Rethinking Food Waste: Optimizing the Food Bank Supply Chain to Tackle Food Waste and Food Insecurity

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Every year in the United States, 133 billion pounds of food waste is produced, of which 68% is potentially edible. At the same time, 35.2 million people in the U.S. struggle with food insecurity. With excess supply on one side and excess demand on the other, food banks seek to bridge this divide. The purpose of this project is to find the optimal location for an additional food bank in Arizona by considering both supply and demand. Geographic data about food insecurity and population statistics (1526 data points), as well as food waste generation from manufacturers, producers, and retailers (4152 data points) were solicited from various databases. By using QGIS, an open-source geographic information system software, each data point on both the demand and supply side of the model could be connected to a parent food bank. A basic python code was constructed to determine total weighted distance, number of people served, and food waste averted from landfills. The results were then compared to each other considering factors such as fuel costs, wages, and CO2 emissions associated with transportation, CO2 and CH4 emissions due to decomposing food waste in landfills, and healthcare costs due to food insecurity to determine the optimal location of a new food bank in Arizona. We find that Flagstaff is the optimal location for a new food bank. Using geographic data, this model is novel in that it harnesses a previously unexploited food source. We hope this model can be adapted and used in other regions for optimizing food bank supply chains.

Awards Won:
Second Award of $2,000