Ty Huetter

CIS129

Professor Chang

December 7th, 2024

Final Project Notes

**Research Problem:**

There is a big issue with how much food buffet style restaurants and university halls waste, and I want to explore why there is so much waste in this area compared to other options of eating and food service like fast food and coffee shops. The goal of this project is to make some kind of program, or outline a program that can reduce the amount of waste food that occurs in buffet style restaurants and university food halls. If the program can reduce food waste, it may be able to financially help restaurants, customers, and suppliers, as well as reduce the environmental impacts waste can cause.

**Research on Buffets:**

After doing some research, I have found out that the average amount of waste per year from food is 108 billion pounds, which contributes to severe greenhouse gas emissions, and takes up much of the space in landfills, and also takes away money, energy, and resources that we could be using on other things. The predominant greenhouse gas emitted into the atmosphere from this food waste is methane, which is 25 times more harmful than carbon dioxide to the environment, which is already and will continue to play a key role in changing the climate for the worse (Kundamal).

I have also found that buffet food waste is not just an American problem. Around the world, specifically places like Taiwan, Malaysia, and the United Kingdom, there are numerous reports of copious amounts of food waste. In some of the Taiwanese buffets, it has been estimated that the average customer left 115 grams of food waste every day in a regular buffet and 112 grams in a vegetarian restaurant. Additionally, the central kitchen produced 200-400 kg of food waste per day, most of it from inedible food, but still a significant amount of waste. At a five star hotel in Malaysia, it was estimated that customers left 1100 grams of food waste for lunch and 1000 grams for dinner. In a Chinese buffet in the UK, the average waste was 138 grams per customer. (Wu & Teng). These statistics emphasize just how important it is that buffets and buffet style restaurants find a way to reduce their waste, or they will continue to cause severe ramifications.

Different food types may get wasted more depending on the culture that the buffet is in, which is why it is important for buffets to have some idea of what foods are wasted more than others. They can fit the production close to the demand, which could also reduce costs of buffets for the customer and the restaurant because there will be less food to buy and prepare.

Some strategies of reducing waste for buffets include: keeping tight measurements of food waste to identify what food is popular and/or unpopular to adjust the menu accordingly; educating workers and customers of food waste statistics which could discourage food waste and encourage mindful consumption; implementing incentives for not wasting food, maybe putting some kind of tax on the food, or requiring people to buy the food based on weight; reuse food waste if possible (putting meat bones in a soup to give it extra flavor, using olives or pickles as garnish); giving the food to workers, charities, homeless shelters, poverty stricken areas; using the food in compost bins to grow more crops and encourage environmental sustainability. (Wu & Teng).

**Research on University Halls:**

After doing some research on university hall food waste, I have found that the estimated amount of food waste from universities is around 540,000 tons each year (Filo, et al.) This makes a lot of sense to me because when I went to Arizona Christian University, I had a 14 meals a week plan, and I got to experience and observe how much food was wasted at university. It is interesting too that “according to a 2017 report from The Hechinger Report, the average cost of a meal plan for an academic year is $4,500, averaging $18.75 per day. Adjusted for inflation, the cost would be over $5,700 in 2023” (Murti). Doing the math myself, in 2023, spending $5,700 per academic year would be an average of $12.72 on each meal, and if someone wanted to buy snacks, even more. The majority of universities require students that have a scholarship to also buy a meal plan, which is much more expensive than buying groceries for the meals, or even eating out every meal. From what I have experienced, the cafeteria food is not much healthier than eating out, so what benefit is there to it over other options?

However, if universities could make the meal plans cheaper, they could be worth it for students. One way that the meal plans could be cheaper is by reducing the amount of waste that the university produces, by doing the strategies that I mentioned earlier in the buffet style restaurant research.

Although many universities that reported have claimed to have food waste management systems (85%), many of them cannot fully control what the cafeterias and food halls do, because they are serviced by an independent company disconnected from the university. If universities are willing to control the food halls themselves, much less food could be wasted and they could save thousands to millions of dollars per year (Filo, et al.).

**Works Cited:**

Kundamal, R. (2023, January 17). *The unsustainability of Buffet Food Waste*. Global Research

and Consulting at Berkeley (GRC). https://grc.studentorg.berkeley.edu/the-unsustainability-of-buffet-food-waste/

Leal Filho, W., Lange Salvia, A., Davis, B., Will, M., & Moggi, S. (2021). Higher Education and

food waste: Assessing current trends. *International Journal of Sustainable Development &amp; World Ecology*, *28*(5), 440–450. https://doi.org/10.1080/13504509.2020.1865474

Learn Python. (2023, August 15). *How To Read Data From Digital Scale In Python*. YouTube.

https://www.youtube.com/watch?v=x\_Z0H7BC5aY&t=347s

Mahalias, I. (2024, December 5). *What is Django used for? (5 use cases)*. PLANEKS.

https://www.planeks.net/what-is-django-used-for/

Murti, L. (2023, December 14). *The cost of convenience: College meal plans*. Covering Poverty.

https://coveringpoverty.uga.edu/the-cost-of-convenience-college-meal-plans/

Wu, C.-M. E., & Teng, C.-C. (2022). Reducing food waste in buffet restaurants: A corporate

management approach. *Foods*, *12*(1), 162. https://doi.org/10.3390/foods12010162

**Existing Programs:**

There are some existing programs that keep data on what menu items are the most popular, but these are mainly with cafes and non buffet style restaurants. My program will implement some of the ideas and code from existing programs, but also give another option for how buffets and universities could reduce their food waste and price of food. I have one main idea which could help improve as of now that I want to make into pseudocode, which include: making a system that puts a device, basically just a scale, and connects it into a computer to eventually records weight changes of food and stamps a time throughout the day to it.

**Coding Steps:**

1. Read weight from a digital scale
2. Record the data at what time the weight increased or decreased
3. When the weight decreases
   1. Add that value to food\_taken weight
4. When the weight increased
   1. Add that value to the food\_made weight
5. Make a food counter that will track how many times a specific food gets taken
   1. Counter += 1 when food decreases
6. Record food weight at the end of open period (when food is replenished and not thrown out)
   1. Compare total food made to total food taken to get the total food wasted
7. Optional input for kitchen to record how much food they threw out in preparation
8. Math for how much money could have been saved if wasted food was not made
9. Print statement that includes how much food was made, taken, wasted, and the most taken food

**Pseudocode:**

Import libraries that can transfer data from a connected external device into python (Django, serial, socket)

Import libraries that can record time (Datetime, time)

Import csv for making files

Make function that records the data from the digital scale to a dictionary

Food\_name = str(input(“What food item is this file documenting? “))

Open CSV file for writing (Name file after food\_name)

weight1 = old weight from scale (original weight)

Weight2 = new weight from scale (changed weight)

Food\_made = 0

Food\_taken = 0

Food\_counter = 0

Writer = csv.writer(filename)

If weight != weight:

while datetime.now() < closing time

If weight1 > weight2:

Weight\_minus = Weight1 - weight2

Food\_taken += weight\_minus

Food\_counter += 1

If weight1 < weight2:

Weight\_plus = weight2 - weight1

Food\_made = += weight\_plus

While datetime.now() >= closing time

Food\_waste = 0

Food\_waste = food\_made - food\_taken

Food\_data = (f‘{food\_name:<15}{food\_taken:<10}{food\_made:<10}{food\_counter:<10}{food\_waste:<10}’)

writer.writerow(food\_data)

Open CSV file for reading

print(f’{‘Dish Name’:<15}{‘Food Taken’:<10}{‘Food Made’:<10}{‘Food Counter’:<10}{Food Waste’:<10}’)

Reader = csv.reader(filename)

For record in file:

File\_print = record

print(f’{file\_print}’)

Def function for finding cost of wasted food

Function call (food\_name, food\_waste)

Open new CSV file (Food\_name\_cost) for writing

S\_size =float( input(“Enter what the normal serving size is for”, food\_name, “: “))

S\_cost = float(input”(Enter how much it usually costs to make a serving size for”, food\_name, “; “))

Waste\_cost = (food\_waste / S\_size) \* s\_cost

Writer = csv.writer(filename)

Food\_cost = (f’{food\_name:<15}{s\_size:<10}{s\_cost:<10}{waste\_cost:<10}’)

writer.writerow(food\_cost)

Open CSV file for reading

print(f’{“Food name”:<15}{“Serving Size”:<10}{“Serving Cost”:<10}{“Waste Cost”:<10}

print(food\_cost)

**Experimental Code (Unfinished):**

#Transfer data from device to the program.

#The device would be able to store specific weights at certain times throughout the day (for example, if the food weighs 1.3 lbs at the start of the day, the device would calculate every time the weight decreases and increases). If the weight increases, that tells the user that food was added back into the container, and if the weight decreases, that tells the user that food was taken from the container. Then the scale can be set to record the final weight at a specific time, preferably when the buffet closes and before the cooks clean the containers. This will ensure that the scale does not record the weight, which would be close to 0, after the cooks dump out and clean the container.

#Most of this code is taken from a video showing how to read data from a digital scale. I am going to add a datetime library to read the time at which the weight changes on the digital scale.

From django.shortcuts import render

From django.http import JsonResponse, HttpResponse

From django.db import connection

Import serial

Import re

Import socket

Def dictfetchall(cursor):

“Return all rows from a cursor as a dictionary”

Columns = [col[0] for col in cursor.description]

Return [

dict(zip(columns, rows))

For row in cursor.fetchall()

]

Def digital\_scale(request):

ComPort = “com3”

Try:

SerialComs = serial.Serial(ComPort, 9600)

Except:

Pass

Value = SerialComs.readline().decode(encoding=”ascii”, errors=”ignore”)

“””Formatting the weight”””

print(‘LBS’, value)

mo=value

Value\_2 = re.sub(‘[lbs]’, ‘ ‘, mo)

Value\_2 = int(float(value\_2))

print(“Value Two”, value\_2)

Value = re.sub(‘[+”\r/nlbs]’, ‘ ‘, value)

“””Formatting the weight”””

Return JsonResponse({‘data’: value})