Increasing Supply Chain Efficiency

Supply Chain Team - Douglas Abney, Cai Chen, Jayla Rosen, Yu-Ting (Peggy) Tang, Sarah Taylor, Boyang Yu

ABSTRACT

Problem: Beck's Hybrids is aware of supply chain errors that are costly to finances and their customer service.

Objective: This project's objective is to increase the efficiency of Beck's supply chain. Our student team was tasked with identifying inefficiencies in Beck's supply chain. Along the way we have also been tasked with opportunities to solve future problems as well as make day to day processes in shipping more efficient.

Importance: Errors in shipping and transportation within Beck's supply chain can easily drain finances from the company. Beck's Hybrids created this project for our team to identify errors, simplify procedures, and avoid mistakes in the future.

Research Questions:
- How can we identify inefficiencies?
- How can inefficiencies be prevented?
- What tools would simplify shipping and transfers?

INTRODUCTION

Beck's Hybrids is the largest family-owned retail seed company in the United States. Beck's Hybrids territory encapsulates Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, South Dakota, Tennessee, and Wisconsin. Beck's produces corn, soybean, and wheat seeds for their farming customers. Beck's Hybrids territory size requires that they have 32 separate warehouses in various locations throughout the Midwest. Beck's Hybrids prides their company on top quality customer service.

METHODOLOGY

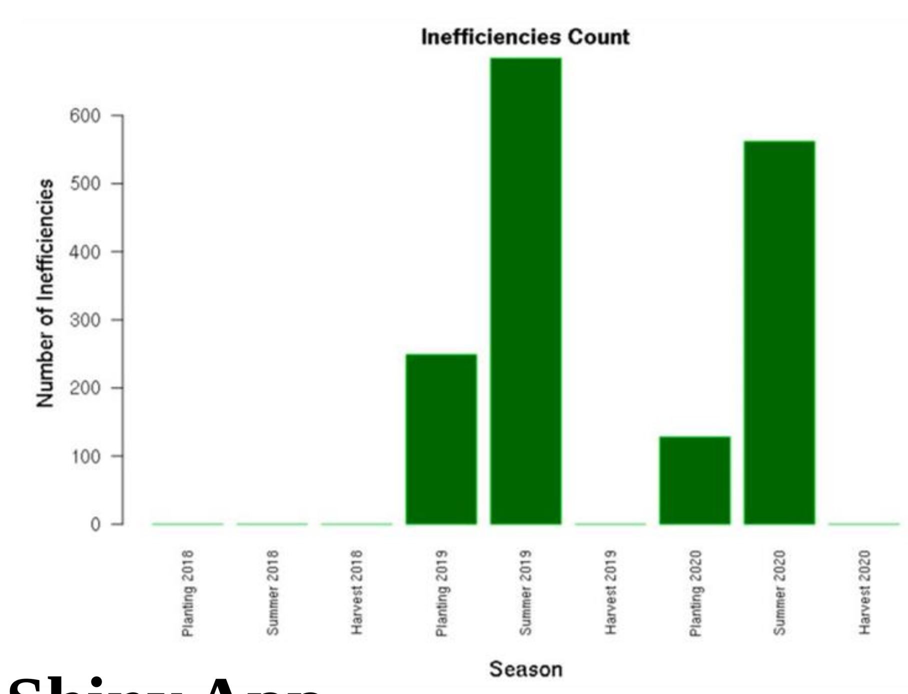
Identifying Inefficiencies

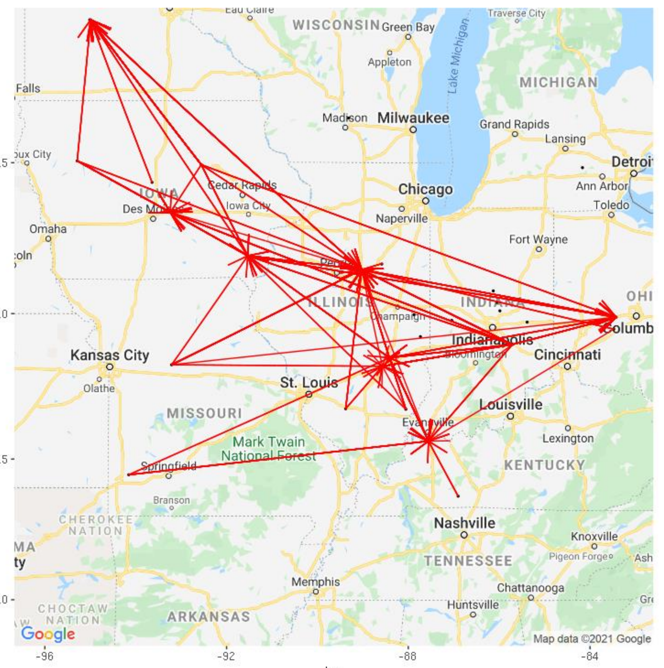
- Product shipping back and forth between WHS.

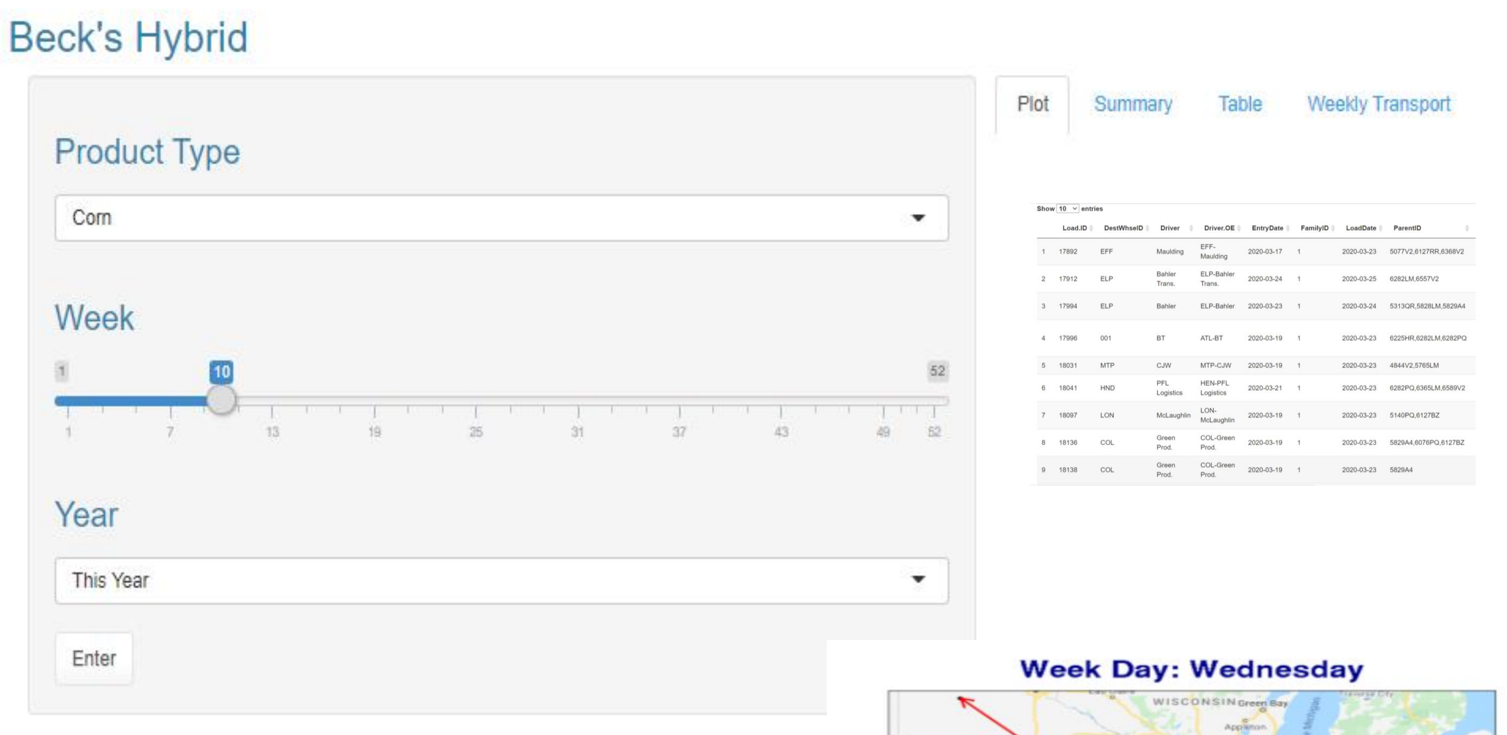
Inefficiencies calculated excluding external factors.

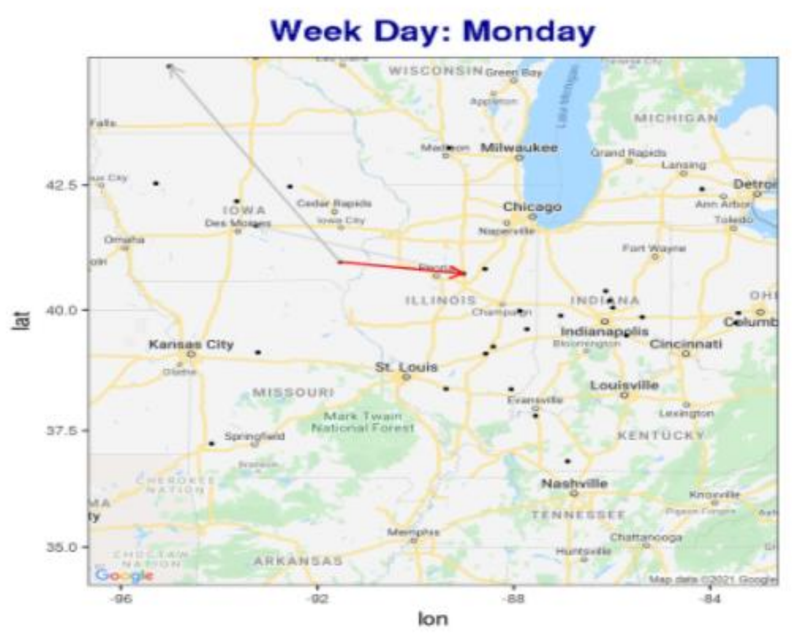
-Total Miles of Inefficient shipping : 187,429.7 miles

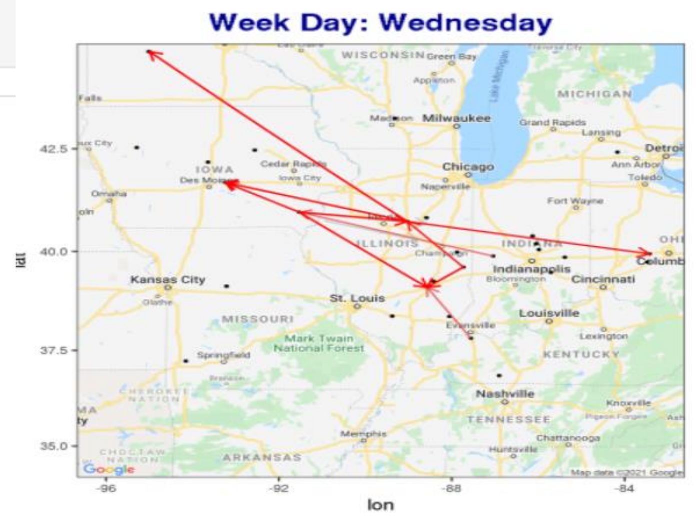
-Total Cost of Inefficient shipping: $421,716.80

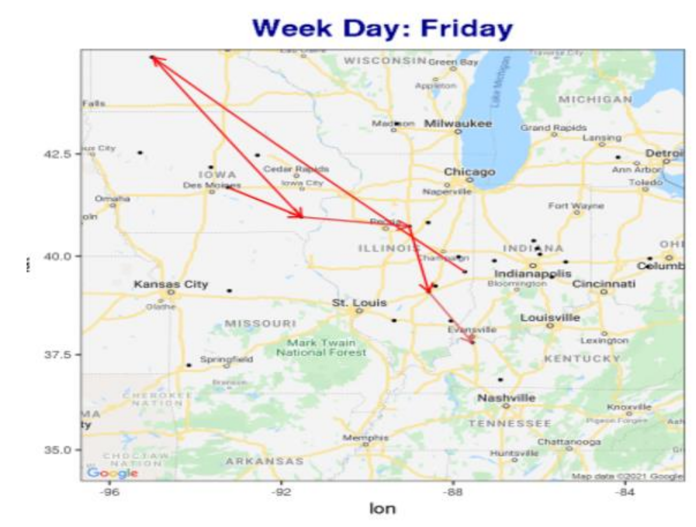












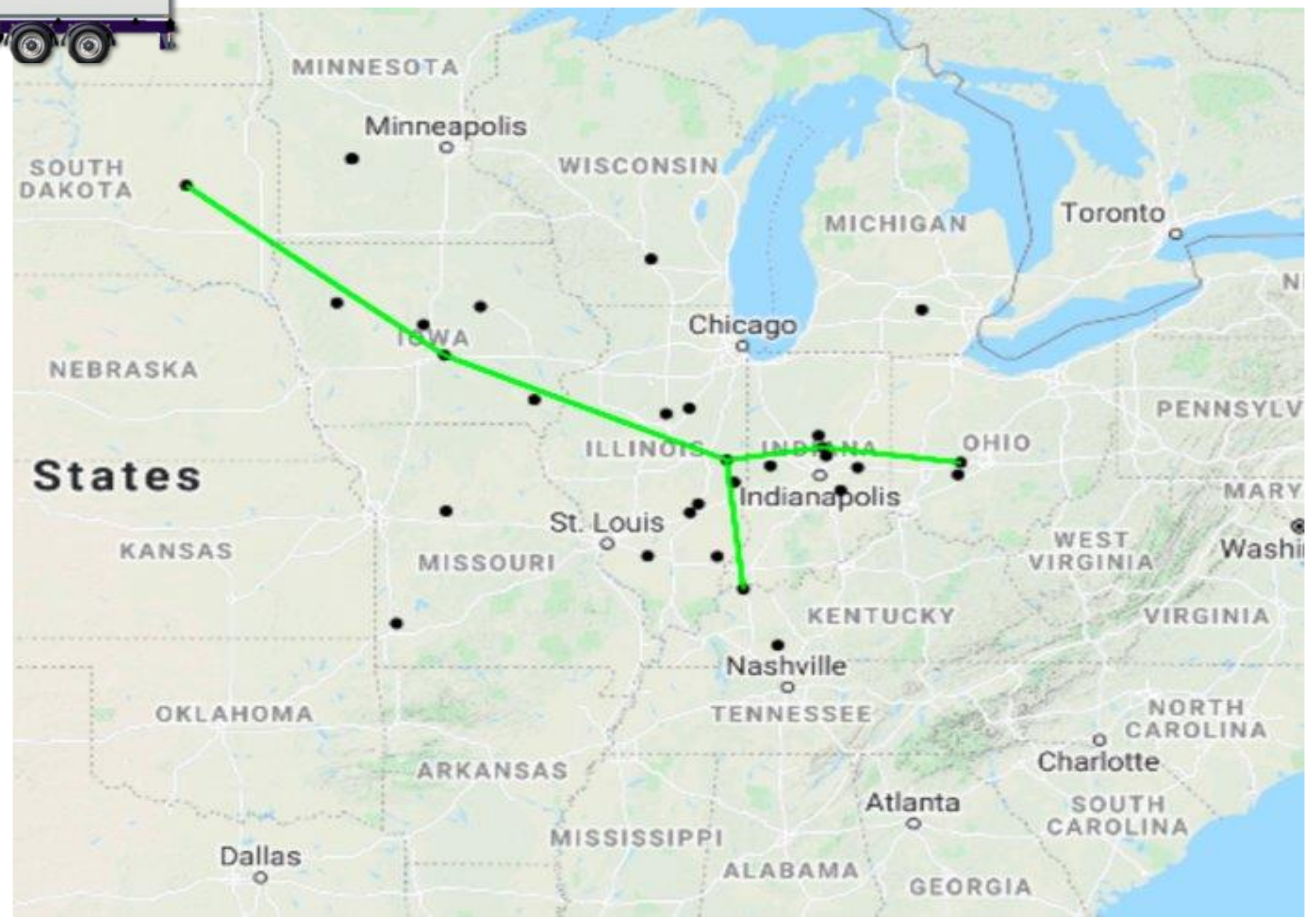
Shiny App

- Weekly Product Animation Shiny
- Product ID Shiny

METHODOLOGY

Minimizing Shipping Distances

- Minimum spanning tree algorithm
- Explains optimum routes that minimizes total miles
- Creates visual understanding of most efficient routes
- Objective of optimizing network flow analysis
- Struggles to explain the number of trucks
- Does not explain origins, transitions, and destinations



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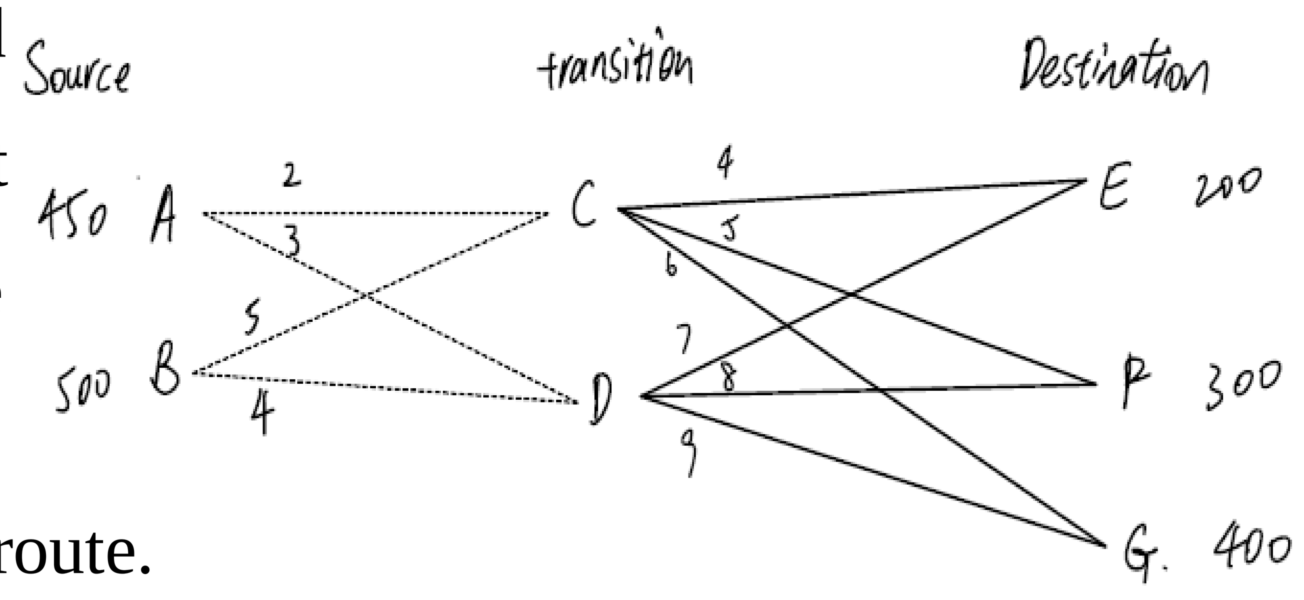
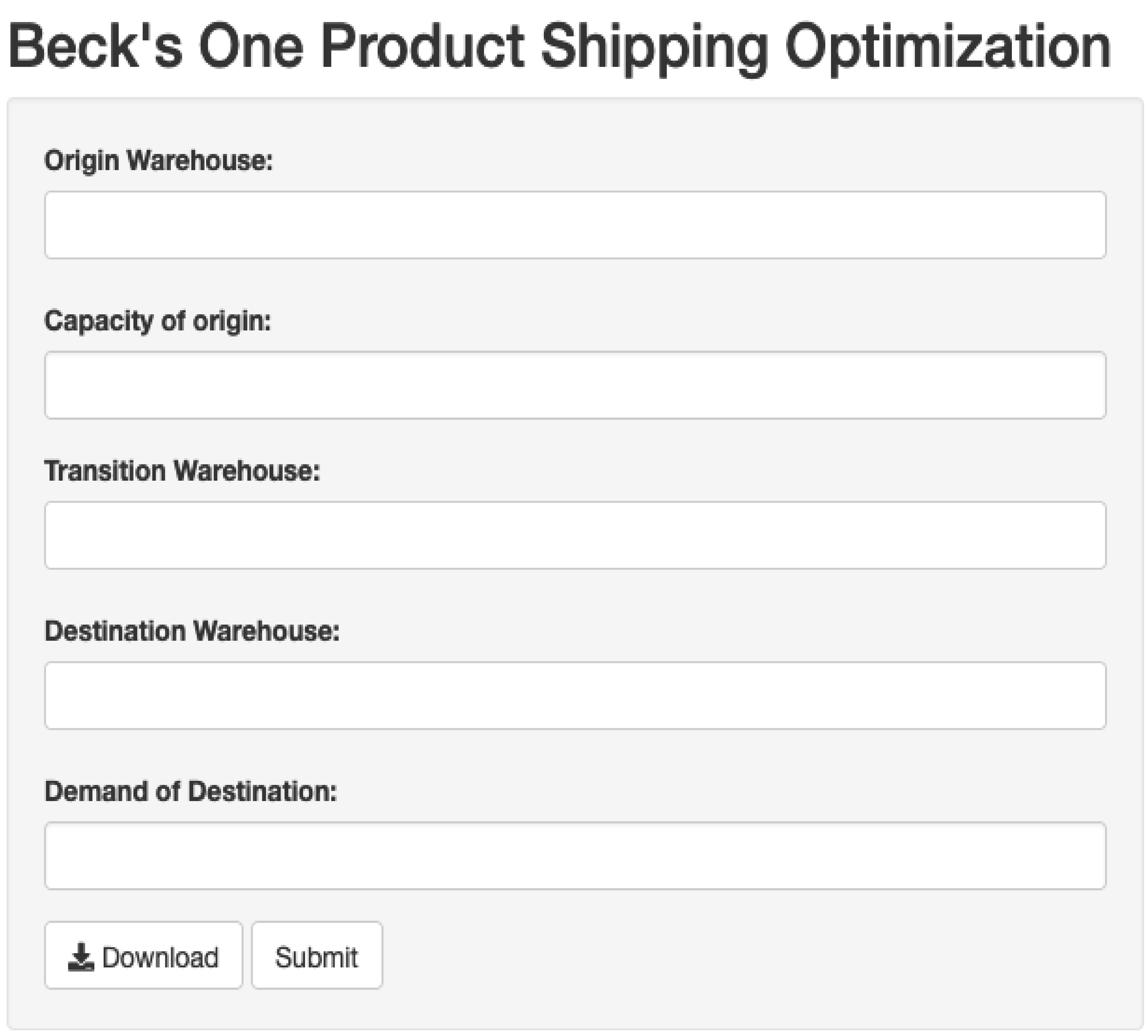
METHODOLOGY

Optimized Shipping with Network Flow Analysis

- Minimize the total shipping cost
- Utilizes matrix and Simplex method
- R create constraints using user input
- Returns the optimum shipping route
- Returns optimum number of trucks
- Returns optimum quantity for each route.
- No limitation on warehouses
- Creating a R shiny app





CONCLUSION

- Identified inefficiencies
- Designed mapping for shipping routes
- Built shiny apps to record shipments
- Created scripts for optimized shipping
- Look for areas of improvement
- Suggested ideas for data collection
- Suggest future areas of research

METHODOLOGY

Mapping Daily Shipment

- Map allows employees to track daily shipping
- App utilizes the R shiny package to create a reactive map
- Users can input daily shipping
- Allows for employees to recognize where trucks are shipped
- Employee at other warehouses can recognize availabilities
- Help to reduce redundant shipping.

FUTURE STEPS

- Finalize R shiny app that optimizes shipping
- Finalize R shiny app that maps daily shipping
- Create visualizations of past shipping routes
- Continue to analyze past shipping inefficiencies
- Develop more detailed shipping data collection
- Identify errors to avoid in the future

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