Developing a priority assignment policy for the Empty Planner application

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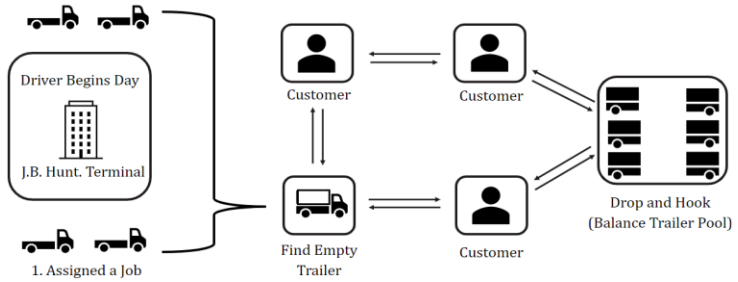
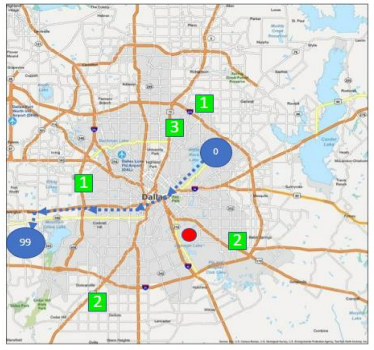
J.B. Hunt Transportation, Inc

J.B. Hunt Transport is a transportation and logistics company based out of Lowell, Arkansas that now has over 60 years of experience in the trucking industry. For this project, it is important to understand the situation from the driver's perspective. A J.B. Hunt Driver begins their day at a terminal where dispatchers and planners work to determine job assignments and trailer assignments. First, a driver will pick up the initial trailer and make a delivery. Hopefully exchanging trailers at the same location (a drop and hook). From this, the process continues for the rest of the day.



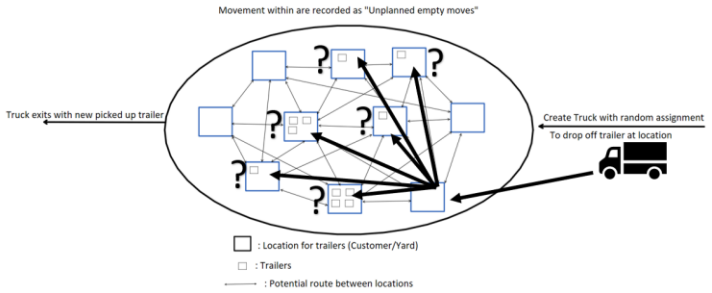
Empty Planner

This project is focusing inside of an application that was developed by JB Hunt. This application is used when there is not an available empty at a customer location and a truck driver needs to pick one up for the next load.



Simulation Performance

Using simulation, we were able to get a baseline of how often of metric of unplanned empty moves are occurring currently. This second simulation model took in three weighted factors; distance, number of available empties, longest idle time at location. This allowed us to see how this selection equation will impact both unplanned empty moves and customers trailer pools. We found that the selection equation greatly reduced our metric of unplanned empty moves and saw a large increase in trailers at customer locations. Every customer had at least one trailer on average versus in the original many had no trailers on average.



Weight Analysis

Using MODA (Multiple Objective Decision Analysis) we found the factors affecting the current process. Then we created value measures for each factor using stakeholder analysis. We used this information to create a swing weight matrix to understand the importance of each factor when comparing them against one another. Lastly, we scaled them to add to a value of 1 and weighted them based on variability and stakeholder importance.

		Importance to JB Hunt Stakeholders		
		High	Med	Low
Value Variability from MODA	High	Distance to location	Idle time	
	Med	Empties available at location	Forecasted empties coming in	
	Low	Realeasing empties		Location Shipper or Receiver

Selection Equation

The key component of this project was to develop some kind of system that can provide numerical value and ranking to each of the different location options that are shown in the Empty Planner application. Taking the information found during the analysis, weight was able to be assigned to each of the factors we deemed important to the system. These were then all put together into an equation that can output a score for that location based on its known information at any given time. As part of the equation, for the weights to be consistent all factors are normalized to a scale of one to ten.

$$.24\left(\frac{\text{Empties available at location}}{}\right) + .21\left(\frac{\text{Total idle time in days}}{10}\right) - .29\left(\frac{\text{Distance to location in miles}}{10}\right)$$

$$+ .08(\text{Customer releasing empties}) + .15\left(\frac{\text{Forecasted empties coming in}}{}\right) + .03(\text{If labeled "Shipper" or "Receiver"})$$

$$= \text{Location Score}$$

Decision Support Tool

Taking the finalized selection equation, a decision support tool was created to capture its use in close to real time. This tool takes in multiple user inputs based on the information of each location to output scores to aid in the selection of the best location to assign a driver.