

Assessing Post-Consumer Waste in Duke Dining

Marketplace and Brodhead Center

ENVIRON 245 Project Brief
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Background:

Universities are estimated to generate almost 540,000 million tons of food waste annually. (Whitehair et al. 2013) Containers, edible food remains, recyclables, and landfill waste constitute post-consumer waste. The extreme amount of waste poses a significant obstacle for universities who seek to reduce their environmental impact. Duke Dining, a nationally-recognized entity managing all food-related operations on Duke University's campus, has specifically identified post-consumer waste as an object of further study. Duke Dining's 2017 Sustainable Procurement Report indicates sustainability to be an important value for the institution in the immediate and long-term future. The findings from this research should yield initial information on patron behavior and waste that will lay groundwork for future food waste-related research on campus.

Research Question:

What constitutes post-consumer waste--including, but not limited to, food waste, recyclable and non-recyclable containers--at Duke University's Brodhead Center and Marketplace? What constitutes consumer behavior and attitudes toward sustainability and post-consumer waste among the Duke Community?



Significance:

This research question holds great potential to reduce Duke's waste and spark further investigation toward creating a more sustainable and intelligently crafted campus-wide dining design. By identifying the elements of post-consumer waste, and consumer behavior contributing to it, entities like Duke Dining can design a more targeted, efficient, and environmentally-friendly system. If our research and reforms within Duke Dining are successful, this framework can also serve as a model to other universities interested in tackling and solving similar problems with post-consumer waste.

Objectives:

- Provide basic statistical information on the level of post-consumer waste
- Generate initial suggestive information on the Duke Community's perceptions of post-consumer waste and sustainability within dining operations
- Identify waste disposal behavioral patterns among Dining patrons
- Provide foundational data for future research



Figure 1. Duke Dining Logo

Methods and Approach:

a) Observations: Observed Brodhead Center and Marketplace to obtain a better idea of consumer behavior, as well as a rough of idea of the portion of to-go vs. reusable items on the sculleries.

b) Surveys: Used to gauge students' knowledge of Dining sustainability as well as to obtain demographics in order to potentially correlate sustainability habits to hometown, age, race, and other factors.

c) Waste Audit: Used to obtain data on the general proportions of food waste, landfill waste, compostable waste, and recycling waste deposited in the Brodhead Center.

d) Interview: Interviewed Gwyneth Manser, sustainability manager at Virginia Tech, to gain a better understanding of their reusable to-go program. Also interviewed students to better understand consumer behavior.

3 Components of Sustainability

Environmental: considers the environmental impact of both **food waste** and **material waste** by trying to determine where the majority of Duke dining's waste lies and finding a **solution**.

Economic: Inquiring into the cost of compostables vs. reusables during the interview and with Marcus.

Social: Surveys provide social data about student sustainability awareness vs. other factors.

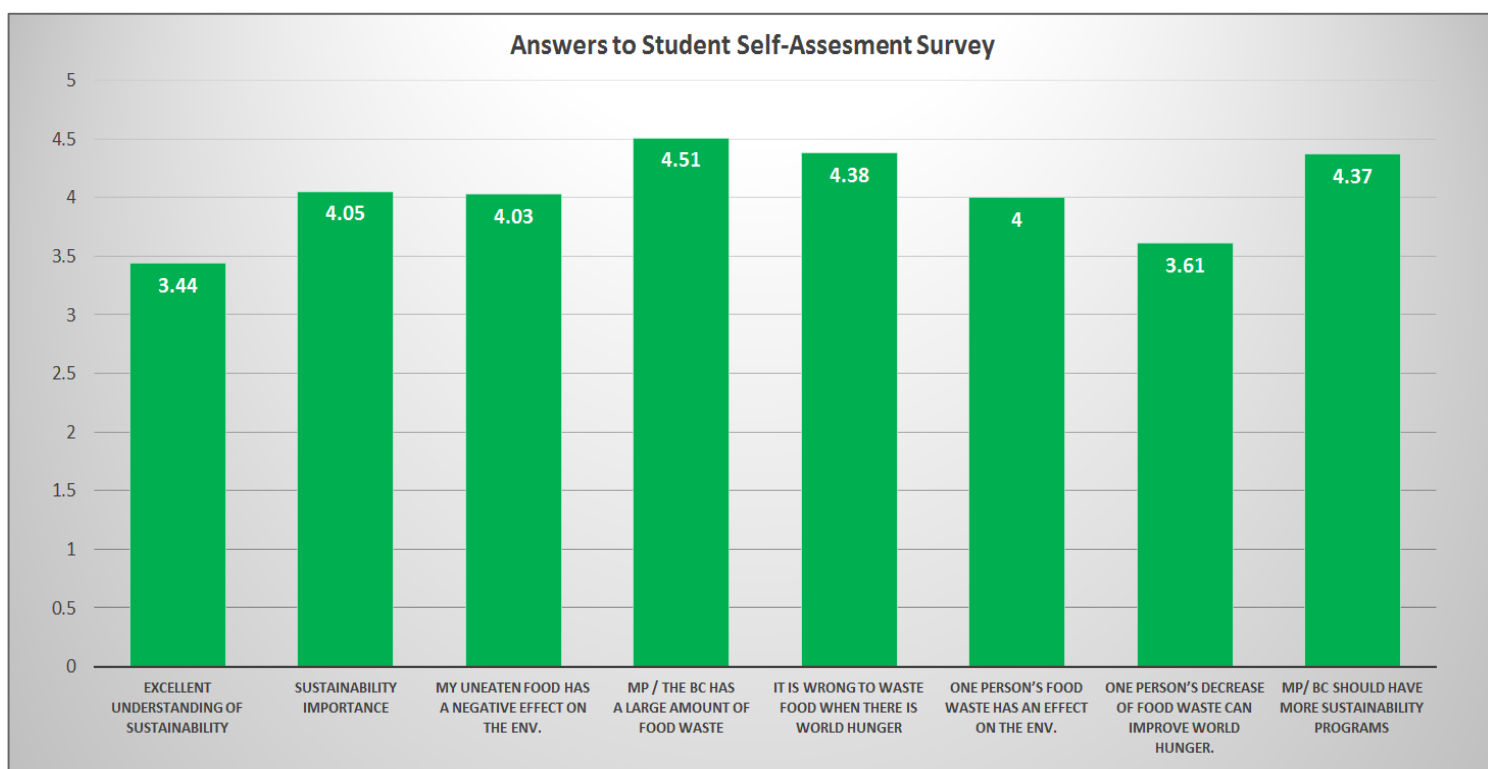


Figure 2. These data depict average student answers from 1 (least knowledge) - 5 (most knowledge) to survey questions on their familiarity with sustainability and beliefs on the effects of individual choices.

While analyzing the data, each team member coded for data that appeared interesting or surprising, contained numerical components, or sparked interest for follow-up questions or further investigation. Survey and waste audit data were necessarily more quantitative, hence greater reliance on descriptive statistics and graphs.

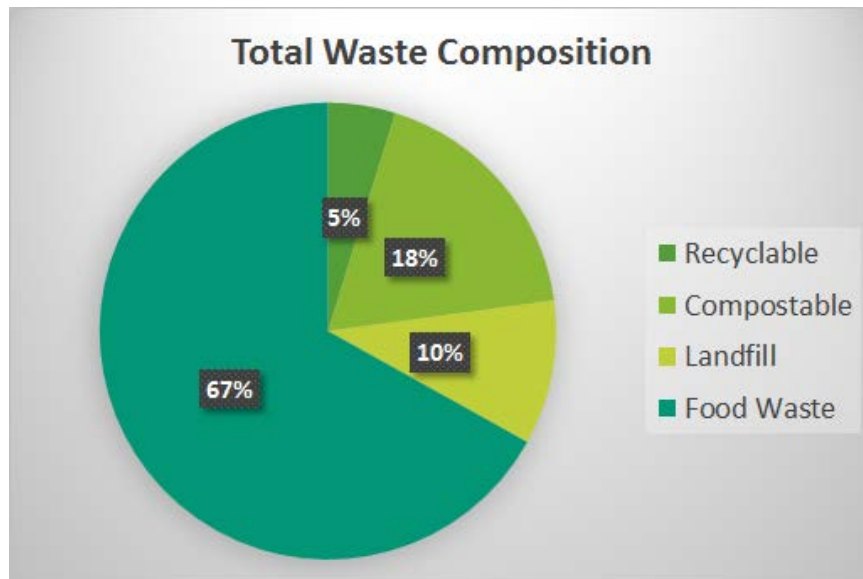
Some observations were compared to others to look for themes between dining centers. Basic statistical analyses were performed on the survey data.

Results and Findings:

High amounts of food waste and unnecessary to-go containers across numerous Duke eateries indicate areas in need of improvement. Possible solutions include implementation of technologies to inform chefs of fluctuations in patron, changes in food presentation or portion size, the use of reusable to-go boxes, and/or the installation of a fee for to-go boxes.

112 containers* were used by 129 Broadhead Center patrons.
*to-go boxes, bowls, plastic containers and pizza boxes

85% of survey participants agree that Marketplace and the Broadhead Center should implement more **programs on environmental sustainability.**



Consumers average nearly a **half pound** of food waste **EACH.**

~89% of survey participants agree that the Broadhead Center and Marketplace produce **large amounts of food waste.**

Figure 3. The results from the Broadhead Center waste audit show that the vast majority of post-consumer waste consists of food waste. This is followed by compostables (including compostable to-go boxes), landfill waste, and recyclables.

Summary of Results

- Post-consumer waste at Marketplace and the Broadhead Center mostly consists of food waste and to-go container waste.
- Students realize that food waste is a problem on campus.
- There is potential to increase student accountability for the food waste they produce.
- Students have expressed interest in the implementation of programming on sustainability and awareness at Duke eateries.

Insight into Consumer Behavior

- When conducting consumer behavior interviews at the Broadhead Center, we sought diners who chose to use a to-go box when dining in. In doing so, we found the most common reasons for using to-go boxes are:
 - Convenience
 - High cost of food
 - Large portion sizes
- Though only 8 interviews were conducted, they offer some intuition about diner choices that contribute to food waste generation.

Future Research

Further research can be done to determine correlations between food waste, sustainability awareness, and demographics such as race, age, major, hometown, etc.; additionally, more data collection (such as interviews) to substantiate observational data is warranted.

Conclusion and Suggestions:

LIMITATIONS

Our study is limited by both time and resources. In-depth experiments could not be conducted. Survey and interview data was intended to provide insights rather than generalizable conclusions. Finally, the waste audit occurred in one location on one day of the week, and thus doesn't take into account daily fluctuations in dining waste. Nevertheless, we are confident that our research succeeds in providing a foundation for more robust inquiry and testing.



Figure 6. The trash collected from the café trash bin in the Brodhead Center.



Figure 4. The Dining Team working with volunteers at the Brodhead Center Waste audit- sorting and weighing trash.



Figure 5. Farmstead and Sprout are two dining locations that provide sustainable, locally sourced meals.

Potential Solutions

1. Reusable to-go containers

Expensive up-front investment that would pay off for vendors. These would not only limit disposable box use, but also reduce food waste.

2. Changes in patron dining experience

Propose changing portion sizes, plate sizes, or food presentation to reduce the amount of food given, or equalize portion sizes across the Brodhead Center. Changing plate size would be beneficial at Marketplace.

3. Student awareness campaigns

Inform students through social media, tabling, or exhibiting physical representations of food waste.

4. Using new food management technology that can track the rate of production and consumption across all restaurants.

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