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Appetite for Change: Reducing Consumer Food Waste

Introduction

Food waste is a current issue with profound environmental, social, and economic consequences. Approximately one-third of all food produced is wasted, contributing to greenhouse gas emissions, resource depletion, and food insecurity (The World Counts). At the consumer level, food waste is often linked to wasteful consumer behaviors. Numerous consumer-facing apps have emerged, claiming to address food waste by leveraging technology to promote mindfulness, redistribution, and better inventory management. The problem framing of these apps raises critical questions about their effectiveness in tackling the root causes of food waste.

A key critique, as articulated by Guthman (2024), is that technology developers tend to define problems in ways that align with the solutions they can offer. This phenomenon, known as the "techno-fix," often results in narrowly focused interventions that fail to address the broader systemic and cultural drivers of food waste. Food waste apps may address what developers perceive to be the causes of waste effectively, but those perceptions usually oversimplify or misrepresent the true complexity of the issue.

This paper explores the question: **How effectively do current consumer-facing food waste reduction apps address what they perceive as the root causes of consumer food waste?** By analyzing four popular apps, Olio, No Waste, Kitche, and SuperCook, this study evaluates their problem framing, features, and effectiveness in tackling consumer food waste.

By critically examining the features, limitations, and underlying assumptions of these apps, this research seeks to shed light on the potential and shortcomings of technology-driven solutions to consumer food waste. It aims to provide insights into how these tools can be improved and complemented by systemic reforms to create meaningful and sustainable change.

Literature Review: Diverging Perspectives on the Causes of Consumer Food Waste

The issue of consumer food waste has generated extensive academic inquiry, yet the literature highlights a critical need for more consensus regarding its root causes. This review synthesizes key contributions to demonstrate how diverging frameworks underscore the complexity of understanding food waste at the consumer level. Conflicting emphases on individual behaviors, systemic factors, and sociocultural influences reveal the challenges of crafting cohesive and effective waste mitigation strategies.

Behavioral and Cognitive Influences on Food Waste

Several studies focus on individual behaviors and cognitive limitations as critical drivers of food waste. Aschemann-Witzel et al. (2015) argue that consumers' "motivation to avoid food waste, their management skills of food provisioning and food handling, and their trade-offs between priorities" significantly shape waste behaviors. These elements highlight how personal responsibility and decision-making skills directly influence waste outcomes. While the authors acknowledge that "a share of the consumer-related food waste needs to be tackled through actions upstream, that is at earlier stages in the supply chain," their primary emphasis remains on consumer behavior. Aschemann-Witzel et al. discuss how systemic inefficiencies, such as unclear date labeling on food products, exacerbate consumer confusion and hinder effective behavioral interventions. This dual focus underscores their interest in the interplay between individual actions and systemic issues, suggesting that food waste is largely shaped by how consumer behavior is influenced and constrained within the broader food system.

Farr-Wharton et al. (2014) build on this perspective by emphasizing the importance of knowledge-related factors, including awareness of food inventory ("supply knowledge"), the ability to locate items in storage ("location knowledge"), and overall food literacy. Their findings suggest consumers are more likely to mismanage food and generate waste when they lack these cognitive tools. This aligns with the work of Stancu et al. (2016), who argue that routines such as shopping practices and leftover reuse play a pivotal role in determining waste levels. These studies collectively propose that enhancing consumers' decision-making skills could significantly reduce food waste.

While these studies underscore the importance of addressing individual behaviors and cognitive factors in food waste, this focus reflects what Evans (2011) critiques as "blaming the

consumer – once again." Addressing consumer behavior in isolation is insufficient because it fails to account for the numerous external and internal factors that heavily shape these behaviors. Market-driven practices, such as bulk purchasing incentives and aggressive advertising for new or exotic products, play a major role in encouraging over-purchasing (Farr-Wharton et al., 2014). Additionally, deeply ingrained evolutionary impulses, such as fears of food scarcity, drive stockpiling, while sociocultural norms surrounding food aesthetics and meal variety often lead to the unnecessary disposal of edible food (Bolos et al.). By positioning consumers as the sole agents of change, this approach overlooks the broader interconnectedness of the food system. Effective strategies must extend beyond individual-level interventions to consider the systemic and cultural drivers perpetuating food waste generation.

Sociocultural and Systemic Dimensions of Waste

In contrast to individual-focused perspectives, some scholars emphasize systemic and cultural factors as the primary drivers of food waste, challenging narratives that place sole responsibility on consumers. Evans (2011) critiques the dominant tendency to blame consumers, arguing that food waste is better understood as the "complex and contradictory demands of day-to-day living." These demands include navigating concerns around food safety, proper storage, and dietary restrictions. Evans advocates for interventions that address the material and social contexts in which food provisioning occurs, rather than focusing exclusively on consumer behavior.

Reynolds et al. (2020) expand on this systemic perspective, situating food waste within the broader framework of the industrial food system. They describe how "standardization, mechanization, short-term efficiency, overproduction, and cheapness" drive wasteful practices inherent in capitalist production models. This critique underscores the structural nature of food waste, pointing to inefficiencies and overproduction embedded in the food system as root causes. Both Evans and Reynolds highlight the inadequacy of consumer-focused strategies, emphasizing the need for systemic changes that target the industrial and cultural processes enabling food waste. They suggest that food waste is embedded within the design and operation of capitalist production models, rather than being a consequence of individual failings.

Emotional and Psychological Factors

Another stream of research explores psychological and emotional dimensions of food waste, offering insights distinct from knowledge or habit-based frameworks. Russell et al. (2017)

identify a paradox in which negative emotions are associated with stronger intentions to reduce waste but are also linked to higher levels of waste behavior. Russell et al. highlight how non-cognitive factors, including emotional responses and ingrained habits, shape waste behaviors, making them less predictable and harder to address through purely educational interventions. These findings diverge from the rational, knowledge-centered approaches discussed by Farr-Wharton et al. (2014) and Stancu et al. (2016). By underscoring the interplay of emotions and habits, Russell et al. contribute to a broader understanding of the complex psychology of consumers, emphasizing that interventions must consider these less tangible, yet significant, drivers. This highlights the diverse interpretations within the field and underscores the challenge of designing universally effective waste reduction strategies.

Sociodemographic, Economic, and Policy Influences

The role of sociodemographic and economic factors in driving food waste has emerged as a contested area of research, with studies offering contrasting conclusions. Di Talia et al. (2019) argue that sociodemographic characteristics, such as household size, composition, income, and education levels, significantly influence food waste. According to their findings, larger or more diverse households tend to generate higher levels of food waste, often due to surplus purchases or inadequate storage practices, especially in rural contexts where logistical constraints amplify these issues. This perspective suggests that socioeconomic conditions and household dynamics are pivotal in understanding the behavioral patterns underlying food waste.

Veselá et al. (2023) argue against the dominance of socio-demographic and economic factors, emphasizing that consumer attitudes, awareness, and planning routines have a more significant impact on purchasing decisions. Their findings suggest that these factors are more predictive of consumer behavior than traditional socioeconomic variables. This divergence in findings highlights a fundamental debate over whether structural sociodemographic factors or individual behavioral traits hold greater explanatory power in predicting food waste behavior. Moreover, it underscores the complexity between these variables, as their relative influence may vary depending on geographical, cultural, or situational contexts.

Policy-related influences further compound this complexity, particularly in food labeling. Wilson et al. (2020) emphasize the significant impact of confusion surrounding date labels on consumer food waste, estimating that up to 20% of discarded food in the United States stems from misunderstandings about labeling terms such as "sell by," "use by," and "best before." This confusion, coupled with the ingrained maxim "when in doubt, throw it out," perpetuates

unnecessary food disposal. Wilson et al. advocate for standardized, clearer labeling regulations to mitigate this issue.

However, Welch et al. (2021) argue for a more comprehensive model that distributes responsibility beyond consumers to producers, retailers, and policymakers. They critique the reductionist focus on consumer behavior, emphasizing that waste is a systemic problem requiring accountability at every stage of the food supply chain. This perspective calls for holistic solutions that address inefficiencies across production, distribution, and consumption by reframing food waste as a collective challenge rather than an individual failing. The combined influence of sociodemographic, economic, and policy factors highlights the multifaceted nature of food waste, where individual behaviors intersect with structural and regulatory dimensions to shape outcomes.

Literature Review Conclusion

Addressing food waste requires a nuanced understanding of the interconnected factors within the food system and the responsibilities of the involved stakeholders. The literature on consumer food waste reveals a fragmented and contested field, with divergent perspectives on its root causes. Behavioral models emphasize individual responsibility, knowledge, planning routines, and food management skills, while systemic approaches highlight structural inefficiencies, overproduction, and sociocultural norms. Emotional, demographic, and policy-related factors further complicate the discourse, underscoring the challenge of identifying universally applicable solutions. This lack of consensus demonstrates the necessity for integrative frameworks that account for the interplay of individual and systemic drivers when creating more holistic and effective interventions to tackle food waste.

Discussion and Broader Implications

To address the complexities of food waste, solutions must target individual behaviors, systemic inefficiencies, and cultural shifts to recognize the multidimensional nature of the problem. The following approaches were informed by discussions with individuals across a diverse spectrum, ranging from retirees to college freshmen, and spanning various cultures and geographic contexts in the United States and India. These conversations revealed varying levels of awareness about sustainability and food waste. For some individuals, practices like composting and mindful purchasing have become second nature; one person even shared that she has been composting for nearly 30 years. Others, however, were less concerned, citing

hectic work schedules or financial security that made food waste less significant in their daily lives. These insights shaped three key aspects of potential methods to minimize food waste on the consumer's end: adopting minimalistic lifestyles, utilizing meal-kit services, and promoting community-driven, closed-loop food systems.

Firstly adopting a minimalistic lifestyle encourages individuals to resist the pressures of overconsumption inherent in a capitalist society. By focusing on simpler, healthier meals and engaging directly in food preparation, individuals can develop a deeper awareness of food's value and the effort involved in its production. This, in turn, enhances food literacy, reduces impulsive purchases, and fosters habits that minimize waste.

Meal-kit services, like HelloFresh, offer another avenue to reduce food waste. These services provide precisely measured ingredients, eliminating the potential for over-purchasing and ensuring consumers use only what is necessary for planned meals. Personal experiences with such services suggest their effectiveness in reducing waste, particularly for individuals or households struggling with meal planning or storage inefficiencies.

On a community level, initiatives that embrace self-sustainability and closed-loop food systems, such as those practiced in eco-communities with integrated farming and composting systems, serve as exemplary models. Treating food waste as a resource to nourish livestock, fertilize crops, or produce energy, eco-communities embody the principles of regenerative agriculture and sustainable living. Such approaches also foster a sense of collective responsibility, emphasizing that food waste is not merely an individual failure but a societal challenge requiring shared solutions.

At the same time, caution must be exercised to avoid unintended consequences of waste valorization strategies. As Reynolds et al. (2020) warn, turning food waste into valuable outputs, such as energy or animal feed, could inadvertently encourage higher levels of waste. When waste disposal becomes economically productive or seemingly beneficial, it may normalize wasteful practices, reducing mindfulness about the resources being misused in the first place. This complacency can intensify strain on other critical resources, including water, land, and energy, ultimately undermining broader sustainability goals.

A meaningful reduction in food waste demands moving beyond the traditional waste hierarchy, prioritizing reuse, recycling, and recovery while often overlooking the systemic causes of waste. Reynolds et al. (2020) argue that the industrialized food system's focus on overproduction and cost-efficiency frames waste as inevitable rather than preventable, perpetuating wasteful practices. Strategies must instead prioritize prevention by addressing the root causes of waste, including structural inefficiencies and cultural drivers of overconsumption.

Although repurposing waste offers environmental benefits, it risks reinforcing complacency without addressing deeper systemic and cultural shifts necessary for sustainable and equitable food systems.

While these interventions highlight pathways for reducing food waste, they also reveal the limitations of solutions confined to specific actions or tools. The upcoming case studies in this research will examine four food waste reduction apps to explore how they frame the problem and propose solutions. As Guthman (2024) critiques, technological solutions, also known as "techno-fixes", are inherently narrow, often misjudging the complexity of the issues they aim to address. She notes that these fixes usually ignore the social dimensions of problems, potentially worsening the issues they seek to resolve or distracting from the systemic conditions that demand change. For example, apps designed to reduce food waste may effectively address developers' perceived causes of waste but fail to account for deeper sociocultural or economic factors. While I do not believe apps alone can solve the numerous issues related to food waste, their ability to influence consumer behavior in an increasingly digital world calls for a closer analysis. By examining how these tools operate and frame the problem, we can better understand their role and areas of improvement within the broader landscape of food waste mitigation.

Case Study: Tech-Based Solutions to Food Waste

This section evaluates four food waste reduction apps, Olio, No Waste, Kitche, and SuperCook, to examine their effectiveness in addressing the issue of excessive consumer food waste generation. While Olio emphasizes community-based food sharing, No Waste and Kitche focus on inventory tracking and waste prevention. SuperCook markets itself as a tool for maximizing ingredient use through recipe generation. This analysis examines how effectively these apps address food waste by exploring their problem framing, features, behavioral influence, and alignment with broader systemic change.

Olio

Olio conceptualizes food waste as discarding edible food, primarily attributing it to overconsumption. The app's mission statement, "normalize sharing what we no longer need and make buying new a last resort," aligns with sustainability goals but inadvertently reduces food waste to individual responsibility, neglecting structural issues such as overproduction or retailer practices. By expanding its scope beyond food to include other reusable items, Olio

demonstrates a broader ambition to minimize all forms of waste. However, the app's focus on redistribution rather than prevention overlooks the behaviors that lead to waste in the first place.

The app facilitates food sharing within local communities by allowing users to list surplus food or items they no longer need, which neighbors can claim or purchase. This model, while innovative, relies heavily on active community engagement, potentially creating barriers in areas with fewer users. Furthermore, the option for users to sell rather than freely share items may discourage participation, particularly among those who could benefit most from the redistribution model, thus potentially reducing the app's overall utility.

Olio encourages sustainable behavior by displaying users' impact metrics, including meals shared, money saved, and water conserved. These metrics foster a sense of accomplishment and promote continued participation. However, the app's reliance on redistribution may unintentionally normalize overconsumption, as users might justify purchasing excess food assuming that others will claim their surplus.

The app's hyper-local model, while creating value within communities, limits its capacity to address systemic issues such as food overproduction or inefficient distribution. Olio does not integrate with broader food systems to combat consumer food waste, and its scalability heavily depends on user engagement and adoption. Consequently, while Olio provides a mechanism for redistributing surplus, its claims of having "fought food waste" overlook the broader systemic and cultural changes necessary to prevent waste from occurring initially.

No Waste

No Waste identifies food waste as a direct consequence of inefficient inventory management emphasizing that consumers often forget their existing groceries, leading to overbuying and subsequent spoilage of older items. Unlike Olio, No Waste positions itself not as a comprehensive solution to food waste but as a tool for improved household organization. While this focused approach clarifies the app's purpose, it overlooks the opportunity to address broader systemic issues or habits contributing to waste.

The app's primary functionality revolves around inventory management, enabling users to catalog the contents of their refrigerator, freezer, and pantry. Users can categorize items by expiration date or food type, with a barcode scanner facilitating data entry. However, maintaining an up-to-date inventory can be time-intensive, requiring users to scan items post-purchase and manually update their status after use. This dependence on user diligence may pose challenges for long-term sustainability, particularly for individuals with demanding schedules or limited interest in routine tracking.

No Waste promotes sustainable habits by alerting users to food nearing expiration and allowing them to set monthly waste reduction goals. While these features encourage mindfulness of food, the app lacks gamification or community-driven elements that could enhance long-term user engagement. The app tracks the percentage of food consumed versus wasted, providing users with a clear measure of their progress. However, it doesn't quantify broader benefits, such as environmental savings or financial impact, potentially limiting its appeal to users seeking a more comprehensive understanding of their contribution.

Operating exclusively at the individual level, No Waste does not integrate with larger food systems. Its efficacy relies heavily on user diligence and behavioral consistency, making it vulnerable to lapses caused by emotional, psychological, or societal factors. By focusing primarily on convenience through inventory management, No Waste misses an opportunity to address systemic causes of food waste or inspire deeper behavioral change.

SuperCook

SuperCook positions itself as a "zero waste recipe generator," emphasizing the reduction of food waste through maximized utilization of available ingredients. However, the app fails to define food waste or identify its underlying causes. This lack of clarity in problem framing limits its effectiveness, as it assumes that recipe suggestions alone address the multifaceted issue of food waste. Notably, the absence of documentation or detailed information about its methodology hinders direct comparison with other apps offering more comprehensive features and insights to tackle consumer food waste.

The app's core functionality allows users to input available ingredients and generate corresponding recipes. While practical, this approach focuses exclusively on meal planning, omitting features such as inventory tracking or expiration reminders, which are integral to apps like Kitche and No Waste. User feedback frequently indicates that while SuperCook's recipes are functional, they are often uninspired, leading users to rely on it as a supplementary tool rather than a comprehensive solution for waste reduction.

SuperCook does little to encourage long-term behavioral change or engagement beyond its primary recipe-generation function. The app lacks features such as gamification, reminders, or sustainability messaging that could foster a deeper connection to the goal of waste reduction. Furthermore, it does not provide mechanisms to measure food waste reduction or track user impact, prioritizing convenience over sustainability.

An additional limitation is SuperCook's narrow cultural applicability. Its ingredient lists and recipes predominantly cater to Western cuisines, restricting its relevance and utility in other

cultural contexts. This lack of inclusivity, combined with minimal engagement features and the absence of clear documentation, underscores its shortcomings as a comprehensive tool for addressing food waste. By focusing solely on recipe generation without addressing broader systemic or behavioral factors, SuperCook presents itself as a convenient but ultimately limited solution to the complex issue of food waste.

Kitche

Kitche identifies food waste as a consequence of overbuying and poor management, aiming to "help reduce food waste" through improved inventory tracking, meal planning, and user education. Unlike No Waste, Kitche implicitly acknowledges the multifaceted nature of food waste while focusing on prevention at the household level. The app refrains from positioning itself as a comprehensive solution to the complex issue of consumer food waste, instead presenting itself as a tool to assist in mitigating the problem.

The app offers robust features, including receipt and barcode scanning, manual inventory entry, recipe suggestions, and sustainability tips. Its user-friendly design incorporates gamification elements, rewarding users for reaching sustainability milestones making it more engaging than No Waste. These features streamline inventory management and meal planning, reducing the effort required from users. However, some users report difficulty entering expiration dates for pantry items with longer shelf lives due to the app’s interface, which requires constant scrolling. This limitation somewhat reduces its overall practicality for certain food categories.

Kitche actively promotes sustainable habits through impact tracking, allowing users to visualize their savings in terms of money, water, and CO_2 by reducing food waste. Reminders about items nearing expiration encourage mindful consumption. Gamification features, such as awards for various levels of sustainability, add an engaging motivational layer, making waste reduction feel rewarding and attainable. This approach not only focuses on practicality but also fosters a sense of accomplishment and commitment among users.

The app distinguishes itself through its holistic tracking of individual impact across financial and environmental dimensions, appealing to users who value tangible results. However, Kitche's UK-specific focus limits its scalability to other regions, and its lack of community-driven or social-sharing features reduces its potential for broader systemic influence. While users can sign up to become ambassadors to promote Kitche and food waste reduction, this largely depends on individual motivation to share and act.

Unlike Olio, which emphasizes redistribution, and No Waste, which centers on inventory management, Kitche sets itself apart by addressing multiple aspects of consumer waste

generation. It emphasizes prevention through a combination of behavioral influence, awareness, and education. While its household-level focus precludes it from tackling broader food system issues, Kitche offers a comprehensive approach to empowering individual users in the fight against food waste.

Conclusion

The case study of Olio, No Waste, Kitche, and SuperCook highlights the diverse approaches taken by technology to address food waste, showcasing the strengths and limitations of each app. Olio excels in fostering community-driven redistribution but risks normalizing overconsumption by focusing on redistribution rather than prevention and overstating its impact on "solving" food waste.

No Waste and Kitche adopt preventive strategies by improving inventory management and offering tools that encourage mindfulness and organization in household food consumption. While Kitche provides a more engaging user experience with gamification and impact tracking, both apps face challenges in maintaining long-term user engagement due to the significant effort required for data entry and maintenance. SuperCook, on the other hand, prioritizes convenience by providing recipe suggestions based on available ingredients, yet it lacks the tools, user engagement features, and systemic focus needed to drive meaningful change. Its framing as a "zero waste recipe generator" oversimplifies the complexities of food waste and fails to address root causes like overbuying and poor planning.

While these apps offer valuable solutions at the individual or household level, none fully integrate into larger food systems or address the structural drivers of food waste. Their individualistic focus highlights the limitations of relying solely on consumer behavior to solve a problem that is deeply rooted in economic, social, and cultural structures. This analysis underscores the need for a systemic approach that combines technological innovation with broader cultural and economic reforms.

Addressing food waste effectively requires moving beyond techno-fixes to a coordinated effort that tackles the root causes, empowering individuals while reforming the larger systems in which they operate. This includes addressing overproduction, challenging cultural norms of overconsumption, and implementing policy changes, aspects that all the apps fail to acknowledge or address directly. Ultimately, while these apps provide useful tools for individual action, true progress in reducing food waste will require a more comprehensive, multi-dimensional approach that engages all levels of the food system.

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