RECYLING FROM A PRIVATE COLLECTOR’S PERSPECTIVE

A New Chapter for Recycling: Using GIS and mixed methods approach to improve the market development and transportation of recycled materials

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Memphis joining the smart cities movement

- Smart cities = more efficient, responsive, more sustainable
- More efficient in managing solid waste
- Improved in operational performance in many sectors, including waste management
- Overcome environmental challenges
- Optimize the efficiency of waste collection value chain in circular economy
- Eliminate contamination coming from multifamily housing units and commercial sectors as well as single family housing
Smart cities and waste management

- Zero waste goal and high diversion rate (e.g. 90%)
- Mandate waste, recycling and organic collections (most smart cities)
- To be more data driven to ensure financially for city and customers
- Collect data, track and analyze and develop more strategic programs
- To establish baseline metrics to help inform sustainability and resiliency planning
- Use web-based smart device solutions and enable operators to monitor their assets in real time
How smart cities are managing solid waste

- Equip transfer stations with software and technology to track recycling, waste, organics, later turn into reporting
- Collect data via radio frequency identification tags, placed on all the carts used for collections
- Per capita waste generation rates, disposal rates, greenhouse emission savings, diversion and recycling rates, participation rates
Understand waste pattern generations in each locations so that collections points can be recommended and number of trips are reduced.
Operation side of managing solid waste

- Solar-powered waste compacting bins measures fill level information so that collectors know which bins to collect and optimized route that goes only full bins
- LED indicators identify the status of the bin
- Offer food waste collection, even residences
- Digitalization of waste and recycling, hauling technologies (tech in trucks) and big data platforms enable dispatchers and operation professionals to optimize assets
- Digitalization, truck routes to tonnage, to details about service sites
- Use sustainability technology verify diversion metrics, carbon tracking and reporting
- Customer facing technology provides visibility
Recycling percentage rates of products

- Auto Batteries: 96.2%
- Newspaper/Mechanical Papers: 71.6%
- Steel Cans: 67.0%
- Yard Trimmings: 57.5%
- Aluminum Beer & Soda Cans: 49.6%
- Tires: 35.5%
- Glass Containers: 33.4%
- PET Bottles & Jars: 29.2%
- HDPE Natural (White Translucent): 27.5%

Source: U.S. Environmental Protection Agency
Business strategies in smart city recycling
Leveraging non-profits in smart city recycling

- Public profit from non-profits:
- Leverage non-profits so cities can help them become more successful with what they are doing instead of the city taking control of the programs or starting a new program with additional costs.
• Certification Steps to be a member of Project Greenfork

• 1- Compostable, biodegradable, recyclable, or made from recycled content.

• 2- Required to recycle all items to prevent materials from ending up in the trash (and eventually a landfill)

• 3- Help restaurants develop a composting process to collect pre-consumed fruit, vegetable, coffee grounds, and eggshell scraps and other compostable waste.

• 4- Reduce the usage of toxic cleaners wherever possible with plant-based and/or biodegradable cleaners.

• 5- Completing an energy audit to reduce and conserve vital energy and water. Help you identify energy waste and find ways to save.

• 6- Properly maintained grease traps and kitchen hoods prevent overflows and emissions to sewer and storm drain systems. Clean and free of debris at all times including cigarette butts and other outside trash.
Project Greenfork, a program offered through Clean Memphis works to make area restaurants sustainable.

Certified restaurants (57) are required to recycle all items that are recognized as recyclable by Project Green Fork.
2017 USA meals spent at restaurants per household in the U.S.
New Green Business Frontier: Recycling for Profit

GET GREEN Recycleworks
Small entrepreneurs are taking the lead in Memphis.

- Private Collector in Circular Economy
- Reduce regular waste disposal costs
- Make recycling affordable
- Support the local and circular economy
- Train and educate on recycling
- Daily, weekly, as needed basis collection
<table>
<thead>
<tr>
<th>Mixed Recycling</th>
<th>January</th>
<th>July</th>
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<tbody>
<tr>
<td>Whole Foods</td>
<td>8950</td>
<td>10700</td>
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<td>Rendezvous</td>
<td>2989</td>
<td>3666</td>
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<td>Cafe Eclectic</td>
<td>2020</td>
<td>1778</td>
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<table>
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<tr>
<th>Cardboard</th>
<th>January</th>
<th>July</th>
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<tr>
<td>Miss Cordelia’s</td>
<td>5830</td>
<td>5080</td>
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<tr>
<td>Booksellers</td>
<td>2760</td>
<td>Rendezvous 2610</td>
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<tr>
<td>Huey’s Midtown</td>
<td>2220</td>
<td>Booksellers 2550</td>
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<table>
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<tr>
<th>Compost</th>
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<th>July</th>
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<tbody>
<tr>
<td>The Juice Bar</td>
<td>825</td>
<td>Miss Cordelia’s 1110</td>
</tr>
<tr>
<td>Cafe Eclectic</td>
<td>800</td>
<td>Café Eclectic 1050</td>
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<tr>
<td>Miss Cordelia’s</td>
<td>730</td>
<td>The Juice Bar 810</td>
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Rendezvous’ monthly comparison
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<tr>
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<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tr>
<td>Mixed</td>
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<td>904</td>
<td>1290</td>
<td>778</td>
<td>554</td>
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<tr>
<td>Cardboard</td>
<td>1100</td>
<td>590</td>
<td>350</td>
<td>450</td>
<td>720</td>
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<tr>
<td>Compost</td>
<td>100</td>
<td>40</td>
<td>40</td>
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</table>
Monday Pick ups – 29 restaurants, 15 Green Fork certified and Drop off facilities

Memphis Recycling Services
cardboard and paper
1131 Agnes Place

Dixie Waste Paper Co.
cardboard, paper, aluminum, scrap metal
2747 Jackson Ave

Recommunity
3197 Farrisview Blvd.

Mud Island Recycling Drop off
Parking lot off Mud Island Drive near the north entrance to Mud Island Park
5, 10, 15 minute drive time analysis:
Towards Dixie Recycling for Madeleine’s Monday Pickups at 9:00 am traffic

<table>
<thead>
<tr>
<th>Location</th>
<th>Mixed</th>
<th>Cardboard</th>
<th>Restrictions</th>
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<tbody>
<tr>
<td>Café Eclectic</td>
<td>240</td>
<td>150</td>
<td>Alley way</td>
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<tr>
<td>Bounty on Board</td>
<td>160</td>
<td>200</td>
<td>Key lock</td>
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<tr>
<td>10 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumping Station</td>
<td>160</td>
<td>20</td>
<td>Busy street, combo lock</td>
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<tr>
<td>Tsunami</td>
<td>148</td>
<td>50</td>
<td>Small parking lot</td>
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<tr>
<td>Huey’s</td>
<td>64</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>15 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grill 83</td>
<td>64</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Mc Ewens</td>
<td>316</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Nettleton</td>
<td>200</td>
<td>50</td>
<td>Low clearance, parking garage, clicker</td>
</tr>
<tr>
<td>Raw girls</td>
<td>100(compost)</td>
<td>50</td>
<td>Compost only</td>
</tr>
<tr>
<td>Total 5/10/15</td>
<td>400/372/580</td>
<td>350/350/400</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1352+100 (comp)</td>
<td>1100</td>
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5, 10, 15 minute drive time analysis:
Towards Cooper Young Recycling for Madeleine’s All Pickups
Conclusions....

- Fewer locations to recycle and redeem for private collectors.
  - That means additional containers from commercial sector are littered or put in the landfill! Open land is expensive near cities. Corporations moving in, opening huge facilities that might serve populations, typically in a rural area with few neighbors. It’s a prudent environmental strategy and it provides jobs for rural communities, which is why some of them have been competing to attract new landfills!
  - Become cheaper to ship garbage than to bury it locally!
  - Glass recycling is an economic challenge for most cities. Would state subsidize the costs of materials like plastic and glass that generally do not pay for themselves?

- Most pick ups are done in the 10 minute drive time and average traffic volume is 6,000-15,000 vehicles per day.
  - No need to travel farther to existing recycling centers, no more than 10 minutes.
  - 10 minute drive-time area means that the number of trips the trucks can potentially do will increase, increasing efficiency. It means that trucks aren’t stuck in traffic, or travelling for as long as they would be otherwise. So that saves the commercial sector money, gives them a better service, and also potentially cuts down on litter.
  - Some states such as California requires that supermarkets must have a recycling center within a half-mile radius of the store. Otherwise they must redeem the containers in the store or pay a daily fine.
  - Rural recycling centers DO not exist.
Conclusions....

• Rendezvous, Whole Foods and Café Eclectic lead Memphis in recycling.

• Composting is not common among restaurants. This is a complex task for restaurants. Finding ways to fit more bins, more staff time, more expense into their daily routine is a struggle. Maybe a pilot program for mandatory composting could be established.

• Mixed Recycling materials are consistently picked up more in winter months than summer months. Could this be related to Thanksgiving to New Year’s holiday period?

• Cardboard is consistently picked up around 300 gallons with no seasonal change, even though it is a high-commodity, numbers are less.
• Recycling in multifamily dwellings such as townhouse, condominium, and garden-style apartment complexes, schools, churches is challenging for private collectors.

• Access to multifamily dwellings present a challenge for private collectors such as low clearance, parking garage, clicker use...

• Ordinances should clarify landlord responsibilities and provide the city with increased enforcement capabilities.
• More data collection and establishing baseline metrics are needed to create blueprint for all sectors—private, public and non-profit in the recycling domain in Memphis.

• Smart devise solutions should be used so GIS maps and apps could monitor and reveal assets in real time.

• Initiative 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.
This project complements city’s in-house GIS, and provides data on commercial sector recycling efforts in the city. GIS has far-reaching potential as an analytical tool, particularly in the recycling domain.

As more data becomes available, the number of GIS applications will grow indefinitely, hindered mainly by the user’s imagination.

However, there are limits to what can be accomplished through GIS since certain information is difficult to represent spatially and may not be available. Such as public’s attitude towards recycling is an information can be derived from mixed methods approach and coupled with GIS to be visualized.
Thank you!