The Drivers Behind Edible Food Recovery Programs at Institutions of Higher Education

Danielle Chun

Messiah College

Abstract

Food waste is a multi-faceted issue that affects societies on a social, economic, and environmental level. In 2014, more than 38 million tons of food were thrown away in the United States, with the Food Recovery Network estimating that institutions of higher education contributed approximately 22 million pounds of food waste that year. Institutions of higher education are increasing their efforts to reduce their food waste through participation in initiatives such as edible food recovery programs. Under these programs, institutions divert edible food from the waste stream and donate that food to people facing food insecurity. This study examines the drivers of an institution's decision regarding the adoption of an edible food recovery program. To study this decision, I collected data from over 100 four-year member institutions of the Association for the Advancement of Sustainability in Higher Education. My conceptual framework allows for the heterogeneous characteristics of these institutions to affect the weights that they place on the benefits and costs of an edible food recovery program. Various patterns emerged from the data: Primarily, an institution's sustainability mindset, its location, and its size have significant effects on its decision to adopt an edible food recovery program. These findings contribute to understanding why certain institutions adopt an edible food recovery program and others do not.

The Drivers Behind Edible Food Recovery Programs at Institutions of Higher Education

The Food and Agriculture Organization (FAO) of the United Nations (2014) defines food waste as "discarding or alternative (non-food) use of food that is safe and nutritious for human consumption along the entire food supply chain." A multifaceted issue that plagues the United States, food waste has dramatic consequences for all. Perhaps throwing away uneaten, unappealing, and unsaleable food has become such a part of the norm—according to the US Environmental Protection Agency (EPA), more than 38 million tons of food were thrown away in 2014—that many people dump their excess into a trash can without a spare thought for the time-, money-, and energy-consuming process that brought the food to their plates. Gunders (2012) calculates that the process contributes to 10 percent of the country's energy budget, employs 50 percent of the land, and utilizes 80 percent of all the freshwater used in the United States—and yet, 40 percent of food is thrown away each year. This translates into an equivalent loss of $165 billion per year, along with increased greenhouse gas emissions as decomposing food in landfills, the largest component of the country's municipal solid waste, releases large amounts of methane into the atmosphere.

Understanding the issue at hand, EPA released the Food Recovery Hierarchy, which breaks down food waste reduction strategies in order of importance. After the first, "Source Prevention," which ultimately targets reducing the overall volume of surplus food generated, EPA lists "Feed Hungry People" as the second most preferred category of food recovery, describing the top levels of the structure as "the best ways to prevent and divert wasted food because they create the most benefits for the environment, society, and the economy." As EPA explains, this could take the form of donating excess food to food banks, soup kitchens, and

shelters. Programs that perform this function are commonly referred to as edible food recovery programs; essentially, they recover food and redistribute it to people facing food insecurity.

Figure 1. Food recovery hierarchy
Source: https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy

The question that this hierarchy then generates is this: Why are more institutions and organizations not participating in or implementing edible food recovery programs? Dining halls, cafes, and restaurants on the campuses of institutions of higher education contribute to the issue of food waste—the Food Recovery Network (2015) estimates that institutions throw away an estimated 22 million pounds of uneaten food each year (as cited in Poon, 2015). The average college student produces 142 pounds of food waste every year (RecyclingWorks, n.d.). With these figures in mind, how are institutions of higher education targeting this issue and attempting to resolve the situation? Would an edible food recovery program meet the triple bottom line of sustainability for institutions of higher education and are there ways to determine so?

A search for literature aimed at addressing the drivers behind institutions of higher education's decisions to adopt edible food recovery programs as well as a search for literature on

edible food recovery efforts at institutions in general revealed that there is a gap in the existing literature available today. The closest study is one done at the University of Texas, Austin, in relation to the Food Recovery Network, an organization dedicated to recovering food at institutions of higher education in partnership with students (see Garber & Huang, 2013). Others exist that examine grocery stores or individual institutions and their own efforts (see Davis, 2014; Guittard, 2015; Luecke, 2015). Hence, recognizing this existing gap, this study will examine edible food recovery programs at institutions of higher education, the drivers behind institutions' reasons for adoption or avoidance of such a program, and the benefits and costs of having an edible food recovery program as one of an institution's sustainability initiatives. I believe that the results of this research will yield a threefold benefit: provide primary data for institutions to learn about other institutions' reasons for their stance on edible food recovery programs, enable institutions considering adopting an edible food recovery program to initially appraise whether such a program would be beneficial to their institution, and contribute to the overall body of information on the topics of edible food recovery and sustainability.

Conceptual Framework

An institution's motivation for starting and running an edible food recovery program hinges on benefit-cost analysis. If the benefits of an edible food recovery program outweigh the costs of the program, an institution would likely choose to adopt one.

The benefits of an edible food recovery program include an increased presence and favorable image in the community (FRN, 2016), a greener ecological footprint and reduced wastage (FAO, 2014), tax benefits[1] (EPA, n.d.; USDA, n.d.), stronger student participation in service-learning, and greater community awareness. Besides its tangible and intangible benefits,

[1] These benefits depend on the tax status of the institution.

an edible food recovery program also addresses the aspect of morality. According to Feeding America (2014), nearly 50 million Americans face food insecurity (as cited in Finn, O'Donnell, & Walls, 2014). An edible food program takes good food en route to the waste stream and redistributes it to people in need—arguably a worthier destination. Throwing food away has costs. Even without evaluating direct costs, food wastage involves an opportunity cost, namely the value of the food thrown away that could otherwise alleviate food insecurity and help to address the hunger others face.

These benefits come at a cost, however, including the start-up costs involved, the costs of maintaining and running the program, the risk of potential lawsuits, and a reduction in the ability of employees to perform their other duties (Finn et al., 2014). Requiring an institution to overhaul its methods is simply not an easy task. The initial capital outlay might be daunting for some institutions who question the long-term success and sustainability of such a program. Purchasing pans and containers or having to create more storage and freezer space might be seen as being more troublesome and financially burdensome than simply avoiding an edible food recovery program. Additionally, having to train—and retrain—dining services employees and student volunteers constitutes a cost in terms of both time and resources. Transportation costs over time also contribute to the overall cost of an edible food recovery program. Institutions fear bearing the liability of donating food and the negative reputation that might arise if a person were to fall sick after consuming that food. Employees might be resistant to the idea of potential extra work on their part, and asking staff members to run an edible food recovery program might reduce their time and ability to perform other duties.

Hence, if the benefits and costs of an edible food recovery program are known, how does an institution weigh the value or influence of these factors? Here is where the characteristics of an institution come into focus.

Institutional Characteristics

These characteristics affect an institution's sensitivity to the benefits and costs of an edible food recovery program and therefore an institution's overall decision. The six variable characteristics that I will conceptualize are an institution's size, geographical location, tuition price, religious affiliation, sustainability mindset, and reputation sensitivity.

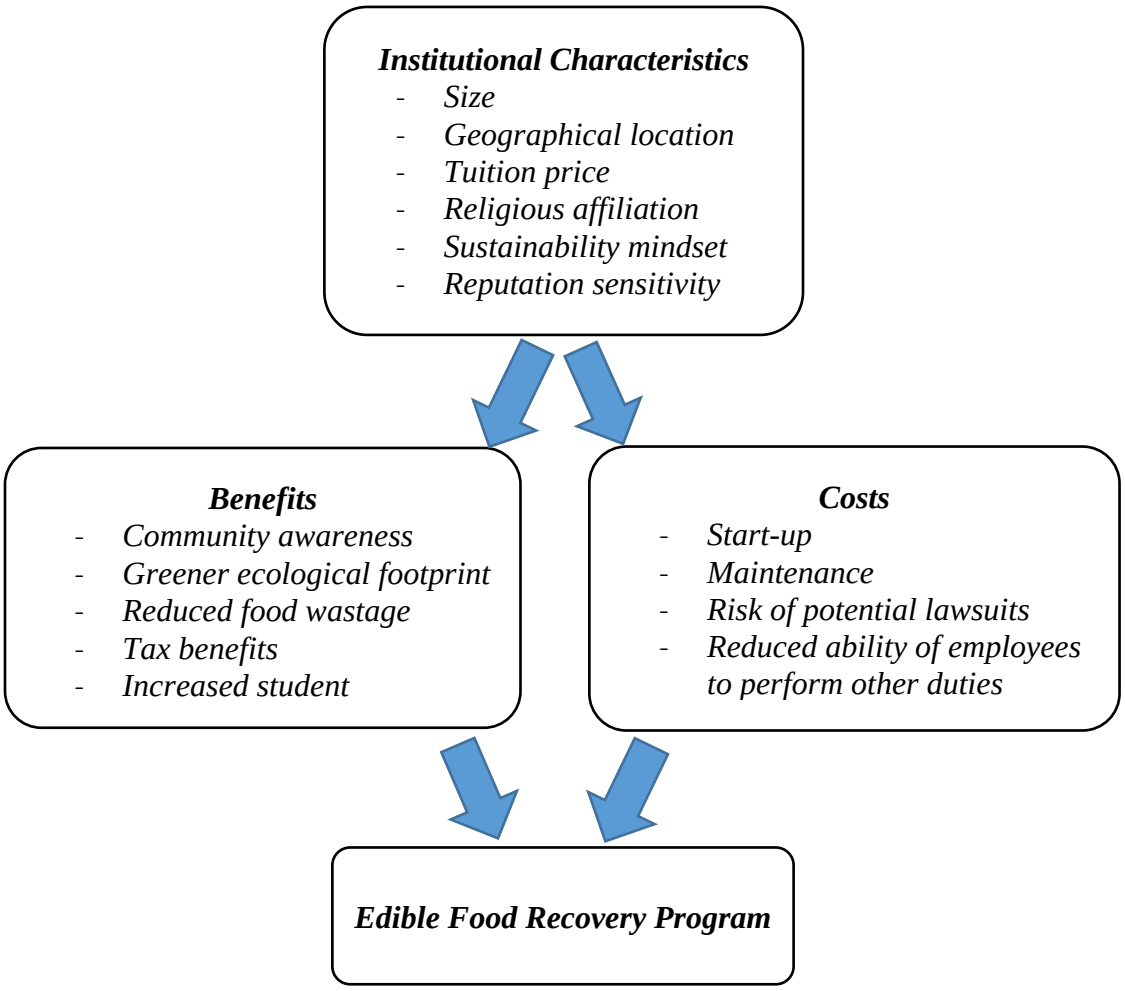

Figure 2. Conceptual framework

Size. The size of an institution could affect both the benefits and costs when it comes to an edible food recovery program. First, reduced food wastage at a smaller institution could lead to a stronger sustainability mindset among students, faculty, and staff—which in turn could encourage more support for such programs and other sustainability initiatives. Managing an edible food recovery program might encourage a small institution to have a full-time staff member in charge, thereby providing additional support for the institution's Office or Center of Sustainability, or lead to the founding of an Office/Center. Second, if an institution were small, its student body might also be tighter-knit than a larger institution's, which could be beneficial when sourcing for volunteer support and spreading information about an edible food recovery program. Third, smaller institutions rely heavily on fundraising and endowments from donors and alumni (Lyken-Segosebe & Shepherd, 2013); the increased publicity and positive community image surrounding an edible food recovery program could be highly beneficial for raising support. In relation, an edible food recovery program might be an aspect that the institution could choose to highlight on student admission tours or preview days. However, for a smaller institution, the costs might override the benefits. First, the fixed costs of running an edible food recovery program might outweigh the benefits it receives in terms of tax benefits or reputation gained. Second, total food wastage typically is lower at a smaller institution due to less food being produced and consumed. Such an institution therefore might not necessarily generate enough food waste to justify the financial costs of adopting an edible food recovery program. Third, a smaller institution might also operate on a tighter budget; the money that it does have might already be used for other initiatives or programs. Fourth, staff members might be working at capacity and might not welcome added duties and responsibilities.

While the benefits and the costs do not necessarily change for a small or a large institution, the larger size of an institution might place different weights on those benefits and costs. First, a larger institution could benefit from having a large student body and therefore potentially more volunteers and support for the program. Second, an edible food recovery program might make logical sense to a larger institution, considering the amount of food waste generated, and provide an opportunity to reduce its ecological footprint. Such a program might be cost-effective for the institution: the fixed costs of running the program would be spread out over more units and therefore decrease per pound of food recovered. Third, a larger institution would be more likely to have an established Office or Center of Sustainability and a full-time staff member to oversee volunteer efforts, leading to a sustainable, enduring program. Nevertheless, costs still exist. First, a larger institution might have more layers of bureaucracy, making it more difficult to get the necessary approval for an edible food recovery program from the various departments and offices involved. Second, the budget of a larger institution is also likely to be already allocated to specific initiatives—meaning that adopting an edible food recovery program might detract from an existing sustainability effort. Attempting to divert and repurpose funds might lead to various complications as the allocated money might have strings attached to it from donors or the institution. Third, the larger an institution is, the more the press might pick up and circulate any negative news about it. Hence, dining services might be wary of adopting an edible food recovery program, imagining potential lawsuits or a bad reputation if donated food were to be linked to a person falling ill.

Geographical location. The benefits of being in a more rural location include potentially more support for an edible food recovery program as rural locations generally face greater average poverty than more urban centers. Health codes may also not be as strict as those in

densely populated urban vicinities. But the geographical location of an institution creates and affects costs such as partner search, transportation, regulations, and community visibility. A more rural institution might have a more difficult time finding partner agencies such as food pantries or food banks, or simply might have fewer options regarding whom to select as a partner. Transporting food to those partners also becomes more of a cost when an institution is more rural.

For a more urban institution, benefits include having greater proximity to both partner agencies and poverty. Typically, a more urban location has more acute pockets of poverty and more agencies working to meet the needs of those populations, thereby increasing the number of potential partners as well as the opportunity to meet those needs. A more urban location also affords an institution greater visibility in the city as the area is more compact than a more rural setting. However, a more urban geographical location bears the costs of potentially stricter city regulations concerning food. Transportation costs are also a factor—parking or traffic in the city might impact volunteers' ability to bring food to the partners.

Tuition price. I first address lower-cost institutions before looking at higher-cost institutions of higher education to conceptualize the effects of the price of attendance on the benefits and costs of an edible food recovery program. Lower-cost institutions likely have greater proximity to food insecurity, birthing a deeper awareness of food security as a pertinent issue. This understanding leads to an increase in the value that these institutions, their staff and faculty, and their students place on edible food recovery programs, with the resultant benefit of greater buy-in from each. This buy-in might take the form of a willingness to volunteer on the part of students or administrative support from the institution. On the other hand, a lower-cost institution might lack the budget or the funds to adopt and support an edible food recovery program. Such a

program simply might not be cost-effective for the institution. With tight measures in place to keep food production at an efficient minimum, dining services might have minimal food to donate. Hence, the costs associated with running an edible food recovery program might outweigh the potential benefits.

A higher-cost institution perceives a different set of benefits in relation to its price of attendance. First, the institution benefits from having a larger budget that can support the adoption and implementation of an edible food recovery program. The budget could cover the cost of hiring a full-time sustainability employee or paying several students to lead and oversee the program. Second, a higher-cost institution might offer a wider range of majors—of which sustainability studies might be one—and therefore seek to provide students with practical experience in working with an edible food recovery program and partner organizations. Third, a higher-cost institution might see an edible food recovery program as a way for students to become involved with the surrounding community and practice leadership and service.

Religious affiliation. Luecke (2015) describes how Catholic Social Teaching informs social issues, including food distribution. The belief that human beings are created in the image of God leads to the notion that each person has dignity and the right to life—and therefore "the right to enough food to sustain a life with dignity" (United States Conference of Catholic Bishops, n.d.). Institutions with a religious affiliation might therefore feel led—perhaps even compelled—to demonstrate their beliefs in a tangible, practical way. For such institutions, an edible food recovery program might be one way of living out their faith. A benefit of a religious affiliation is an established network of partners and supporters. This network might include worship communities and partner agencies within the faith tradition, guaranteeing like-minded supporters and partners. However, a cost of a religious affiliation might be the opportunity cost

of investing in other social or religious programs. The money, time, and effort poured into an edible food recovery program might come at the expense of other efforts toward which an institution might be inclined. For example, the institution might have to choose between adopting an edible food recovery program and subsidizing service or mission trips.

A non-religiously-affiliated institution could benefit from not having any specific aspect of a faith tradition dictate how it runs its social efforts and sustainability initiatives. Additionally, a non-religiously-affiliated institution might attract more students from diverse backgrounds and perhaps benefit from grants withheld from religiously-affiliated institutions. However, a cost of not having a religious affiliation might be that without a religious or faith-based weight to even out the scales, the cost of running the program—from a purely economic perspective— might act as a deterrent.

Sustainability mindset. The first benefit of a strong sustainability mindset might be a desire to pursue initiatives targeting different sectors; an environmentally and socially conscious effort like an edible food recovery program might be elevated above others. Second, an institution with a strong sustainability mindset would likely have a larger budget for its sustainability initiatives. Or, an institution simply might decide that such a program is worth the effort and provide the needed support and budget to implement it. A strong sustainability mindset might generally not be perceived as a deterrent to an edible food recovery program, yet a first possible cost of a strong emphasis on sustainability might be an emphasis on other sustainability initiatives—to the detriment of an edible food recovery program. Second, an institution's sustainability staff might be working at capacity on other projects, leaving no space for another program.

On the other hand, a weak sustainability mindset could be costly as it might dampen an institution's—or its staff's or students'—motivation to launch and upkeep an edible food recovery program. Without buy-in from the institution, its staff, and the student body, an edible food recovery program would most likely not last very long.

Reputation sensitivity. Increasingly, institutions of higher education are being evaluated on their sustainability initiatives. The Princeton Review uses its Green Ratings to compile a "Green Honor Roll"—institutions must score 99 out of a possible 99 to make the honor roll—and also conducts an annual evaluation of "green colleges," ranking its top 50 out of 2,000 institutions (Princeton Review, 2017). Meanwhile, the Sierra Club honors green colleges that make its "Cool Schools Ranking" (Sierra Club, 2017).

A reputation-sensitive institution might see an edible food recovery program as a valuable means of reaching out to its surrounding community and gaining greater recognition. An edible food recovery program can be an effective vehicle of community service, and students might be enthusiastic about getting involved in a program that has a genuine impact on people's lives and wellbeing. Conversely, a highly reputation-sensitive institution that donates large quantities of food might fear a negative public reaction—the institution might be perceived as wasteful and poor at planning its food preparation. In line with that, the institution might worry about a backlash from students who might be unhappy about paying for costly meal plans, especially when they see extra food being donated elsewhere. Hence, an edible food recovery program has the potential to be both beneficial and costly to an institution's reputation.

On the other hand, an institution that has a lower sensitivity to reputation simply might not care about public opinion. If this is the case, this characteristic might not have a strong influence on an institution's decision about edible food recovery programs.

Characteristics		Benefits	Costs
Size	*Smaller*	Reduced food wastage could lead to a chain effect of a stronger sustainability mindset and support for the Office Tight-knit student body—easier to spread awareness and source volunteers Publicity and positive image good for fundraising and for admissions	High fixed costs Total food wastage insubstantial Tighter budget—money already being used Staff at capacity—pushback from employees
	Larger	Reduced total food wastage—a solution to large quantities of waste Cost-effective Larger student body—more volunteers Possible full-time sustainability staff to oversee effort	Bureaucracy and obtaining approval Coordinating a large-scale effort Sustainability budget already allocated to other initiatives—possible opportunity cost Susceptible to negative publicity
Geographical Location	*More rural*	More potential support/buy-in due to higher poverty rates Less strict health codes	Transportation (distance) costs Difficulty in finding partner agencies and/or fewer options
	More urban	Closer proximity to partners and poverty More partner options Greater institutional visibility in the city	Transportation (parking, traffic) costs Stricter city codes and regulations
Tuition Price	*Lower*	Potential for greater support and buy-in from the institution, staff and faculty, and students More student volunteers and more administrative support	Lack of budget and funding Not cost-effective
	Higher	Larger budget Wider range of majors and need to provide relevant experience Provides leadership and/or service opportunities and a way of reaching out to the community	N/A

Religious Affiliation	*Religious*	Impetus to care for others Network of partner agencies and communities	Opportunity cost of investing in other social or religious programs
	Non-religious	No religious aspect to consider Attract larger and/or more diverse student body Potential grants	Possibly no intrinsic motivation to override economic costs
Sustainability Mindset	*Strong*	Desire to pursue various sustainability initiatives Larger budget and more support	Emphasis on other sustainability initiatives instead Staff already at full capacity
	Weak	N/A	Lack of motivation No buy-in could lead to failure
Reputation Sensitivity	*High*	Greater recognition Means of reaching out to the surrounding communities Better ranking among "green" institutions	Fear of negative public perception (wasteful, poor planning) Backlash from unhappy students over meal plan costs
	Low	N/A	Lack of interest Lack of concern about public opinion

Figure 3. Summary of benefits and costs by characteristics

Conceptually, these six characteristics—size, tuition price, geographical location, religious affiliation, sustainability mindset, and reputation sensitivity—could impact an institution's decision regarding whether to adopt an edible food recovery program. Some characteristics have the potential to affect both benefits and costs; as such, institutions must decide if the weights of these characteristics will lead to greater benefits than costs. Hence, taking into consideration the factors above, five hypotheses follow:

H_1: Institutions with more than 5,000 students (that is, medium to large institutions) will be more likely and/or more inclined to have an edible food recovery program

H_2: Institutions located in a more urban setting will be more likely and/or more inclined to have an edible food recovery program

H_3: Institutions charging a higher tuition price (that is, $30,000 or more per year) will be more likely and/or more inclined to have an edible food recovery program

H_4: Institutions with a religious affiliation will be more likely and/or more inclined to have an edible food recovery program

H_5: Institutions that demonstrate a strong sustainability mindset, evidenced by an office or center of sustainability and at least one full-time sustainability employee, will be more likely and/or more inclined to have an edible food recovery program

Data

I collected the data for this research study through an online survey[2] that asked both qualitative and quantitative questions of respondents. The survey comprised two sections: The first examined institutions ’general characteristics and sustainability initiatives while the second focused on edible food recovery programs. The edible food recovery program-related questions differed depending on whether institutions already ran an edible food recovery program. To encourage respondents to be honest with their evaluation, I provided anonymity and did not link answers to specific institutions.

I sent my survey to 542 four-year institutions, hoping to gain an understanding of their rationale and thoughts on edible food recovery programs. I selected this subsample after cross-referencing members of the Food Recovery Network (FRN) with members of the Association for the Advancement of Sustainability in Higher Education (AASHE) and discovering that many

[2] I used Qualtrics to create the survey.

FRN participants also belong to AASHE. AASHE is a nonprofit organization dedicated to empowering members of higher education institutions to be "effective change agents and drivers of sustainability innovation" (AASHE, n.d.) at their institutions and across the United States. With AASHE having close to 1,000 members, I chose to focus on four-year institutions to observe how these institutions of higher education have the opportunity to develop their sustainability programs and initiatives over time.

A total of 165 complete responses was collected over the course of two months, representing institutions across the United States. Respondents were members of sustainability offices or centers, facilities services, dining services, or offices overseeing sustainability efforts (occasionally the Office of the President or the Office of the Provost).

Methods

General

Based on the conceptual framework, I analyze the effects of the following six institutional characteristics on an institution's decision to adopt or avoid an edible food recovery program: size, tuition price, geographical location, religious affiliation, sustainability mindset, and reputation sensitivity. When available, I include a variable for each characteristic in my regression analysis. The regression model isolates the independent variables to draw a clearer picture of the effect of each institutional characteristic.

Empirical Model

The empirical model that I use in my research is as follows:

$$Edible\ Food\ Recovery\ Programs = Large + Expensive + Urban + Religious + Sustainability + Reputation\ Sensitivity + \varepsilon$$

The first characteristic in the empirical model is an institution's size. I categorized an institution as small, medium, or large based on the size of its student body (fewer than 5,000 students; between 5,000 to 10,000 students; and more than 10,000 students, respectively). In my model, I use the variable *large*, using the data points of institutions with more than 10,000 students.

The second characteristic is an institution's tuition price. I capture this variable in my model as *expensive*. From my data, I separated institutions into 'cheap' or 'expensive' based on their annual tuition prices. I used the cut-off point of $30,000 per year as the divider between cheap and expensive institutions. Hence, in my equation, the variable *expensive* captures the institutions charging $30,000 or more per year.

The third characteristic is an institution's geographical location. I assumed that more urban institutions would be more likely to adopt edible food recovery programs, and therefore use the variable *urban* in my model. *Urban* indicates that institutions are located in an area with more than 250,000 people.

The fourth characteristic in my equation is an institution's religious affiliation. One of my hypotheses was that an institution would be more likely to adopt an edible food recovery program if it had a religious affiliation; as such, I include that assumption in my model as the variable *religious.* In my model, *religious* indicates that institutions have a religious affiliation.

The fifth characteristic is an institution's sustainability mindset. In my equation, I use *sustainability* to characterize this aspect of an institution. The variable *sustainability* incorporates the presence of a sustainability office or center in an institution, a full-time staff member in that office/center, and more than 10 student-workers or volunteers in that office/center.

The sixth and final characteristic that I examine is an institution's reputation sensitivity. Reputation sensitivity is a difficult aspect to measure as it incorporates multiple elements; as such, I could not include a specific variable in my regression to reflect this characteristic. The error term, ε, captures the effects of reputation sensitivity.

Estimation Methods

I use the probit model as it yields the probability of choice for a binary (0,1) dependent variable. I employ the following model in my estimation methods:

$$Y = \Phi(\beta X) + \varepsilon$$

This equation yields the function for the probit model, which estimates the effects of the independent variables (X) on the probability that a dependent variable (Y) has a value of 1. The error term, ε, captures any possible error in the estimation methods. In the case of my research, this general probit model takes on the following form:

$$Probability\ of\ Edible\ Food\ Recovery\ Program = \phi\left(\begin{matrix}\beta_1 \cdot Large + \beta_2 \cdot Expensive + \beta_3 \cdot Urban + \beta_4 \cdot Religious + \\ \beta_5 \cdot Sustainability\end{matrix}\right) + \varepsilon$$

Results

Table 1

General Characteristics

	All institutions (%)	Institutions with EFRP (%)	Institutions without EFRP (%)
Edible food recovery program	59	-	-
Size			
Small	44	41	49
Medium	29	24	37
Large	27	35	14
Price			
Less than $30,000 per year	44	43	46
$30,000 or more per year	56	57	54
Location			
Urban	42	51	30
Suburban	34	29	41
Rural	24	21	29
Religious affiliation	22	20	25
Office or Center of Sustainability	86	91	78
Full-time sustainability staff	92	94	88
Number of students involved			
0	1	0	2
1-5	39	35	45
6-10	22	18	29
More than 10	39	47	24
Breakdown of student labor in the Office/Center			
Volunteers	9	5	15
Paid	34	36	31
Both volunteers and paid	57	58	55
Sustainability practices			
Recycling	99	99	98
Composting	76	92	52
Renewable energy	75	78	71
Energy conservation	95	97	92
Community garden	80	86	71
LEED/energy-efficient buildings	86	93	76
Water-saving devices	51	58	40
Green transport	88	92	81
Sustainability training for RAs and other student-leaders	84	88	78

General Characteristics

Edible food recovery programs appear to be prevalent among institutions of higher education who are members of AASHE, with 59% of the 165 respondents indicating adoption of edible food recovery programs. The descriptive statistics point to certain patterns of adoption associated with different institutional characteristics.

In relation to the demographics of an institution—captured by the size of the student body, tuition price, geographical location, and religious affiliation—we observe the following patterns. First, large institutions (defined as institutions with more than 10,000 students) appear to be more likely to adopt edible food recovery programs, with large institutions comprising 35% of institutions with edible food recovery programs and just 14% of institutions without edible food recovery programs. Second, more expensive institutions (categorized as charging $30,000 or more per year in tuition fees) are more likely to adopt edible food recovery programs, with 57% of the institutions with edible food recovery programs falling into this category. Third, edible food recovery programs are prevalent in institutions located in an urban setting, with 51% of institutions with edible food recovery programs situated in areas with more than 250,000 residents. Fourth, religion appears to be insignificant in affecting an institution's decision to adopt or avoid an edible food recovery program—only 20% of institutions with edible food recovery programs profess a religious affiliation.

Looking at the formal sustainability programs of an institution—identified as a present office or center of sustainability, a full-time sustainability employee, and student involvement in the office/center—we see certain patterns emerge. First, the presence of an office or center of sustainability appears to be strongly correlated with an institution's adoption of an edible food recovery program—91% of the respondents from institutions with edible food recovery

programs point out that their institution has an office/center of sustainability on campus. Second, a full-time sustainability employee also appears to have some influence on the presence of an edible food recovery program at an institution, with 94% of institutions with edible food recovery programs employing at least one full-time staff member in the office/center of sustainability. Third, institutions with edible food recovery programs demonstrate strong student involvement in their office/center of sustainability, with 47% of these institutions having more than 10 students involved as volunteers, paid student-workers, or both.

Examining the presence of other sustainability initiatives, several patterns stand out. First, composting is highly prevalent among institutions with edible food recovery programs, with 92% pairing composting with edible food recovery as food waste management practices. Second, the presence of a community garden on campus is widespread among institutions with edible food recovery programs, with 86% of these institutions also adopting this agricultural initiative. Hence, an interesting finding in looking at institutions with edible food recovery programs is observing the prevalence of edible food recovery programs, composting, and community gardens at these institutions, with 77% utilizing all three of these sustainability initiatives.

Institutions with an Edible Food Recovery Program

Table 2

Institutions with an Edible Food Recovery Program

	Institutions with EFRP (%)
Edible food recovery program type	
Internal	62
External	38
Origin of the program	
Student-initiated	71
Institution-driven	29
Institutional involvement with the program	
No institutional involvement	11
More student involvement than institutional	29
Equal student and institutional involvement	30
More institutional involvement than student	14
Full institutional involvement	15
Challenges faced during initial set-up	
Regulations	31
Finding volunteers	45
Student buy-in	5
Staff/faculty buy-in	16
Institutional buy-in	27
Initial capital outlay	15
Benefits derived from the program	
Increased publicity and greater community awareness	54
Tax benefits	2
Reduced food wastage	81
Greater environmental consideration among students	48
Greener footprint	49

The responses of institutions with edible food recovery programs yield several data patterns, from which we identify three key findings. First, institutions with successful edible food recovery programs appear to share one key component: student buy-in and support. The majority of institutions with edible food recovery programs have those programs because students initiated and proposed the idea to the institution, with 71% originating that way. At the same time, looking at the challenges that these edible food recovery programs faced during their initial

set-up, student buy-in was the least challenging aspect, with just 5% of respondents selecting this as a challenge. However, interestingly, finding volunteers provided the most difficulty, with 45% of survey respondents noting this. Hence, it appears that the student bodies of the majority of these institutions support edible food recovery programs, but the issue of recruiting and keeping volunteers remains—perhaps part of the cyclical flow of students entering and leaving institutions. It is worthwhile to point out that student-initiation of an edible food recovery program does not necessarily translate to zero difficulty in finding volunteers; student-initiation simply means that one or a few students felt strongly enough about edible food recovery that they attempted to launch a program. The issue that some institutions have found is that once those students leave, unless they were able to recruit and train other students, enthusiasm for the program diminishes. Nevertheless, many of these institutions have come up with creative and successful ways to ensure the sustainability of their edible food recovery programs. Some respondents note that providing paid positions for students to lead the programs has been successful for them. Recruiting volunteers through Greek Life and/or the service-learning center on campus has also been fruitful. Others have negotiated this challenge by housing the edible food recovery program in the office/center of sustainability and having a staff member oversee the efforts to ensure continuity of the program.

Second, edible food recovery programs are not very expensive to adopt, with 94% of respondents estimating the cost of running the edible food recovery program at their institution at less than $5,000 a year. Several survey respondents also highlight that having an edible food recovery program at their institution has been helpful to their dining services in better estimating food production and costs, as one aspect of an edible food recovery program involves tracking the amount of food donated.

Third, staff and faculty tend to be supportive of edible food recovery programs, with just 16% of institutions facing the challenge of staff/faculty buy-in. Statistical patterns in the survey data support this finding. Most institutions with edible food recovery programs face minimal unhappiness or discontent from employees, with 75% of the respondents indicating the absence of any employee pushback. Additionally, even with the presence of an edible food recovery program, employees are able to perform their other duties without any impairment according to 89% of the respondents. In fact, one survey respondent notes that the institution's edible food recovery program and commitment to sustainability helped attract "top talent" to its dining services.

Institutions without an Edible Food Recovery Program

Table 3

Institutions without an Edible Food Recovery Program

	Institutions without EFRP (%)	Institutions who previously attempted an EFRP (%)	Institutions with no prior attempt (%)
Previously attempted to launch an edible food recovery program	49		
Reasons for not having a program			
Have not considered it before	16	-	31
Regulations	24	23	25
Location	27	21	34
Finding volunteers	35	42	28
Student buy-in	19	13	25
Staff/faculty buy-in	16	16	16
Institutional buy-in	46	45	47
Initial capital outlay	22	26	19
Imagined potential benefits from a program			
Increased publicity and greater community awareness	87	87	86
Tax benefits	6	3	9
Reduced food wastage	87	84	91
Greater environmental consideration among students	78	74	81
Greener footprint	83	74	91
Imagined potential costs of a program			
Increased workload on dining staff	78	77	78
Increased institutional expenditure	68	61	75
Employee unhappiness or pushback	30	23	38
Reduced ability of employees to perform other duties	38	35	41
Interested in potentially adopting an edible food recovery program	95	97	94

From the responses of institutions without edible food recovery programs, we observe several patterns, drawing three key findings. Incidentally, these connect to several of the responses of institutions with edible food recovery programs.

First, finding volunteers proves more difficult in actuality than imagined, with 42% of institutions who have actually attempted to adopt an edible food recovery program before citing this constraint as a reason for not having one. In contrast, institutions without edible food recovery programs who have not previously attempted one perceive this challenge as a far lesser difficulty, with just 28% listing it as a reason.

Second, both increased institutional expenditure and employee unhappiness are greater imagined costs than actual ones, with 75% of institutions with no prior attempt at edible food recovery programs listing greater expenditure and 38% selecting employee unhappiness or pushback as potential costs. In comparison, among institutions who have previously attempted to adopt an edible food recovery program, 61% cite increased expenditure and 23% list employee unhappiness as costs.

The third key finding is that the majority of institutions without edible food recovery programs are interested in potentially adopting such a program in the future, with 95% of the respondents indicating a willingness to consider edible food recovery. Considering that almost a third of the institutions who have not previously tried an edible food recovery program indicated on the survey that they had not even thought about such a program before, this statistic is one to track in the upcoming years. Interestingly, an even higher percentage of institutions who have attempted an edible food recovery program indicate an interest in trying to launch an edible food recovery program again than institutions who have not attempted one prior, with 97% of those who have tried indicating they would be interested in one in the future.

Regression Results

Table 4

Regression Analysis (Marginal Effects)

Variable	Marginal Effects	Coefficient (p-value)
Large	0.243*	0.018
Urban	0.201*	0.020
Expensive	0.130	0.226
Religious	-0.042	0.701
Sustainability	0.249**	0.004

Note: * is significant at the 95% level and ** is significant at the 99% level

Using the probit model, the regression analysis identifies the marginal effects of the drivers behind an institution's adoption or avoidance of an edible food recovery program. The marginal effects better isolate the effects of the independent variables, permitting analysis of the individual effects of each of the institutional characteristics identified. The results in Table 4 provide the following five key findings.

First, the size of an institution is significant in determining whether an institution adopts an edible food recovery program. More specifically, a large institution will be more likely to adopt an edible food recovery program. This is consistent with my first hypothesis—driven by the conceptual model—that large institutions would be more likely and/or more inclined to adopt edible food recovery programs. Large institutions have the benefit of a larger budget to fund the adoption of an edible food recovery program and pay for a full-time sustainability employee or students to oversee it. They also have the motivation to implement one as they face large quantities of food waste. Hence, for large institutions, edible food recovery programs are cost-effective; additionally, with large student bodies, these institutions benefit from a large pool of volunteers.

Second, an institution's geographical location is a significant driver in its adoption or avoidance of an edible food recovery program. In particular, an urban institution will be more likely to adopt an edible food recovery program. This finding is consistent with my second hypothesis that urban institutions would be more likely and/or more inclined to adopt edible food recovery programs, as urban institutions are in closer proximity to both poverty and partner organizations. Additionally, an edible food recovery program would give an urban institution greater visibility in the city.

Third, the tuition price of an institution is insignificant in determining whether an institution adopts an edible food recovery program. My third hypothesis predicted that expensive institutions would be more likely and/or more inclined to adopt edible food recovery programs as they have a larger budget, a wider range of majors, and a desire to provide relevant leadership and service opportunities. However, the regression analysis does not affirm this hypothesis, showing that tuition price does not have a significant effect on an institution's decision to adopt an edible food recovery program.

Fourth, a religious affiliation is also shown to be an insignificant influence on an institution's adoption of an edible food recovery program. My fourth hypothesis proposed the idea that institutions with a religious affiliation would be more likely and/or more inclined to adopt edible food recovery programs, based on the belief that these institutions would be driven by an impetus to care for others and already have a large network of partner agencies and communities. However, the regression analysis suggests otherwise, indicating that institutions adopt edible food recovery programs for other reasons besides religious beliefs. A religious affiliation might result in an institution being heavily involved in other activities, reducing its ability to also conduct an edible food recovery program.

Fifth, an institution's sustainability mindset is the most significant driver, having the strongest effect on an institution's decision to adopt an edible food recovery program. This is consistent with the fifth hypothesis, which predicted that a strong sustainability mindset—evidenced by the presence of an Office or Center of Sustainability on campus and a full-time sustainability employee—would lead to an institution being more likely and/or more inclined to adopt an edible food recovery program. This result is also consistent with the descriptive analysis, which showed that student buy-in is vital to the adoption and implementation of edible food recovery programs. An institution with a strong sustainability mindset would likely attract students passionate about sustainability, who in turn would support the institution's sustainability initiatives. This cycle would foster a culture of sustainability on campus, thus providing a receptive environment for an edible food recovery program.

Conclusions

The push for sustainability in institutions of higher education is gaining momentum, with a visible trend towards "going green." As a part of this push, edible food recovery programs are gaining traction as a means of addressing the issue of food waste on a multi-level platform.

In terms of the sustainability movement's triple bottom line—economic, environmental, and social—edible food recovery programs provide a comprehensive means of addressing all three aspects. Nevertheless, not all institutions within AASHE choose to adopt edible food recovery programs, which implies that certain institutions have determined that the costs of an edible food recovery program outweigh the accompanying benefits. The results of this study suggest that some institutional characteristics have a more significant effect than others on an institution's decision to adopt or avoid an edible food recovery program. While size (large enrollment) and geographical location (urban) are both significant drivers, the most significant

determiner is an institution's sustainability mindset. The presence of an Office or Center of Sustainability and its staff indicates that the institution believes in the value of such a department—and in sustainability in general—and is willing to invest in it. In relation, an institution known for its sustainability disposition would attract students passionate about sustainability, an element crucial to the long-term success of an edible food recovery program. Hence, while an institution's size and geographical location affect its decision, ultimately, the most significant driver behind an institution's decision is its sustainability mindset.

My research highlights how institutions have benefited from edible food recovery programs in terms of reduced food waste, greater community engagement, increased environmental consideration among students, and a greener institutional footprint. Bearing in mind the survey data statistic indicating that a third of the institutions without edible food recovery programs had not even considered adopting such a program before, greater education and awareness about edible food recovery programs are definite steps to consider in the goal to reduce food waste. Organizations such as the Food Recovery Network and the Campus Kitchens Project are playing a key role in the spread of the movement, providing structure, resources, and support for students and institutions alike. In partnership with an institution's administration and dining services, sustainability offices and centers can play their part in addressing food waste. Educating campus communities about the issue and providing avenues for opportunities to recover food from dining facilities are two ways that institutions can encourage the proliferation of edible food recovery programs on their campuses.

Certainly, institutions have legitimate concerns about edible food recovery programs and their long-term viability. Some of these include liability concerns and worries about employee pushback and unhappiness, the sustainability of the program, and increased institutional

expenditure. Nonetheless, my research data suggest that these fears expressed by institutions without edible food recovery programs are greater than what institutions with edible food recovery programs—or even those who have attempted them before—experience in reality. With regards to liability concerns, the Bill Emerson Good Samaritan Food Donation Act of 1996 protects donors from lawsuits over donations given in "good faith," a perhaps less well-known and utilized federal bill. One other concern that institutions without edible food recovery programs identify is finding volunteers and maintaining consistency. As a point of note, survey respondents indicate that volunteer recruitment is a challenge—possibly more than initially imagined. Hence, a carefully thought-out plan of action and strong student buy-in are key to the success of edible food recovery programs.

Edible food recovery programs yield multiple benefits to institutions of higher education, to their surrounding communities, and to the environment. They tackle the ironically coexisting issues of food insecurity and food waste. Numerous survey respondents note that their institutions' edible food recovery programs enable them to both address food insecurity in their surrounding communities and reduce their own food waste through better estimation of food production and the subsequent food donations. In the words of one respondent, "The benefits are enormous—community outreach, student education, impact on the environment, et cetera—and far outweigh the challenges." With student buy-in and institutional support, edible food recovery programs represent a highly viable, sustainable means of addressing the national issue of food waste while benefiting both people in need and the earth.

What is our next move?

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