Automating Product Selection and Removal Process for Cross-Dock Operation via Decision Support Tool

UNIVERSITY OF ARKANSAS
College of Engineering
Industrial Engineering

Team Members: Nate Hemby (PM), Ben Thornton, Tylon Jackson, Kyle Adams, Damon Pettis
Industry Partner: Guido Malpartida
Faculty Advisor: Dr. Manuel Rossetti

Medtronic

Introduction

Medtronic is a global medical device manufacturing company with major supply chain operations to support the manufacturing effort. Our project is a part of a larger project headed by CELDi that is focused on supporting the Medtronic cross-dock in Pedricktown, NJ. The CELDi project is examining the parameters by which Medtronic selects products for the cross-dock, trying to determine the most cost effective parameters for selecting cross-docked products. Our portion of the project was supporting the larger project with data analysis and designing a product selection tool to help streamline the selection process.

Goals & Objectives

Main Objectives:

- Aid in data analysis for CELDi project
- Develop a tool to streamline the product selection process and integrate seamlessly with the current process

Primary Goal:

The primary goal from these objectives are to improve their standard operating procedures for selecting and removing items for cross-dock. In addition we sought to decrease the time it takes for the Medtronic cross-dock planners to perform the product selection process

Background Information

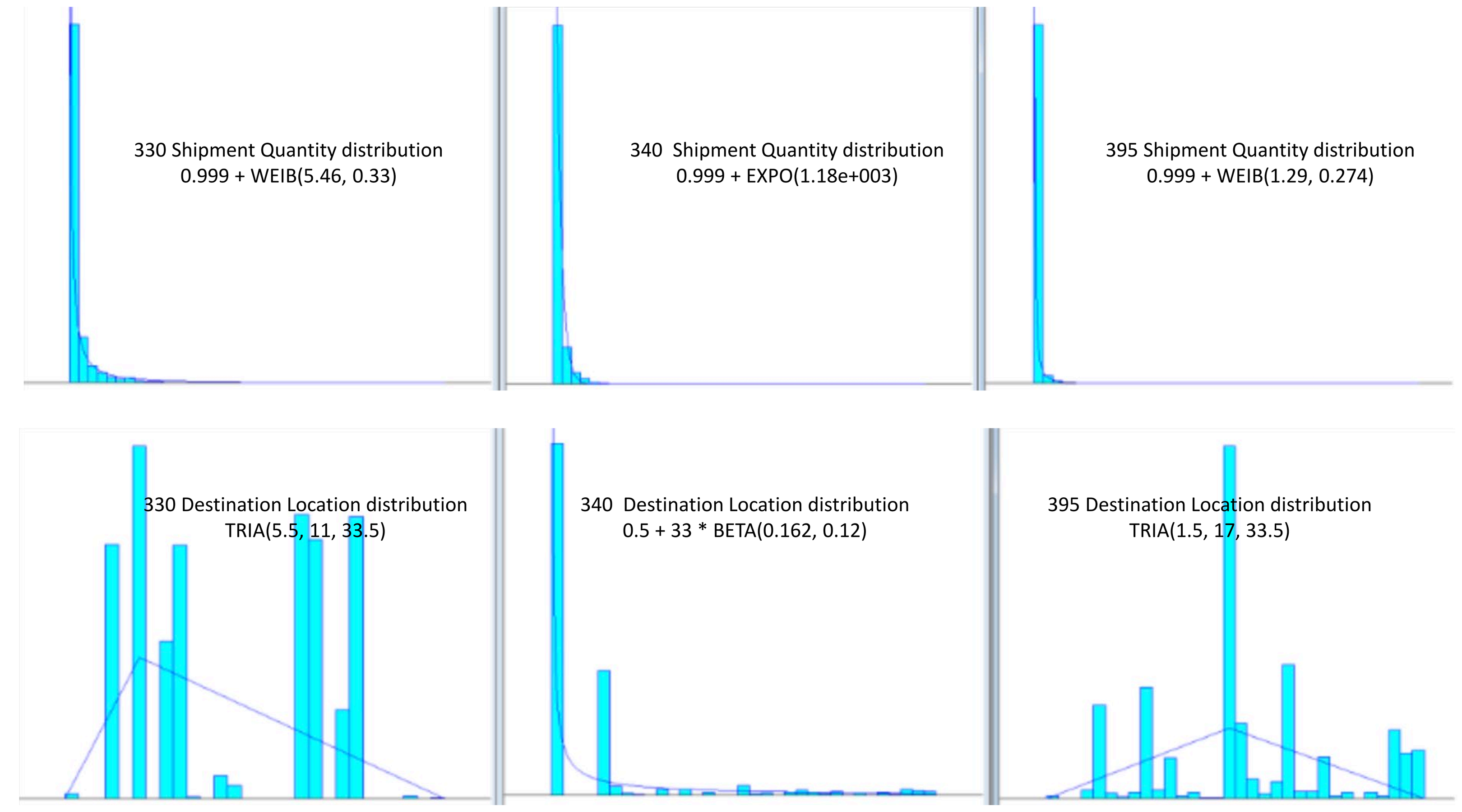
Cross Docking Best Practices:

- Popularity: Items flowing through the cross-dock should not sit and take up valuable space. Products with high demand are ideal for cross-docking because they spend less time
- Total Cubic Movement: Refers to the total volume of a product moved through the facility. Space is valuable in the cross-dock. Products with high volumes should be cross-docked because they can be shipped out faster.
- Demand Variation: Products with steady, consistent demand are better suited for cross-docking because they need less safety stock.
- Product Life Cycle: Products that could expire quickly should be pushed through the supply chain as fast as possible, and therefore are good candidates for cross-docking.

Engineering Analysis

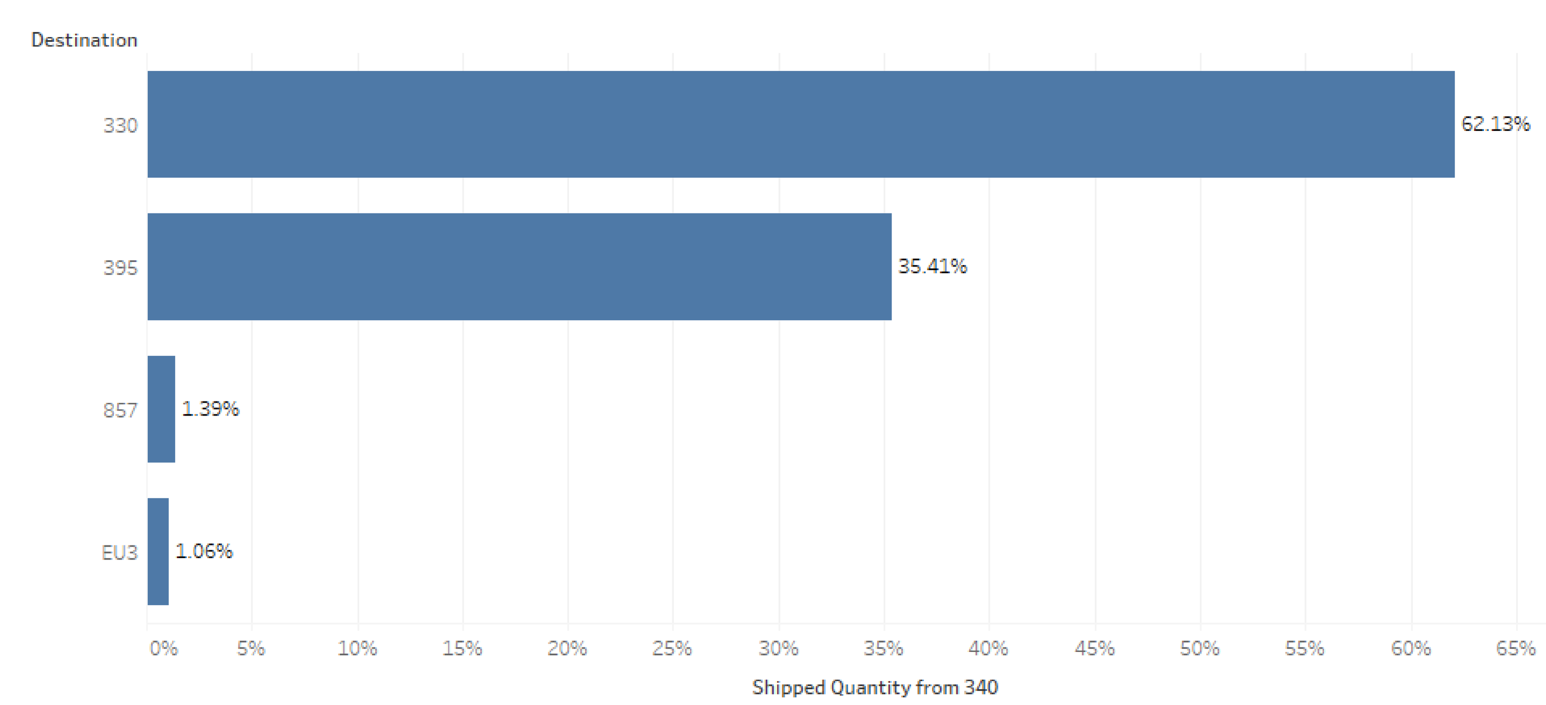
Simulation Modeling:

The team modeled a typical year of Medtronic's product flow from their 330, 340, and 395 distribution locations. In a normal year, millions of products flow to 33 different locations around the world. The distributions shown were created through data analysis tools, such as ARENA's input analyzer, to describe both an order's item quantity and destination location. This model was utilized to shed light on not only the busiest origin and destination location, but also the magnitude of product flow for each location, allowing CELDi to better understand the characteristics of Medtronic's supply chain.



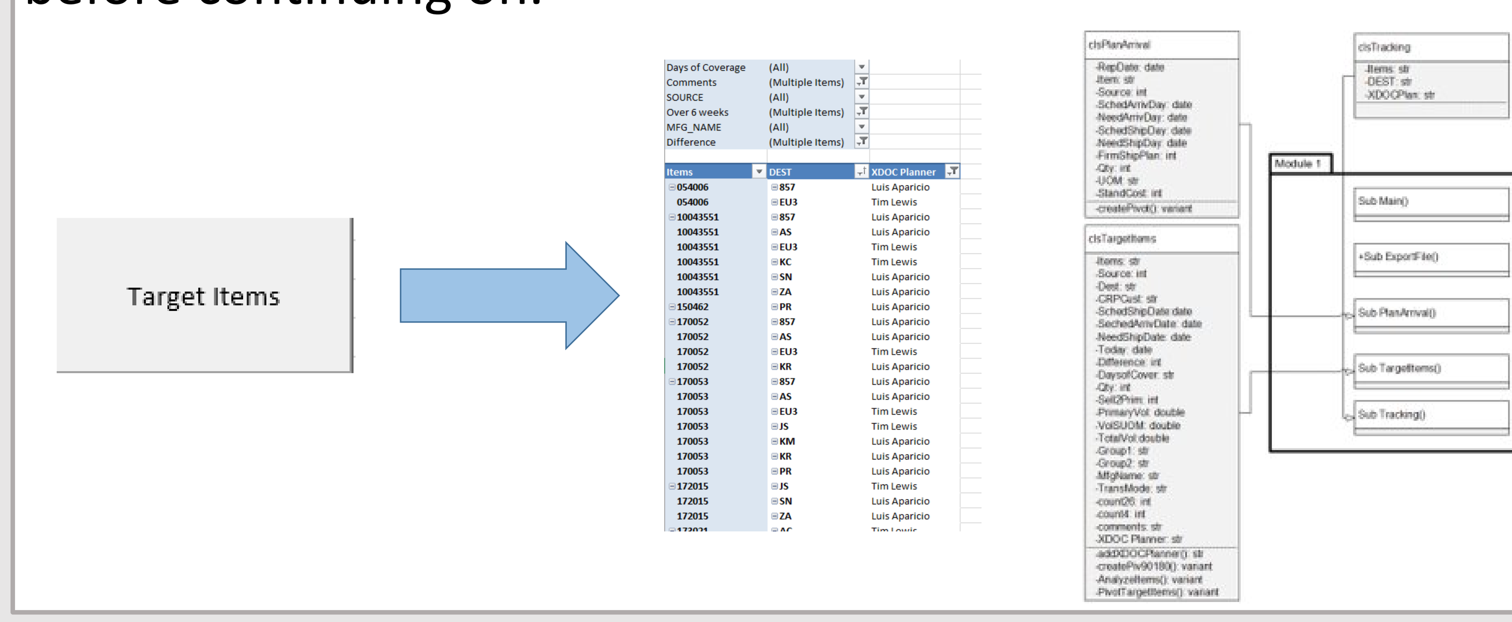
Data Analysis:

The team assisted CELDi in some preliminary demand analysis for the larger CELDi project. The purpose of the demand analysis was to better understand product flow through the Medtronic supply chain. Analysis showed Medtronic was utilizing their cross-dock differently than suggested best practices, shipping over 90% of product to other Medtronic facilities, rather than to customers.



Decision Support Tool

The Medtronic cross-dock planning team has a process for deciding which products should flow through the cross-dock. This process is performed once a month, and involves large amounts of data manipulation via Excel. Most of this manipulation is done manually, so we sought to automate this process to reduce the amount of time spent on the process. To do this, we created a decision support tool using Excel VBA to automate the process and free the cross-dock planners to work on other tasks. The tool is a multi-click tool allowing the cross-dock planner to check the output at key points in the process before continuing on.



Expected Impact

We measured the potential impact of the usage of the tool by utilizing our industry partner's estimation of the process duration (approximately 6 hours) and salary data available on Glassdoor. It is expected the tool will save the team between three and four hours, leading to a 50-60% reduction in time and labor costs spent on the process.