Undergraduate Thesis Prospectus

Unfantastic plastics: how the ban on SUPs in Virginia altered sustainable materials management at the University of Virginia

(technical research project in Civil Engineering)

Surplus in waste: food insecurity and waste management in the United States

(sociotechnical research project)

by

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November 1, 2021

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General research problem

How may the sustainability of food waste systems be improved?

The challenge with food waste and insecurity is optimization. Many groups' sole purpose is to provide for the masses while minimizing surplus and food waste. The combination of the climate crisis and the global public health crisis, Covid-19, encouraged businesses to innovate more creatively as supply chain shutdowns, unionized strikes, and poor agricultural production disrupted the global food system. Released in 2015, the United Nations 2030 Agenda for Sustainable Development sets seventeen goals for combating the climate crisis, improving health and education, reducing inequalities, and promoting economic growth by 2030 (United Nations, n.d.). The agenda has prompted other organizations to draft plans for combating climate change by 2030. The University of Virginia, for example, outlines a "30 by 30" program for waste footprint reduction, potable water consumption reduction, carbon neutrality, and sustainable food purchases promotion by 2030 (Darden School of Business, 2020). United Nations Sustainable Development Goals (SDGs) Zero Hunger (2), Sustainable Cities and Communities (11), and Responsible Consumption and Production (12) relate most to food waste systems sustainability and the University of Virginia's Sustainability 2020-2030 Plan. The SDGs challenge businesses to advance the global agenda through a commitment to innovating sustainably.

The Covid-19 pandemic exacerbated food supply chain interruptions, contributing to the rise of organizations committed to affordable, nutritious food with less surplus waste such as Feeding America, Meals on Wheels, No Kid Hungry, etc (Kroger Co. Zero Hunger Zero Waste Foundation, 2021). Food industry related groups adopted strategies to promote sustainability either through public relations mechanisms or adjustments in practice. Sustainable materials management (SMM) strategies in recycling, composting, and packaging is an example that

ranges from some public relations to a restructuring of the supply chain to contribute to specific United Nations SDGs.

Unfantastic plastics: how the ban on SUPs in Virginia altered sustainable materials management at the University of Virginia

How will the University of Virginia best meet its waste reduction sustainability goals detailed in the University of Virginia Sustainability 2020-2030 Plan?

The University of Virginia (UVA or the University) is at a crossroads with composting. The ban on single-use plastics (SUPs) across the Commonwealth of Virginia, established in March 2021 under Executive Order No. 77, pushes the University to adapt the status quo waste management system for more compostable materials in the waste stream (VDEQ, 2021). The UVA Sustainability 2020-2030 Plan is another driving factor in reducing the waste to 30% of the University's 2010 tonnage while striving to make University operations carbon neutral and eventually fossil fuel free.

The "Unfantastic Plastics" capstone group has seven team members and is led by advisors Dr. Lisa Colosi Peterson and Dr. Lindsay Ivey-Burden of the UVA Engineering Systems and Environment department. Team members Madeleine Alwine, Madison Crouch, Geneva Lanzetta, Shannon Hepp, and myself have been tasked with developing a model that evaluates the past, current, and potential waste management of University goods in relation to the 10-year UVA Sustainability Plan and Virginia Governor Ralph Northam's ban on SUPs. The largest constraint is the lack of consistently collected and reported data; the model will require careful assumptions.

The team will plan the methodology of the analysis and identify any assumptions by creating a model which reflects the following parameters: landfilled mass in tonnage, global

warming potential (GWP) in kg CO2-eq, energy in MJ, and cost in U.S. dollars (USD). Due to the inconsistent data record of solid waste management (SWM) at the University, the team will use ranges of historical and projected data to evaluate the target parameters. The team may also conduct a solid waste audit to aid in data projections for the post-ban portion of the analysis. The target parameters will be evaluated annually for the most consistent dataset within 2015-2018 to represent the status quo and for the 2021 academic year to represent post-ban. The model will be created using Microsoft Excel software and Google Sheets collaborative network technology through the "Trash Capstone" Google Drive created by the team. Major project deliverables to the team advisors and UVA Facilities Management include: a status quo analysis and report; a post-ban materials management analysis, report, and comparison to the status quo; and an identification of potential alternatives for SMM. UVA Facilities Management may use these findings to adapt the current SMM system to better align with the 10-year UVA Sustainability Plan.

Surplus in waste: food insecurity and waste management in the United States

In the U.S., how have interest groups competed to influence the life cycle management of perishable food products?

Complexities in food and food packaging waste management and insecurity are often treated as mutually exclusive concerns. The effect of the Covid-19 pandemic on grocers, the food service industry, and consumers exposed and altered the consumption of single-use containers for take-out meals, reallocation of perishable food to communities impacted most by occupational hazards and supply-chain shut down, and the role of the climate crisis in food insecurity and sustainable materials management. Total Food Service is a news resource that chronicles and influences food service industry practices related to plastic waste and food

consumption. The news resource recognizes the lasting impact of the pandemic on the way that consumers view food systems and the importance businesses must place on appearing sustainable by stating, “Sustainability is no longer just a passing trend. It is a way of doing business that consumers expect” (Total Food Service, 2020). Groups like the FarmLink Project, a 501c3 rescue food group staffed entirely by volunteers with an average age of 21, arose in response to the challenges posed by Covid-19 to minimize the agricultural waste and food insecurity through reallocation of resources (Dvonch, 2021). Funded by generous donors or partnerships with organizations such as Chipotle, JW Crouch Foundation, Kroger Co. Zero Hunger Zero Waste Foundation, and the Purple Carrot, the FarmLink Project has raised more than 6.5 million dollars toward feeding communities in need while reducing the global waste footprint. Though the pandemic did not *create* the threat to food sustainability, it exposed concerns about the life-cycle management of food and packaging waste.

Other participants include the US Department of Agriculture, a governmental agency that works to increase US agricultural production and reduce the US environmental footprint (USDA, n.d.). Grocers like Whole Foods Market must also be participants in food and packaging waste to address the concerns of their eco-minded patrons (Whole Foods Market, n.d.). Amazon, the owner of Whole Foods Market, partners with over thirty organizations to reach business-wide and SDG goals (Amazon, n.d.). These partnerships may contribute to Whole Foods Market comprising multiple participant groups or different participant groups than another retail grocery chain like Kroger. Competing retail grocery chains like Harris Teeter, Kroger, and Food 4 Less, while all owned by Kroger Co., may demonstrate variable commitments to food systems sustainability to cater to customers with different needs and are thereby supported by a slew of trade associations per their 2020 Political Spending Report. Kroger Co. must ensure the status of

their “egalitarian brand” by offering a variety of goods and services to many customer demographics and therefore states that they “do not always share the same perspectives on legislation and regulatory matters as do [their] trade associations” (Kroger Co., 2021). The trade association FMI: The Food Industry Association represents Kroger Co. along with other retail and wholesale grocers (FMI, 2021). Grocers, their parent companies, and interest groups may diverge to demonstrate varying commitment to waste management. While some may establish a relatively serious commitment to waste control, others may limit their effort to some public relations, if anything. This may lead to investigating misalignment with public relations and practice within the participant groups.

Researchers have investigated the connection between food insecurity and waste management. For example, Munesue et al (2014) found that reductions of food losses in developing regions reduced the amount of undernourished people and environmental impacts from agricultural practices while Lee et al (2017) found a mechanism - improvement of the gleaning schedule in agricultural production - that addresses both food waste and insecurity. Tsiros and Heilman (2005) examined the role of consumer behavior regarding perishable food expiration dates and found that effective promotional strategies by grocers can reduce food waste.

I will review the techniques used by participant groups to achieve their missions with respect to food systems management and the related published research findings to understand how varying interest groups influence the supply and waste management of food systems.

References

Amazon (n.d.). Partnership highlights. https://sustainability.aboutamazon.com/about/partnerships

Darden School of Business (2020, Oct. 19). UVA Embarks on Ambitious 10-Year Sustainability Plan (press release). *The Darden Report.* https://news.darden.virginia.edu/2020/10/19/uva-embarks-sustainability-plan/#:~:text=The%202020-30%20UVA%20Sustainability%20Plan%20includes%20six%20goals,adds%20four%20new%20goals.%20The%20plan%E2%80%99s%20goals%20include%3A

Dvonch, L. (2021, June 16). Powdered milk deliveries with the dairy pricing association. The FarmLink Project. https://blog.farmlinkproject.org/stories-and-features/powdered-milk-deliveries-with-the-dairy-pricing-association

FMI (2021, Oct 31). FMI: The Food Industry Association. FMI member search results. pubMemberDirectory.pdf (fmi.org)

Kroger Co. (2021, June). 2020 political contribution annual report. https://www.thekrogerco.com/wp-content/uploads/2021/06/2020-Political-Spending-Report.pdf

Kroger Co. Zero Hunger Zero Waste Foundation (2021, July). Investing in positive impact 2021 report. https://www.thekrogerco.com/wp-content/uploads/2021/07/The-Kroger-Co.-Zero-Hunger-Zero-Waste-Foundation-Report-2021-Final.pdf

Lee, D., Sönmez, E., Gómez, M. I., & Fan, X. (2017). Combining two wrongs to make two rights: Mitigating food insecurity and food waste through gleaning operations. *Food Policy*, *68*, 40-52.

Munesue, Y., Masui, T., & Fushima, T. (2015). The effects of reducing food losses and food waste on global food insecurity, natural resources, and greenhouse gas emissions. *Environmental Economics and Policy Studies*, *17*(1), 43-77.

Total Food Service (2020, April 29). Top waste strategies for restaurants and food distributors in a pandemic. https://totalfood.com/top-waste-strategies-for-restaurants-and-food-distributors-in-a-pandemic/

Tsiros, M., & Heilman, C. M. (2005). The effect of expiration dates and perceived risk on purchasing behavior in grocery store perishable categories. *Journal of marketing*, *69*(2), 114-129.

United Nations (n.d.). The 17 goals. https://sdgs.un.org/goals

USDA (n.d.). U.S. Department of Agriculture. Food systems. https://www.usda.gov/oce/sustainability/foodsystems

VDEQ (2021). Virginia Department of Environmental Quality. Executive order 77. https://www.deq.virginia.gov/get-involved/pollution-prevention/greening-of-government/eo-77

Whole Foods Market (n.d.). Our commitment to reducing single-use plastics. https://www.wholefoodsmarket.com/mission-in-action/environmental-stewardship/plastics-packaging