Kitting Facility Supply Chain Analysis and Refrigerated Freight Prediction

**Background**
Talking Rain is a fast-growing beverage company known for their popular brand Sparkling Ice.

**Generalized Question**
How could Talking Rain reduce cost in their supply chain?
1) By scheduling fewer unnecessary refrigeration trucks
2) With the implementation of a centralized kitting system

**Constraints**
- Shipment routes between facilities are estimated
- Limited historical weather forecasts
- No exact addresses for suppliers and co-packers
- 44,500 lb capacity for trucks
- FMCSA regulations for truck driver work schedule

**Goals / KPIs**
- Cut transportation costs by scheduling fewer refrigerated trucks
- Find optimal kitting facility location
- Reduce transportation costs
- Utilization of kitting facility < 80%

**ISE Skills**
- Simio
- FICO
- R
- Python

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**Future Kitting Supply Chain**
Kitting facility receives raw materials and creates kits. Production facilities use kits to produce finished product.

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**Current Supply Chain**
All production facilities receive raw materials and produce their own products from start to finish.

**Weather Prediction**
Refrigeration trucks are ordered for routes through at-risk states from November to March.

**Proposed System**

**Current Refrigeration SOP**

**Weather Prediction**

**Proposed System**

**Optimization Model**
- Finds optimal city to locate kitting facility to minimize total transportation cost
  - Accounts for variable price between dry van and refrigerated freight
  - Picks one supplier for each ingredient with the exception of juice concentrate
  - Model scalable via Google’s Directions API

**Current System Model**
- Calculates cost and lead time for ingredient transportation
- Demand scales up by 10% per year

**Kitting System Model**
- Tracks annual transportation cost considering seasonality
- Validates utilization of kitting facility

**Results**
Freight Prediction Savings:
2019-2021: ~$250k
TR Demand Goal (80 mil. bottles): ~$960k
Optimal City Location: Chicago, IL
Kitting Facility 5-Year Savings: ~$2MM

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