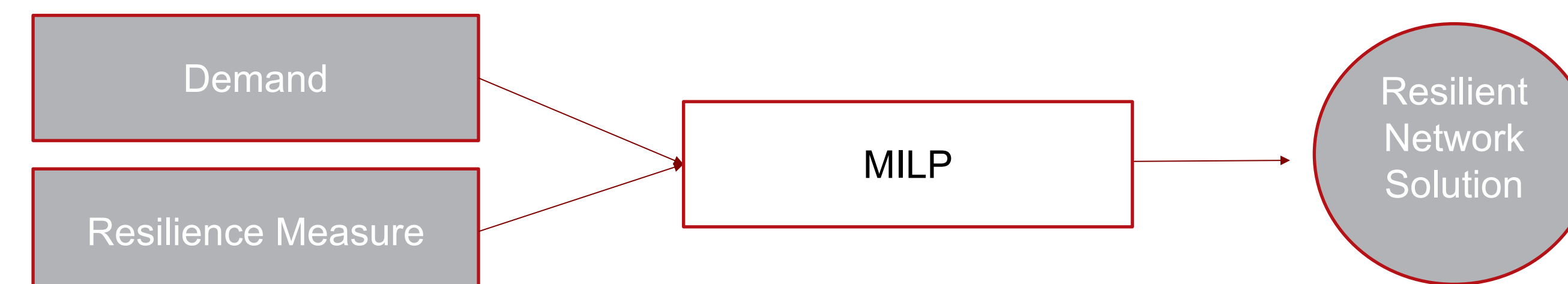
→It is critical to understand DC capacity for organizations that are opening new retail locations across multiple regions.

Expected Contribution

- Developed a practical and realistic network design recommendation
- Developed a universal model which can be applied across different industries to optimize supply chain resilience
- Facilitated network design decision making in two different industries

Methodology

Use a MILP to solve a network optimization problem which minimizes costs.



Pai Peng



Karoline Rueckerl

