

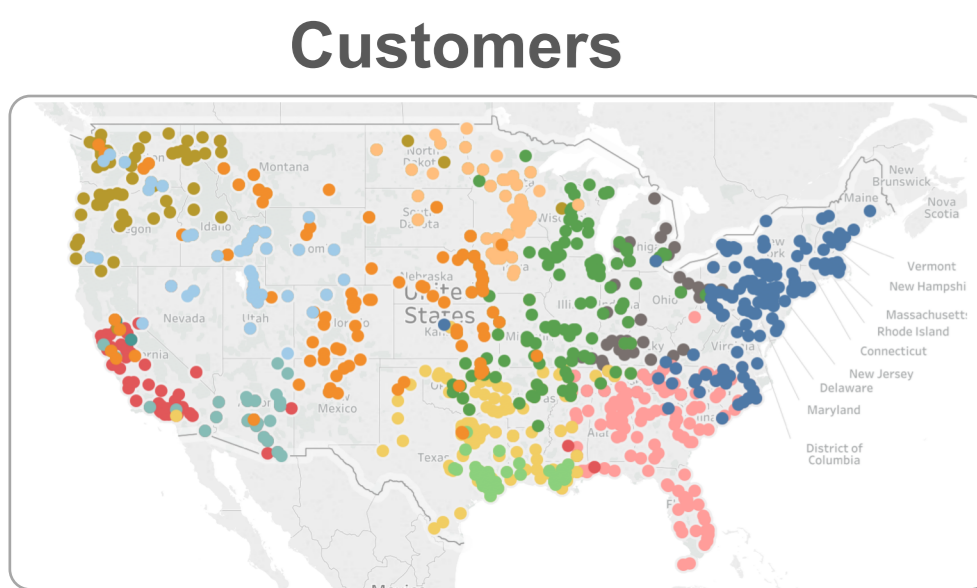
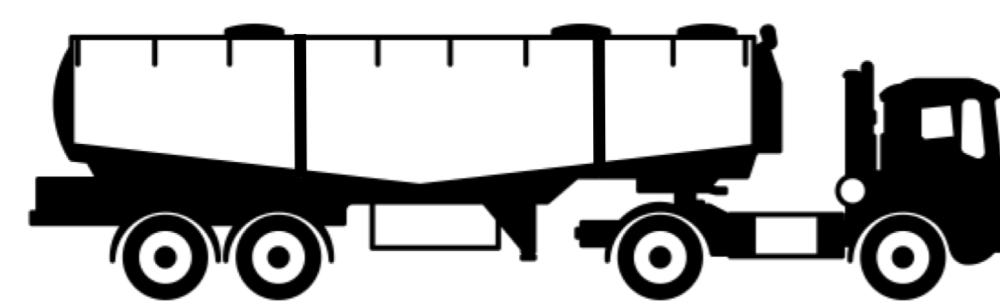
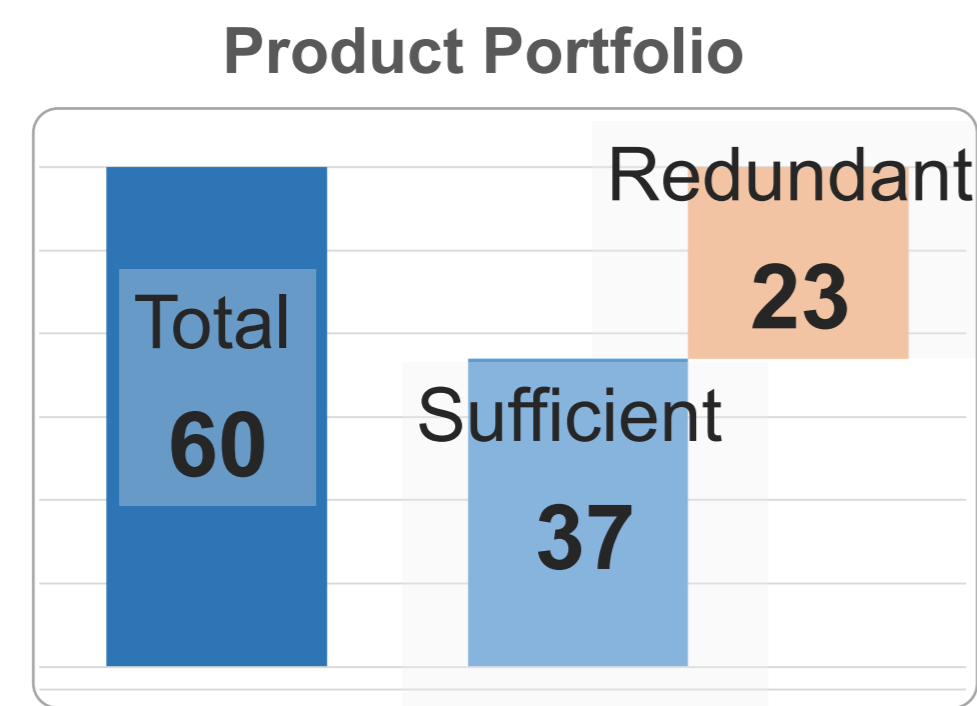
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The Impact of Product Portfolio Complexity on Truck Utilization

Motivation / Background

Some chemical divisions are shifting to a commodity industry. Product portfolio complexity is affecting the Supply Chain.

- 60 different products
- 23 redundant products
- 3,000+ customers
- 100+ trucks



Key Question / Hypothesis

How is truck utilization affected by:

- Number of products in the portfolio?
- Replacing redundant products?
- Demand variability?
- Lead time variability?

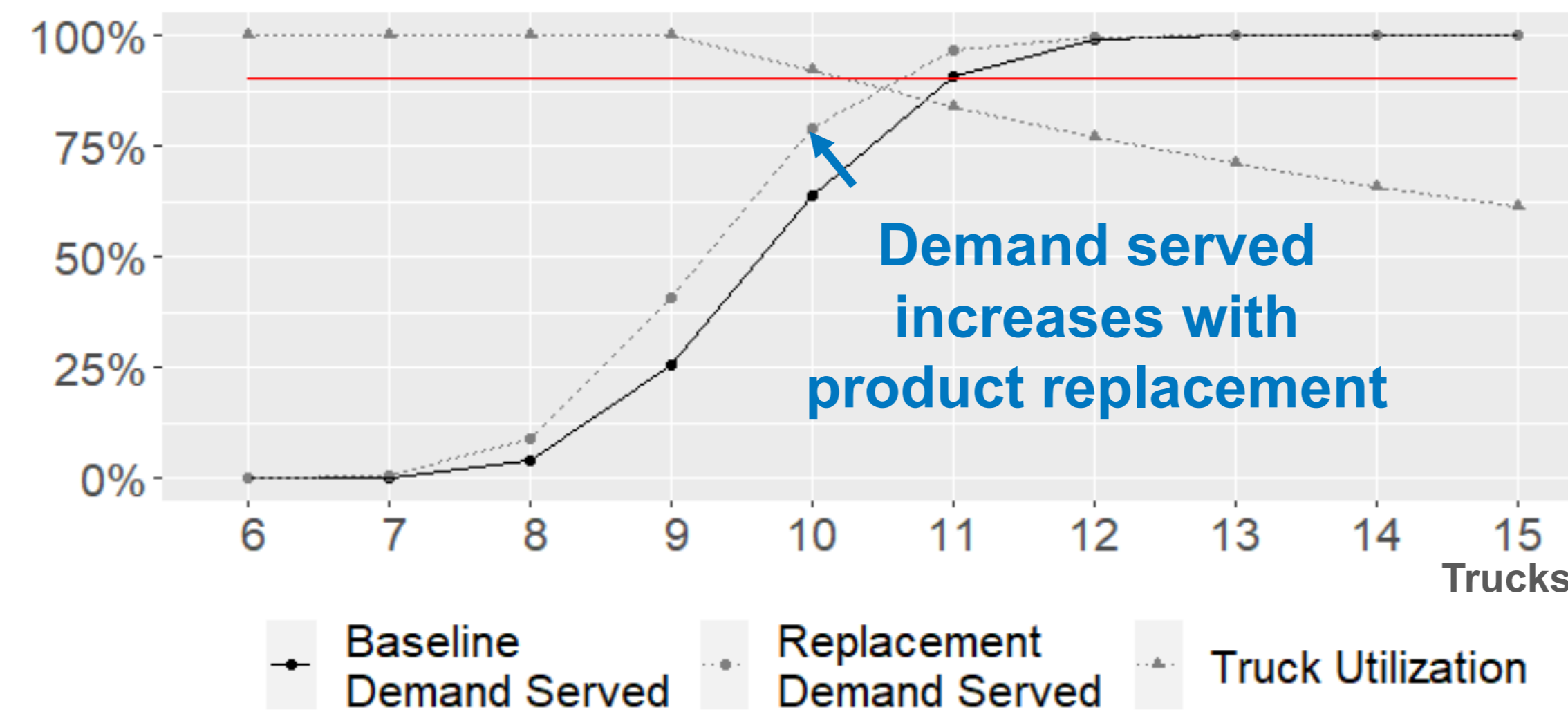


Relevant Literature

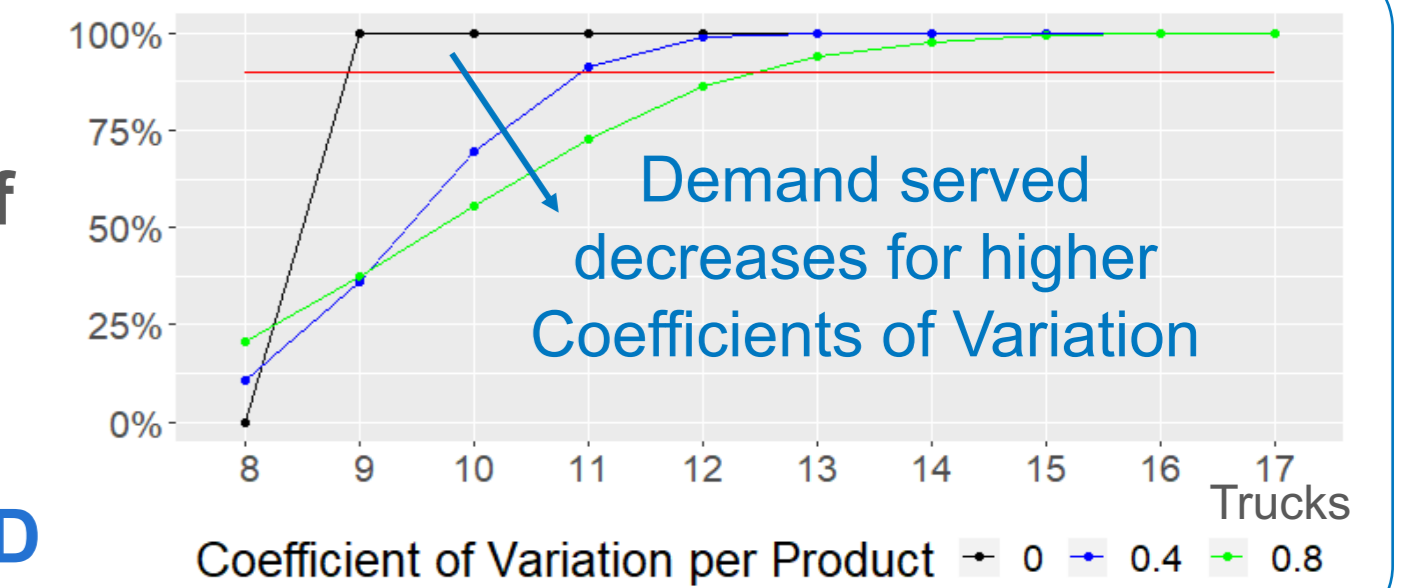
- Er, M., & MacCarthy, B. (2006). Managing product variety in multinational corporation supply chains: A simulation study.
- Malinowski, E., Karwan, M. H., Sun, L., & Pinto, J. M. (2018). Packaged gas supply chain planning with network-wide SKU rationalization

Initial Results

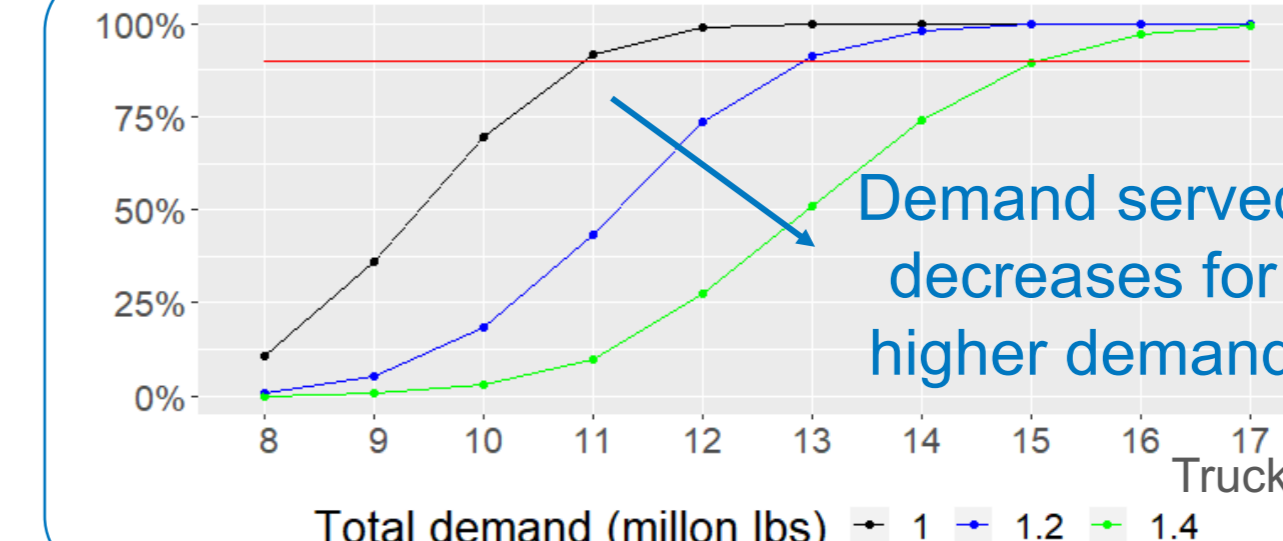
Parameters were evaluated independently, allowing to understand which of them affect truck utilization



- Same total demand
 - Greater Coefficients of Variation
- ➡ MORE TRUCKS NEEDED

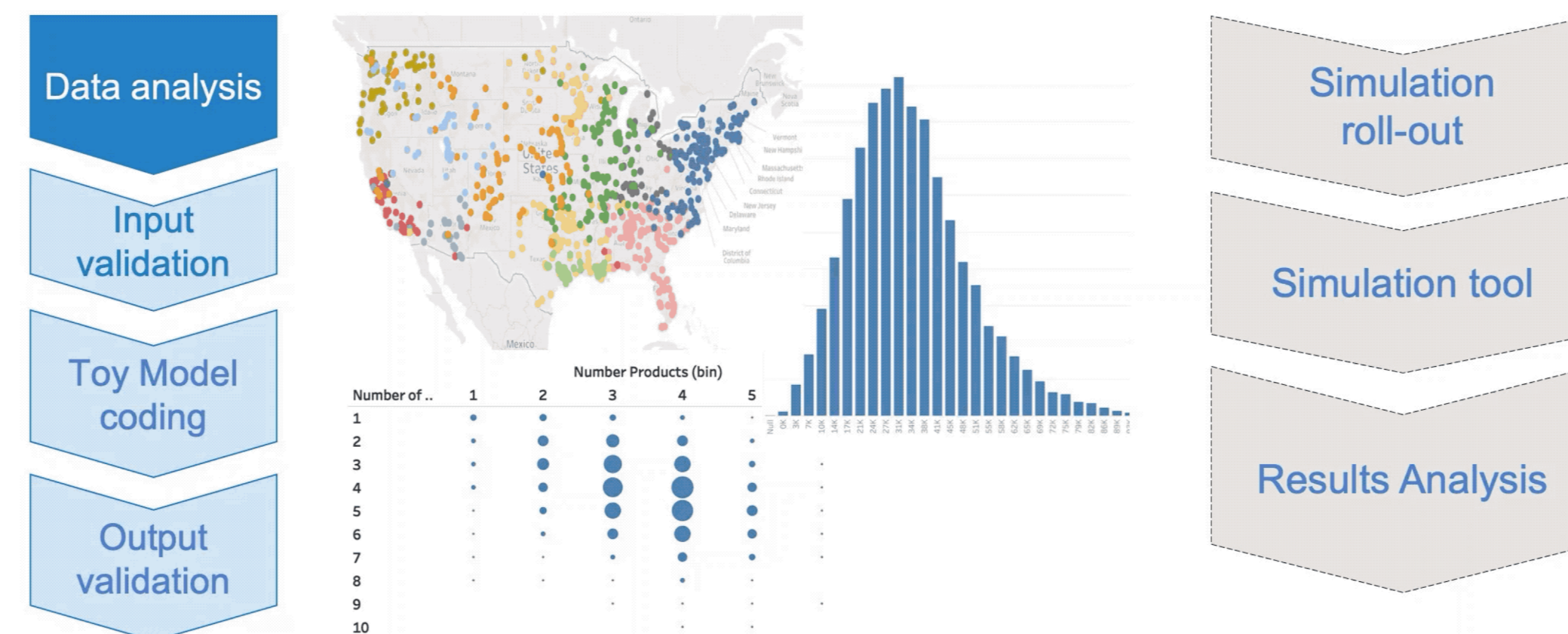


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Methodology

Through Monte Carlo simulation we developed a tool to analyze the impact of 6 parameters in truck utilization.

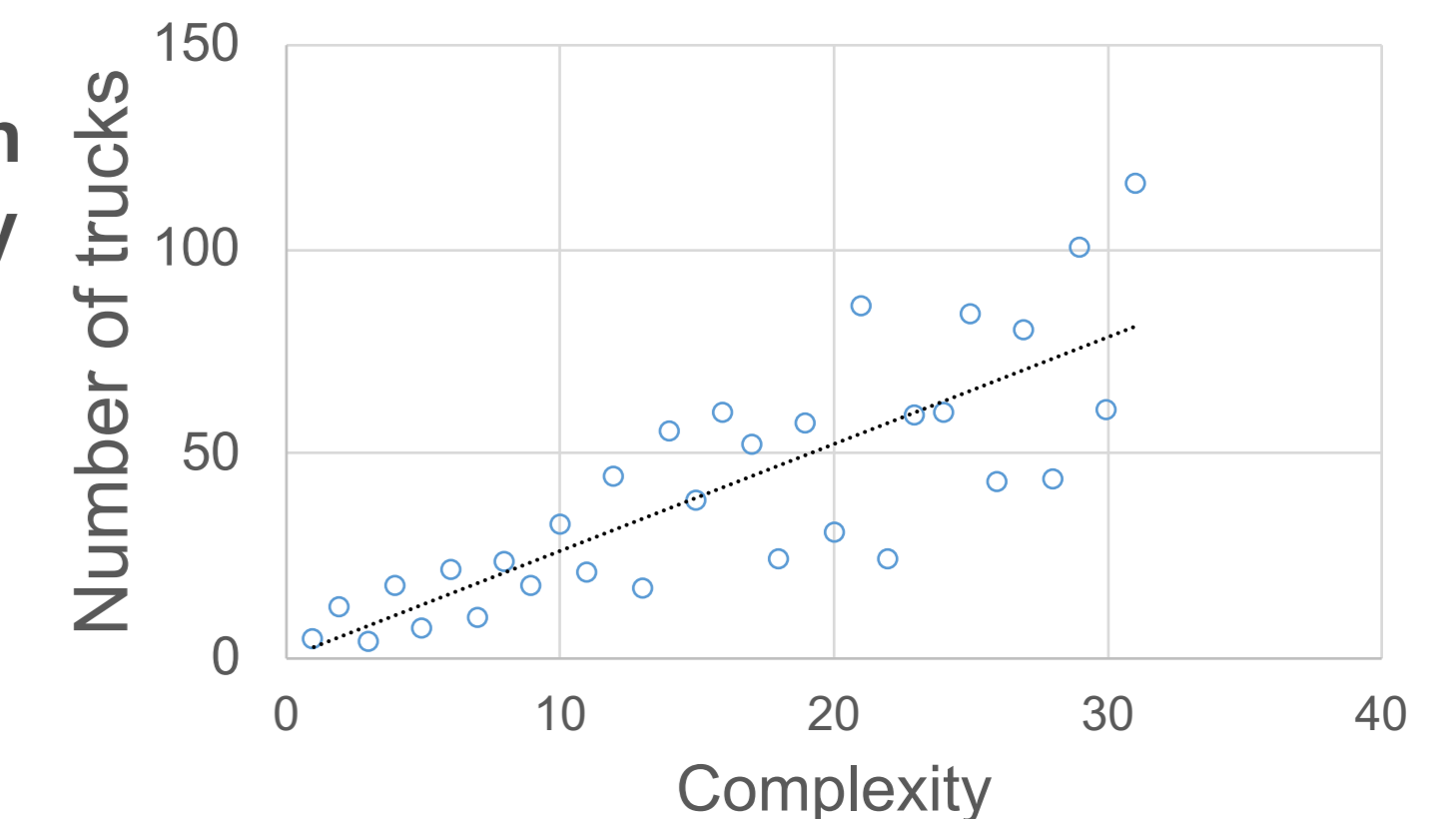


Parameters:

- Average demand per product
 - Standard deviation
- Quantity of trucks
- Average truck speed
- Average distance per trip
 - Standard deviation
- Average stops per trip
- Delivery lead time

Expected Contribution

- Help the sponsor understand the impact of decisions to the fleet size with an Excel tool
- Analysis of real data and recommendations for fleet optimization
- Correlation function between complexity and number of trucks



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