

Smart City Movement in Memphis, TN: Recycling from a Private Collector's Perspective

By Dr. Esra Ozdenerol: Final Research Report --Smart City Research Cluster

Smart cities manage solid waste by mandating recycling, establish baseline metrics and monitor their assets in real time by smart device solutions. Smart cities optimize the efficiency of waste collection value chain in circular economy by leveraging non-profits become more successful instead of the city taking control of the programs or start a new program with additional costs. Private sector supports the local and circular economy by working with non-profit organizations to reduce regular waste disposal costs, make recycling affordable, train and educate on recycling and provide daily, weekly, as needed basis collection. As Memphis is joining the smart cities movement by improving operational performance in waste management, the purpose of this research is to learn about the current infrastructure of recycling in the city from the perspective of a private collector. *GET GREEN Recycleworks* has provided information about the amount of recyclable waste generated by commercial sector such as apartment complexes and Memphis area restaurants, which are certified by *Project Green Fork*, a non-profit organization works to make area restaurants sustainable. Figure 1 shows Zip codes USA meals spent in Shelby County and Project Green Fork certified restaurants. Darker areas reveal higher \$ amount spent along Poplar Avenue corridor and suburbs in Shelby County.

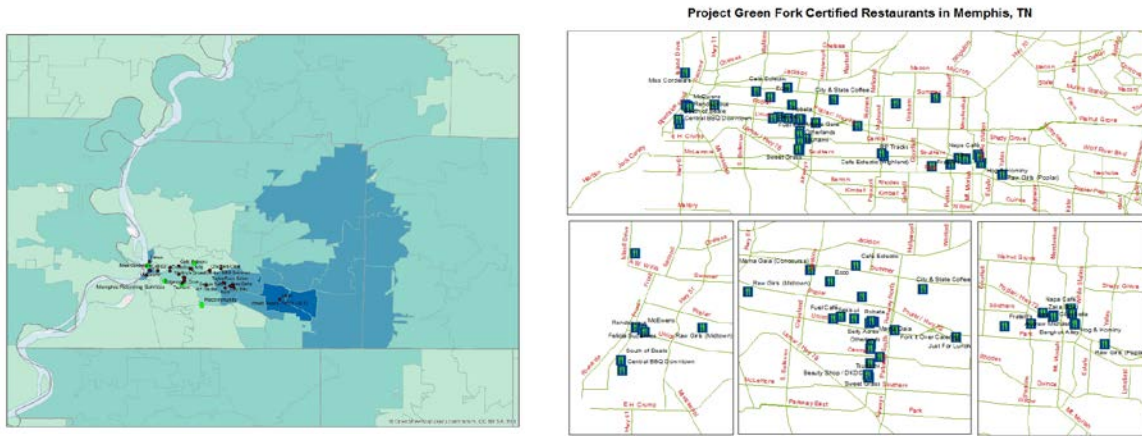


Figure 1. 2017 USA Meals spent at restaurants by Zip codes and Project Green Fork Certified Restaurants

On average, 353 pounds of cardboard, 576 gallons of mixed recyclables and 55 gallons of compost are picked up by *GET GREEN Recycleworks* during a week. Winter (e.g., January) and summer months (e.g., July) don't differ in the amount of pickups (Cardboard 33%, Mixed recycle 78 %, Compost 14 % but in winter (516) there are more visits than summer (440). Blue- Mixed Recycle; Cardboard-Orange; Yellow/Gray-Compost



Figure 2: Comparison of January and July Pickups.

Composting is not common among restaurants. Mixed recycled materials are consistently picked up more in winter months than summer months. Cardboard is consistently picked up around 300 gallons with no seasonal change. Figure 3 below is a seasonal comparison for world famous Rendezvous Restaurant.

Rendezvous' monthly comparison



Figure 3. January and July pickups for Rendezvous restaurant

A GIS's drive time analysis function is applied to determine the area that can be reached within a specified travel time (5, 10, 15 minutes) along street network based on travel mode (at 9 AM traffic), where recyclables are collected from businesses to drop off centers (e.g., Memphis Recycling Services; Dixie Waste Paper Co.; Recommunity; Mud Island Recycling Drop off). Figure 4 shows two drive time analyses of Monday pickups from Cooper Young Recycling and Dixie Recycling drop off centers. Most pickups are done in the green zone in 10 minute drive time and average traffic volume is 6,000 to 15,000 vehicles per day in 10 minute zone.

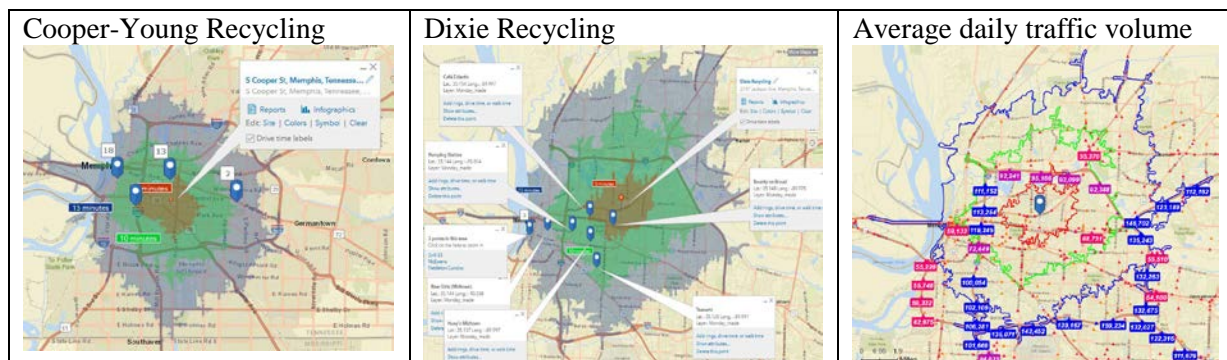


Figure 4. Drive time analysis

Next steps furthering this research:

For further steps in this research, more data collection and establishing baseline metrics are needed to create a blueprint for all sectors – private, public, non-profit- in the recycling domain in Memphis. Smart device solutions should be used so GIS maps and apps could monitor and reveal assets in real time. Initiatives should be taken towards a smarter, healthier, and more sustainable city by focusing on business and consumer education efforts; raising local business and community awareness of the economic development opportunities associated with recycling and recycling-related manufacturing; identifying meaningful incentives to encourage the use of recycled materials.

External funding:

I plan to seek external funding to further this research by partnering with a non-profit and/or for-profit organization for local and/or state funding.

Presentations:

I plan to present my findings at a local non-profit organization event such as Sierra Club, Clean Memphis, Project Green Fork, Memphis Green drinks and Memphis Area Geographic Information Council.

Student involvement in the project:

My Introduction to Geographic Information Systems- ESCI 4515-6515 course participated to the project. Shea Stock, a graduate student, did her final project. She mapped the weekly pickups.