Bridging Surplus and Sustainability: A Sharing Economy Approach to Food Waste Reduction in Malaysian Higher Education Institutions

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ABSTRACT

Food waste is a pressing global challenge with significant environmental, social, and ethical implications, and higher education institutions (HEIs) are increasingly recognized as important actors in addressing this issue. Despite growing interest in sustainability, food redistribution initiatives within many HEIs remain fragmented and largely ineffective. This study explores the potential of applying sharing economy principles to food waste minimization at Universiti Sultan Zainal Abidin (UniSZA), Malaysia. Qualitative data were collected through six semi-structured interviews with students, academic staff, and support personnel across UniSZA's campuses.

The findings reveal two key barriers to food redistribution: social stigma and safety concerns. Stigma discouraged students from accepting surplus food due to fears of embarrassment or negative social judgement, while safety concerns particularly related to food hygiene, freshness, and liability undermined trust and limited willingness to participate in redistribution efforts. In contrast, three main drivers were identified: moral norms, social norms, and incentives. Moral and religious values encouraged food sharing as an ethical responsibility to avoid waste, while social norms supported redistribution as an accepted practice within campus communities. Incentives, such as recognition or symbolic rewards, were perceived as supportive mechanisms to sustain participation, provided they did not replace intrinsic motivations.

These findings align with core sharing economy principles, where moral and social norms reflect reciprocity, incentives function as mechanisms of value creation, and stigma and safety concerns highlight trust as a critical condition for participation. The study offers practical implications for policymakers and university administrators, emphasizing the need for formal redistribution procedures, stigma-reducing and dignified mechanisms, and clear food safety governance. By embedding sharing economy principles into institutional systems, HEIs can transform informal food-sharing practices into structured and scalable solutions that contribute to sustainable food waste reduction.

Keywords: Sharing economy; food waste reduction; sustainability; higher education institution; Malaysian university

INTRODUCTION

By 2050, prevailing patterns of production and consumption are projected to demand the equivalent of almost three planet Earths to sustain the natural resources on which societies depend (UN, 2021). Since these resources are finite and cannot be replenished at the current pace of exploitation, there is an urgent need to reorient lifestyles and economic systems toward more sustainable modes of consumption. Practices of overconsumption, the "throwaway" mentality, and the acceptance of product obsolescence must give way to circular approaches that prioritize efficiency, durability, and waste minimization.

Food waste exemplifies this challenge. Globally, it accounts for 8–10% of anthropogenic greenhouse gas emissions and undermines food security, with millions going hungry while edible food is discarded (Wani et al. 2024). In Malaysia, the problem is particularly acute; more than 16,000 tonnes of food are discarded daily, of which approximately 3,800 tonnes remain edible (SWCorp, 2020). Much of this waste is generated in urban and institutional contexts where large-scale food preparation is routine. Higher education institutions (HEIs) in particular, represent a unique microcosm of society, hosting thousands of students, faculty, and staff, and operating dining halls, cafeterias, and catering services. Yet, despite this potential for coordinated sustainability interventions, many universities in Malaysia lack structured mechanisms to manage surplus food, often relying instead on ad hoc or informal redistribution practices (Ghazali et al., 2025).

To address such inefficiencies, new paradigms of sustainable consumption such as the circular economy, smart economy, and sharing economy have gained prominence. The sharing economy (SE) is especially relevant in tackling food waste, as it fosters resource efficiency, social cohesion, and economic inclusion. By redistributing underutilized goods and services rather than producing new ones, the SE reduces waste and lowers carbon emissions (Akma et al., 2022). Despite its growing application in various sectors, the SE within HEIs remains underexplored. Existing studies are limited, fragmented, and discipline-specific, often focusing on how particular SE initiatives are taught rather than systematically implemented at the institutional level (de la Torre et al., 2021; Giannoccaro et al., 2021). To date, there has been little effort to integrate SE principles into university-based sustainability strategies for food waste management. As Kopnina and Padfield (2021) emphasize, further studies are required to examine the SE holistically, particularly within educational ecosystems.

This study addresses this gap by synthesizing key themes that explain how sharing economy principles can support food waste minimization in Malaysian HEIs. Specifically, this study has two aims: (i) to identify barriers hindering effective surplus food redistribution in university settings, and (ii) to assess factors that motivate participation in campus-based food redistribution initiatives through sharing economy principles. By situating food redistribution within broader sustainability discourses, this study contributes to debates on food systems, sharing economy, and campus sustainability. This study offers a culturally grounded, socially inclusive, and operationally scalable model that advances Sustainable Development Goal (SDG) 12 on responsible consumption and production, while addressing one of the most overlooked forms of institutional inefficiency, edible food waste.

This study is organized as follows: Section 2 illustrates the literature review, and Section 3 defines the materials and methods. Section 4 and Section 5 reports the study's main outcomes and the discussion, and Section 6 provides the conclusions, the limitations and the future research.

LITERATURE REVIEW

A. The sharing economy as a driver of sustainability

The sharing economy (SE) has emerged as a significant paradigm in sustainable development, frequently framed as both a novel school of thought and a practical mechanism for transforming production and consumption systems (Kirchherr et al., 2017; Murray et al., 2017). In contrast to the linear "take–make–dispose" model, the SE promotes resource circulation, extending product lifecycles and reducing waste by enabling reuse, redistribution, and collaborative consumption (Geissdoerfer et al., 2017; Urbinati et al., 2017). Scholars often align the SE with the principles of the circular economy, which emphasizes restorative and regenerative processes that redesign systems rather than merely preventing waste (Murray et al., 2017).

Design and innovation are central to SE practices. They require rethinking how products are conceived, how supply chains are structured, and how industrial systems operate to prioritize efficiency and resilience (Velenturf & Purnell, 2021). In practice, SE solutions frequently draw on the principles of reduction, reuse, and recycling (D'Amato & Korhonen, 2021; Ghisellini et al., 2016). These initiatives are not confined to individual firms or consumers; rather, they necessitate collaboration across multiple stakeholders and scales. Research commonly distinguishes three levels of transition: micro (products, companies, consumers), meso (supply chains, clusters, industrial symbiosis), and macro (cities, regions, nations) (Kirchherr et al., 2017; Prieto-Sandoval et al., 2018).

When successfully implemented, SE initiatives have the potential to generate triple-bottom-line outcomes. Environmentally, they reduce dependence on virgin resources, energy inputs, and waste outputs. Economically, they lower costs, create new market opportunities, and stimulate innovation. Socially, they encourage cooperative modes of consumption, generate employment opportunities, and foster participatory decision-making (Korhonen et al., 2018; Pattanaro & Gente, 2017). These multiple benefits underpin the SE's promise as a transformative mechanism for advancing sustainability.

B. Previous research on the sharing economy

Over the past decade, scholarship on the SE has expanded across multiple sectors, reflecting its growing significance for economic, social, and environmental transformation. Much of this research has examined the mechanisms that underpin SE platforms, including trust, digital infrastructures, and governance structures (Faraji et al., 2023; Ling, 2023). Technological perspectives have focused on the role of blockchain in enhancing transparency and supply chain customization (Ye et al., 2025; Kuhn et al., 2025), while organizational studies have demonstrated how knowledge sharing strengthens innovation, particularly in service-oriented industries such as hospitality (Haryanto & Alshoushan, 2025). Behavioural research, meanwhile, highlights the importance of personal relevance, intrinsic motivation, and social norms in shaping participation in digital sharing practices (Cosme et al., 2025; Lian et al., 2025). Collectively, these studies underscore the multidimensional character of the SE, encompassing economic efficiency, technological innovation, and social behaviour.

In parallel, scholars have begun to explore the sustainability implications of SE applications. Research in the mobility sector demonstrates that car-sharing and ride-hailing can reduce vehicle ownership and associated emissions, although rebound effects remain a concern (Acquier et al., 2017). In accommodation, platforms such as Airbnb have been linked to expanded tourism access, but also to urban pressures and increased consumption (Treitler, 2024). More recently, attention has turned to food systems, where SE platforms show promise in redistributing surplus and reducing edible food waste. Studies indicate that digital food-sharing platforms can lower transaction costs, expand redistribution networks, and enable the circulation of perishable goods that would otherwise be discarded (Falcone & Imbert, 2017; Michelini et al., 2020; Richards & Hamilton, 2018). Yet scholars also caution that the economic savings generated may induce indirect rebound effects, raising questions about the net impact of such interventions (Makov et al., 2020).

Despite these contributions, the application of SE principles to HEIs remains limited and fragmented. Existing studies have primarily examined adjacent areas such as digital academic platforms, collaborative learning, or graduate employability (Tandon et al., 2025; Sulistiawan, 2025; Baban, 2025), but very few have framed these findings explicitly through the SE lens. Research on resource centralization and vocational clustering in universities (Gao & Yang, 2025) also stops short of connecting such practices to the logic of shared consumption or peer-based collaboration. More critically, in the context of food systems, there is little empirical evidence on whether consumer-side food-sharing practices effectively reduce waste within HEI ecosystems. While community-based initiatives and digital start-ups demonstrate the redistributive potential of food sharing (Falcone & Imbert, 2017), university settings remain largely overlooked, particularly in Malaysia where food waste arises not only from institutional catering services but also from events, meetings, and other campus activities that involve large-scale food provision.

This study addresses this gap by offering an in-depth understanding of the factors influencing food waste minimization in Malaysian HEIs from a sharing economy perspective. By situating food redistribution within the broader discourse on sustainability, this study aims to contribute to the development of culturally grounded, socially inclusive, and operationally scalable solutions that advance Sustainable Development Goal (SDG) 12 on responsible consumption and production.

METHODOLOGY

This study employed a qualitative research design to explore and answer the research questions on food waste minimization by food redistribution in HEIs. A qualitative approach was deemed appropriate for two reasons. First, the research questions were framed in terms of "what" and "how", which align with exploratory qualitative inquiry (Yin, 2009). Second, given the limited empirical research on food redistribution in HEIs, particularly in Southeast Asia, qualitative methods provided an opportunity to capture stakeholder perspectives and contextual

nuances in depth (Creswell & Poth, 2017). Importantly, the study is anchored in the concept of the sharing economy, which emphasizes access over ownership and the efficient use of underutilized resources. In this context, the sharing economy offers a valuable lens for examining food waste reduction through the redistribution of surplus food generated on campus to those experiencing food insecurity.

A. Study Context

The study was conducted at Universiti Sultan Zainal Abidin (UniSZA), a Malaysian public university in East Coast region with three campuses: Gong Badak, Besut, and Kota Putra. UniSZA was selected as the research site due to its extensive food service operations across these campuses, including cafeterias, residential hostels, and event catering, which generate significant daily food surplus. At the same time, many students facing financial difficulties, especially amid the rising cost of living (Kementerian Pengajian Tinggi, 2025), making UniSZA an appropriate case for studying the barriers and drivers of food waste reduction within a higher education context through a sharing economy lens.

B. Research Design and Data Collection

A purposive sampling strategy was used to gather a wide range of perspectives from different parts of the university community. In August 2024, six semi-structured interviews were conducted with participants representing students, academic staff, support personnel, and cafeteria vendors. Each interview lasted between 45 and 60 minutes, was audio-recorded with the participants' informed consent, and later transcribed verbatim. The interview guide featured open-ended questions aimed at exploring respondents' views on the barriers to food redistribution, their motivations for involvement, and their attitudes toward implementing a redistribution model based on sharing economy principles. Table 1 summarizes the informants, including their assigned codes and respective categories.

Table 1: Profile of Informants

No.	Informant Code	Category
1	RA01	Student
2	RA02	Support Staff
3	RA03	Student
4	RA04	Academic staff
5	RA05	Food Vendor
6	RA06	Academic staff

Source: Author's own work

The sample size was guided by Morse (1994), who recommended a minimum of six participants for phenomenological research. This number was sufficient to allow for in-depth exploration of the research topic while keeping the data manageable for analysis.

C. Data Analysis

The qualitative data obtained from the semi-structured interviews were analyzed using thematic analysis, a widely accepted method for identifying, analyzing, and interpreting patterns in qualitative research. The process began with transcribing the interview recordings, followed by several readings of the transcripts to gain familiarity with the content. The transcripts were then systematically coded to categorize and label relevant segments of information. These codes were grouped into broader categories to uncover recurring themes, which were subsequently refined and interpreted to offer deeper insights into the barriers and enablers of food redistribution in higher education institutions (Miązek & Świątowiec-Szczepańska, 2020).

Thematic analysis was selected for its ability to organize textual data systematically while focusing on elements most relevant to the study's research objectives (Anderson, 2007). This method is especially useful for capturing detailed insights from participants' experiences and interpreting complex qualitative information (Schreier, 2012). The study followed Braun and Clarke's (2012) six-phase framework: (1) familiarization with the data, (2)

generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. Through this structured approach, four central themes were identified from the interviews: (i) norm-driven food sharing practices, (ii) social stigma associated with surplus redistribution, (iii) conditional readiness for digital platforms, and (iv) motivational drivers for participation. These themes collectively illustrate the interplay of barriers and enablers that shape efforts to reduce food waste within higher education institutions.

To improve reliability, two researchers independently coded a subset of the interview transcripts and compared their results. A high level of inter-coder agreement was achieved, reinforcing the dependability and credibility of the coding process. As a result, the final themes were firmly rooted in the participants' narratives while maintaining a clear and systematic structure.

D. Trustworthiness and Process Documentation

To ensure the rigor of the study, established qualitative research criteria credibility, dependability, confirmability, and transferability were followed. Several strategies were implemented to uphold these standards. First, memoing was used throughout the research process to capture the researchers' reflections, analytical insights, and key decision points. This approach enhanced reflexivity and ensured transparency in how interpretations were formed. Second, a decision trail was maintained to document the steps taken during data collection and analysis, thereby ensuring that the research process remained systematic and traceable (Akkerman et al., 2008).

Data saturation was reached when no new themes or insights emerged from the interviews, confirming that the sample size was sufficient. The credibility of the findings was further strengthened through triangulation, drawing on perspectives from a diverse range of stakeholder groups including students, academic staff, support personnel, and vendors. These measures helped ensure that the study's results are trustworthy and offer a reliable account of food redistribution practices within the sharing economy framework at UniSZA.

FINDINGS

The thematic analysis of six interviews identified five interrelated themes influencing food redistribution practices in the higher education context: moral norms, social norms, incentives, social stigma, and safety concerns. These themes represent both drivers and barriers to food waste minimization and map directly onto core sharing economy principles. Moral and social norms reflect reciprocity and collective responsibility, which are central to solidarity-based and community-oriented sharing practices that prioritize moral obligation and mutual aid over market exchange (Cesnuitytė et al., 2022; Simonovits & Balázs, 2022). Incentives correspond to value creation within the sharing economy, where participation is sustained through a combination of intrinsic motivations, social recognition, and perceived collective benefit rather than purely financial returns (Ritter & Schanz, 2019; Curtis & Mont, 2020). In contrast, social stigma and safety concerns highlight trust as a critical enabling or constraining factor in food redistribution, particularly in contexts where participation depends on perceived hygiene, liability, and social acceptance. Together, these themes illustrate how food sharing in higher education institutions is embedded in the moral, social, and institutional dynamics that characterize contemporary sharing economy systems.

A. Social Stigma

A significant barrier to the adoption of food-sharing practices was the social stigma associated with claiming surplus food. Students, in particular, reported feelings of embarrassment and shame, expressing concern that accepting free food might be perceived as a reflection of poverty or personal hardship. Even in situations where food was readily available, cultural sensitivities and social perceptions often discouraged participation. As articulated by two participants:

"Sometimes food is left out with a sign saying, 'please take,' but hardly anyone does. People feel shy or don't want others to think they're desperate." (RA01)

Another participant recounted:

"There is still stigma here. Even if the food is good, people don't want to be seen taking it."(RA06)

This finding aligns with existing research in higher education contexts. El Zein et al. (2019) found that stigma discourages many food-insecure students at U.S. universities from seeking help. Similarly, Papargyropoulou et al. (2019) identified stigma as a key barrier to food redistribution in collectivist societies, where social perceptions carry significant weight. Interestingly, this contrasts with contexts like Finland, where Solovyeva et al. (2023) found minimal stigma due to the social normalization of food sharing. The case of UniSZA highlights how cultural context significantly influences redistributive practices. In Malaysian universities, implementing discreet or anonymous systems may be crucial for reducing stigma and promoting the normalization of food redistribution.

B. Safety concern

Next, safety concern was one of the barriers identified for food sharing initiative. The respondents expressed reluctance to consume redistributed food because of worries about hygiene, freshness, and liability. In particular, they highlighted the risk of being blamed if shared food caused illness. These concerns meant that, even when surplus food was available, it often went to waste rather than being redistributed. According to the participants:

“Even if we want to share, we worry what if someone gets sick? Who’s to blame?” (RA05)

Another participant added:

“Sometimes you don’t know how long the food has been out. It doesn’t feel safe, so people avoid it.” (RA03)Spindeldreher and Teubner (2018) found that liability concerns are among the most significant constraints in surplus food initiatives, while Sales et al. (2021) emphasize that measures such as labeling, time-stamping, and transparent handling protocols are crucial for ensuring safe redistribution. For UniSZA, the persistence of safety concerns highlights a central paradox: while food sharing has the potential to minimize waste, fear of contamination or liability prevents surplus from being transformed into a sustainability opportunity. Without systematic safety protocols, food sharing as a waste minimization strategy risk remaining underutilized.

C. Moral Norm

Moral and religious values were identified as powerful motivators for the redistribution of surplus food. Participants framed food sharing as a moral obligation, deeply rooted in Islamic principles that promote charity and discourage wastefulness. As one academic participant explained:

“It feels wrong to throw food away when others can eat it; Islam teaches us to share what we have.” (RA04)This finding aligns with Hua et al. (2023) and Srivastava et al. (2024), who note that cultural and moral values significantly influence food redistribution behaviours, particularly in collectivist societies. However, consistent with Filho et al. (2021), such intrinsic motivations often fail to translate into systematic waste reduction without formal institutional reinforcement.

D. Social Norms

Food sharing was also shaped by social expectations within campus communities. Informants described a culture of sharing surplus food after events, often directed to peers, staff, or cleaners. One participant explained:

“When there’s food left after events, we usually ask cleaners or students to take it, but it is just based on initiative.” (RA02)

These results are consistent with Solovyeva et al. (2023), who found that social norms can normalize redistribution practices in Northern Europe. However, as Papargyropoulou et al. (2019) emphasize, informal norms remain insufficient unless embedded into formal food waste management hierarchies.

E. Incentives as Motivational Drivers

Participants frequently highlighted the role of incentives and recognition in encouraging participation in food redistribution. While some acknowledged ethical and religious values as important, the majority emphasized that

small rewards or acknowledgement could make sharing more consistent and sustainable. One academic respondent reflected:

"People here want to do the right thing. But sometimes they need a push some reward or at least acknowledgement." (RA04)

This reflects Hamari et al. (2016), who demonstrate that participation in sharing economy platforms is reinforced when extrinsic motivators complement intrinsic values. Similarly, Sales et al. (2021) highlight the role of gamification and recognition systems in sustaining engagement. However, as Meshulam et al. (2022) caution, excessive reliance on incentives can lead to rebound effects, where participation becomes contingent on rewards rather than genuine commitment. Incentives function as mechanisms of value creation within the sharing economy, where participation is sustained through a combination of intrinsic motivations, social recognition, and perceived collective benefit rather than purely financial returns.

DISCUSSION AND RECOMMENDATION

The findings of this study indicate that food redistribution practices at UniSZA are shaped by a combination of enabling and constraining factors that reflect core sharing economy principles. While several drivers support food sharing through reciprocity and value creation, multiple barriers rooted in trust deficits and institutional gaps limit the effectiveness of these practices. This section discusses the findings by distinguishing between key drivers and barriers to food waste minimization in higher education institutions.

Moral norms emerged as a strong intrinsic driver of food redistribution, reflecting reciprocity as a central principle of the sharing economy. Rooted in ethical and religious values, particularly Islamic teachings on charity and the avoidance of waste, participants viewed food sharing as a moral obligation. This finding aligns with Hua et al. (2023) and Srivastava et al. (2024), who demonstrate that moral beliefs encourage food-sharing behaviours across cultural contexts. However, consistent with Filho et al. (2021), the UniSZA case illustrates that moral motivations alone are insufficient to achieve sustained food waste reduction without formal institutional support.

Social norms further reinforced redistribution by normalizing food sharing within campus communities. Informal practices, such as offering surplus food after events to peers or staff, reflect collective reciprocity and shared social expectations. Similar patterns have been observed in European contexts, where social norms contribute to the normalization of redistribution (Solovyeva et al., 2023). Nevertheless, as Papargyropoulou et al. (2019) caution, reliance on informal norms limits scalability. Without integration into formal governance structures and standard operating procedures (SOPs), such practices remain fragmented and inconsistent.

Incentives functioned as complementary drivers by supporting value creation within the sharing economy. Participants emphasized that recognition, rewards, or symbolic incentives could sustain engagement by reinforcing goodwill and participation. This aligns with Hamari et al. (2016) and Sales et al. (2021), who highlight the role of extrinsic motivators in strengthening participation when aligned with intrinsic values. However, echoing Meshulam et al. (2022), the findings suggest that incentives should act as light nudges rather than primary motivators, as overreliance on rewards risks undermining moral commitment and generating rebound effects.

Despite the presence of these drivers, several barriers significantly constrained food redistribution efforts. Social stigma emerged as a major barrier, undermining participation by associating surplus food consumption with embarrassment or perceived poverty. This finding is consistent with El Zein et al. (2019) and prior evidence from higher education contexts, where stigma discourages students from accessing food assistance. Unlike Northern European settings where food sharing has been socially normalized (Solovyeva et al., 2023), the UniSZA case highlights how cultural sensitivities intensify stigma, indicating the need for discreet and dignified redistribution mechanisms that protect anonymity and social identity.

Safety concerns represented another critical barrier, reflecting a broader trust deficit in food redistribution systems. Participants expressed anxiety over food hygiene, freshness, and liability, often preferring disposal over redistribution to avoid potential blame. These concerns mirror findings by Spindeldreher and Teubner (2018), who identify liability as a key constraint in surplus food initiatives, and by Sales et al. (2021), who emphasize

the importance of labelling and transparent handling protocols. In the absence of standardized safety governance and institutional accountability, food sharing remains perceived as risky, limiting its potential as a waste minimization strategy.

Taken together, the findings demonstrate that effective food waste minimization in higher education institutions requires more than individual goodwill. While reciprocity and value creation support participation, trust-related barriers—manifested through stigma and safety concerns—undermine the scalability and sustainability of food redistribution. Embedding sharing economy principles into formal institutional systems is therefore essential. This includes integrating moral and social norms into policy frameworks, implementing clear SOPs and safety protocols, reducing stigma through discreet redistribution designs, and deploying incentives as supportive rather than dominant mechanisms.

By addressing both drivers and barriers in a structured manner, universities can transform fragmented, informal food-sharing practices into coordinated, scalable redistribution systems aligned with sharing economy principles and sustainability agendas.

CONCLUSION

This study explored the application of sharing economy principles to food waste minimization in higher education, using Universiti Sultan Zainal Abidin (UniSZA) as a case study. The analysis identified five interrelated themes: moral norms, social norms, incentives, social stigma, and safety concerns. Moral and social norms emerged as key drivers encouraging food redistribution through ethical, religious, and collective values; however, these practices remained fragmented and lacked institutional reinforcement. Incentives were perceived as important extrinsic supports for sustaining participation, though they require careful calibration to avoid dependency. Conversely, social stigma and safety concerns particularly related to food hygiene and liability emerged as significant barriers that constrained engagement in redistribution initiatives.

These findings align with core principles of the sharing economy. Moral and social norms reflect reciprocity and community orientation; incentives function as mechanisms of value creation that reinforce participation; while stigma and safety concerns illustrate the central role of trust in shaping willingness to share food. Embedding these principles into university governance and sustainability strategies is therefore essential to transform informal and ad hoc food-sharing practices into structured and scalable redistribution systems.

The study offers several practical implications. Universities should formalize food redistribution through clear standard operating procedures (SOPs), address stigma by implementing discreet and dignified redistribution mechanisms, and strengthen trust through transparent food safety governance, including labelling, handling protocols, and clear accountability structures. Incentives, when integrated as complementary nudges such as recognition or digital badges, may further support sustained engagement without undermining intrinsic motivations.

This study is limited by its small sample size and reliance on self-reported perceptions, which may restrict generalizability. Future research should extend this work across multiple higher education institutions and employ mixed-method or longitudinal designs to examine how cultural, institutional, and governance factors interact to sustain food redistribution over time.

In conclusion, effective food waste minimization in higher education requires more than individual goodwill. By embedding reciprocity, trust, and value creation into institutional systems, universities can play a transformative role in advancing responsible consumption and reducing edible food waste in line with global sustainability goals.

Author Declaration

Conflict of Interest - The authors declare no conflict of interest. The views and opinions expressed in this article are solely those of the authors and do not necessarily reflect the official position of their affiliated institutions.

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Ethical Approval - The study was conducted in accordance with ethical research standards. Informed consent was obtained from all participants prior to data collection, and confidentiality was assured throughout the study.

Author Contributions - All authors contributed to the conceptualization, data collection, analysis, and writing of this manuscript. All authors have read and approved the final version of the manuscript.

Use of Generative AI - During the preparation of this manuscript, the authors made use of generative AI tools to enhance language clarity, grammar, and readability. All AI-assisted outputs were critically reviewed, edited, and validated by the authors to ensure accuracy and scholarly integrity. The authors take full responsibility for the final content of the article.

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