

SUSTAINABLE FOOD WASTE REDUCTION PRACTICES IN TRAINING KITCHENS

Ahmad Raza

BS Student, Department of English, University of Okara

ABSTRACT

Food waste is a major environmental, economic, and educational challenge within hospitality and culinary education. Training kitchens generate food waste during purchasing, storage, preparation, cooking, service, and the handling of surplus food. Because students develop their professional culinary habits in these environments, training kitchens provide an important opportunity to teach practical food-waste prevention and sustainable resource management. The present study examines sustainable food waste reduction practices in training kitchens, with particular attention to food planning, accurate portioning, proper storage, ingredient utilization, menu planning, reuse of safe surplus food, waste segregation, composting, and student awareness. Recent research indicates that professional training, sustainability education, practical supervision, and measurement of food waste can contribute to improved waste-management behavior among hospitality and culinary students. The study proposes that food-waste reduction should not be treated as an additional topic but integrated into everyday kitchen training and assessment. By developing students' knowledge, skills, attitudes, and professional responsibility, training kitchens can contribute to more sustainable culinary practices and support Sustainable Development Goal 12.3, which calls for reducing food waste. UNEP reported that approximately 1.05 billion tonnes of food were wasted at household, food-service, and retail levels in 2022, demonstrating the scale of the global challenge.

KEYWORDS: Food waste, sustainable kitchens, training kitchens, culinary education, hospitality education, waste reduction, food management, sustainability, food waste prevention, culinary students.

INTRODUCTION

Food waste has become an important environmental, economic, social, and educational issue across the global food system. Food is wasted at several stages, including purchasing, transportation, storage, preparation, cooking, serving, and post-consumption. In hospitality and food-service environments, food waste is particularly significant because kitchens handle large quantities of perishable ingredients every day. Jomaa, N., Attamimi, R., & Al Mahri, M. (2025). THAT EXPLAINED The United Nations Environment Programme's Food Waste Index Report 2024 estimated that 1.05 billion tonnes of food were wasted globally in 2022 across households, food services, and retail, emphasizing the need for stronger measurement and reduction strategies. Food waste also represents wasted water, energy, labor, land, money, and other resources used throughout the food-production system. Therefore, reducing food waste is not simply a waste-disposal issue; it is an important component of sustainable food-system management. Training kitchens are especially important because they are educational environments in which future chefs, food handlers, restaurant managers, and hospitality professionals develop their practical skills. Students learn techniques such as mise en place, cutting, cooking, portioning, plating, menu preparation, storage, and food service. However, these activities can also generate considerable quantities of food waste if students

are not taught how to plan ingredients, control portions, use edible parts effectively, store food appropriately, and manage surplus ingredients. Recent research on hospitality students has emphasized the development of specific zero-food-waste competencies involving knowledge, attitudes, and practical skills. Similarly, research published in 2025 found that culinary students' professional competencies related to food-waste avoidance include areas such as food handling, menu analysis, planning, and management skills.

Sustainable food-waste reduction in training kitchens requires a shift from simply disposing of waste toward preventing waste at its source. Prevention can begin before food reaches the kitchen through accurate purchasing, demand forecasting, menu planning, and appropriate quantities of ingredients. Once ingredients enter the kitchen, proper storage, stock rotation, temperature control, yield management, and careful preparation can reduce unnecessary losses. During cooking and service, portion control, recipe standardization, appropriate production quantities, and responsible use of surplus food can further reduce waste. A recent framework developed specifically for hospitality education identifies six stages of the educational food lifecycle: purchasing and receiving, storage and distribution, food preparation, cooking, food service, and surplus management. Education and professional training are also central to sustainable food-waste reduction. Evidence from restaurant settings shows an association between employee training and lower food waste, suggesting that training can influence both knowledge and workplace practices. More recent research in 2026 found that a food-waste management training intervention reduced food waste generation by 10% in trained small and micro hospitality enterprises while improving staff knowledge and awareness. These findings are relevant to training kitchens because students can learn waste-reduction techniques before entering professional hospitality workplaces.

The issue is also relevant to Pakistan's hospitality sector. Research conducted in Pakistan has identified food-waste challenges in restaurants and hotels, while a 2026 study of Pakistani hotels found that meal planning, appropriate food storage, leftover repurposing, date-label awareness, and food-sharing practices were associated with lower food wastage. Research in Multan has also quantified food waste in hotel restaurants and catering establishments, demonstrating the relevance of food-waste measurement and forecasting within the Pakistani context. Consequently, introducing sustainable food-waste practices within culinary and hospitality training institutions can help students develop competencies that may later be applied in restaurants, hotels, catering organizations, and other food-service settings. Food waste has become a major environmental, economic, social, and sustainability challenge across the global food system. Large quantities of food are discarded during purchasing, transportation, storage, preparation, cooking, serving, and consumption, resulting in the unnecessary loss of valuable food resources. Food waste also represents wasted water, energy, agricultural land, labor, financial investment, and other resources used throughout the food-production process. The hospitality and food-service sectors are particularly important in this context because professional kitchens handle large quantities of ingredients and

prepared food on a daily basis. Training kitchens are an especially significant area for food-waste reduction because they serve both educational and food-production purposes. Students in culinary arts, hospitality management, food and beverage management, and related programs develop practical skills such as food preparation, cooking, portioning, plating, storage, and service within these kitchens.

However, without appropriate guidance and sustainable practices, practical activities can generate considerable quantities of avoidable food waste through excessive preparation, incorrect portioning, poor storage, preparation errors, unnecessary trimming, overproduction, and inappropriate management of surplus food. Therefore, incorporating sustainable food-waste reduction practices into training kitchens can help institutions reduce waste while simultaneously developing responsible professional behavior among future chefs and hospitality workers. Sustainable practices may include accurate menu and production planning, appropriate purchasing, inventory management, proper storage, stock rotation, standardized recipes, efficient ingredient utilization, portion control, safe reuse of suitable surplus food, waste segregation, recycling, composting, and regular monitoring of discarded food. Education is particularly important because students who learn sustainable practices during their training may carry these behaviors into restaurants, hotels, catering organizations, and other professional food-service environments. Training kitchens can therefore function as practical laboratories for sustainability, where students learn not only how to prepare high-quality food but also how to use resources efficiently and minimize unnecessary waste. Developing students' awareness, knowledge, practical skills, and positive attitudes toward food-waste reduction can contribute to more sustainable culinary practices and support broader environmental objectives, including responsible consumption and production.

RESEARCH OBJECTIVE

1. sustainable food waste reduction To examine practices used in training kitchens and assess how food planning, storage, preparation, portion control, surplus-food management, and student training contribute to reducing food waste.

RESEARCH QUESTION

1. How do sustainable food waste reduction practices in training kitchens contribute to reducing food waste and developing sustainable behaviors among culinary and hospitality students?

LITERATURE REVIEW

Food waste management has increasingly become an important research area within hospitality, tourism, culinary education, and sustainability studies. Recent literature

demonstrates that food waste should be addressed through prevention, reduction, reuse, recycling, and responsible disposal rather than relying primarily on end-of-pipe waste treatment. A 2024 systematic review of circular practices in hospitality identified food-waste prevention, minimization, and recycling as major areas of research and emphasized the importance of circular practices for reducing resource loss. Similarly, a 2026 systematic review examined food-waste management strategies across pre-kitchen, kitchen, and post-kitchen stages, demonstrating that food waste can be addressed throughout the entire food-service process rather than only after waste has been produced.

Training and professional competence are important components of food-waste reduction. Research published in 2023 developed a zero-food-waste competence scale for hospitality students and identified knowledge, attitude, and skills as important dimensions of zero-waste competence. Jomaa, N., Attamimi, R., & Al Mahri, M. (2025) THAT eXPLAINED The study suggests that students require more than theoretical awareness because practical food-choice, food-management, preparation, and menu-related skills are also important. This perspective is particularly applicable to training kitchens, where students can practice sustainable behavior while simultaneously learning culinary techniques. In this context, food-waste reduction becomes part of professional competency rather than an isolated environmental topic. Professional training has also been associated with improved food-waste management in hospitality workplaces. A 2024 study of 300 restaurant managers and owners in Ecuador found differences in food waste and sustainability practices according to levels of employee training. Restaurants with higher levels of staff training demonstrated lower levels of certain food-preparation waste and greater awareness of resource conservation and social responsibility. Research in 2025 similarly examined training practices in restaurants and found that verbal instruction, mentoring, and hands-on coaching were common approaches for teaching employees to minimize food waste. These findings indicate that practical supervision and continuous feedback may be particularly relevant in training kitchens.

The role of curriculum and experiential learning is another important theme in the literature. A 2026 study focusing on hospitality students examined educational strategies for aligning attitudes and behavior toward food waste and investigated a sustainability course using traditional, collaborative, and experiential learning approaches. In addition, research on sustainable food literacy among hospitality students reported improvements in knowledge, skills, and attitudes following a sustainability-focused educational intervention. These studies indicate that classroom instruction can be strengthened when students are given opportunities to observe, measure, discuss, and directly manage food waste during practical activities. Food planning and inventory management are also essential strategies. Accurate demand forecasting can prevent overproduction and unnecessary purchasing, while appropriate storage and stock rotation can reduce spoilage. Recent research from Pakistan found significant relationships between sustainable practices—including meal planning, proper storage, repurposing leftovers, technology solutions, and date-label awareness—and lower

food wastage in hotels. In training kitchens, students can be taught to estimate required quantities, prepare ingredients according to standardized recipes, monitor inventory, use older stock first, and record ingredients that are discarded.

This approach can help students understand that sustainability requires both culinary creativity and responsible resource management. The literature further highlights the importance of behavioral and social factors. Research applying Social Practice Theory argues that food-waste behavior is shaped by interconnected materials, meanings, and competencies rather than knowledge alone. A 2025 restaurant study similarly found that attitudes, behaviors, knowledge, materials, meanings, and competencies influence sustainable food-waste management. More specifically, 2026 research involving gastronomy and culinary students found that cognitive competencies interact with awareness and moral emotions in shaping food-waste reduction intentions. Therefore, training kitchens should develop not only technical skills but also responsibility, awareness, reflection, and positive attitudes toward resource conservation. Overall, the literature indicates that effective food-waste reduction requires a combination of prevention strategies, practical education, measurement, supervision, behavioral change, and institutional support. However, training kitchens remain an important area for further investigation because they have a dual role: they are food-production environments and educational spaces. This makes them different from commercial restaurants. Students are simultaneously learning culinary skills and developing professional habits. Therefore, embedding food-waste reduction into everyday practical training can potentially influence both immediate kitchen waste and students' future professional practices.

METHODOLOGY

This study adopts a quantitative research approach to examine sustainable food-waste reduction practices in training kitchens. A quantitative approach is appropriate because the study focuses on measurable aspects of food-waste management, including students' awareness, knowledge, attitudes, practical behaviors, and use of sustainable kitchen practices. Data can be collected through a structured questionnaire distributed to culinary arts, hospitality management, food science, or professional cookery students who regularly participate in practical kitchen sessions. Teng, C. C., Lin, Y. M., Cheng, Y. J., & Yang, T. C. (2025) THAT FOUND The questionnaire can include Likert-scale statements ranging from strongly disagree to strongly agree. The items may address food planning, storage, portion control, ingredient utilization, surplus management, waste segregation, composting, and training related to food-waste reduction. The study can also investigate the relationship between sustainability education and students' practical behavior. Students may be asked about the frequency with which they follow waste-reduction practices during practical classes. The approach is consistent with recent research that has used surveys and quantitative

analysis to examine food-waste competencies and sustainability practices among hospitality students.

RESEARCH DESIGN

A descriptive survey research design is proposed for the study. The design will allow the researcher to describe existing sustainable food-waste practices in training kitchens and examine students' perceptions of their effectiveness. The population may consist of students enrolled in culinary arts, hospitality management, hotel management, food and beverage management, or related practical food-service programs. A sample of approximately 100–200 students may be selected through convenient or purposive sampling depending on institutional access. A structured questionnaire can contain two major sections. The first section can collect demographic information such as academic level, practical-kitchen experience, and frequency of kitchen training. The second section can measure sustainable food-waste practices through statements related to purchasing, storage, preparation, cooking, serving, surplus management, segregation, and recycling. Participation should be voluntary, and respondents' identities should remain confidential.

DATA ANALYSIS

The collected data will be analyzed using descriptive statistical techniques. Frequencies and percentages will be calculated to summarize respondents' demographic characteristics and their responses to individual questionnaire items. Mean scores and standard deviations can be used to determine the overall level of sustainable food-waste practices in training kitchens. Higher mean scores would indicate greater reported implementation of the relevant practice. The data can also be analyzed to identify patterns between students' sustainability knowledge and their reported kitchen behaviors. For example, responses related to food planning, proper storage, portion control, ingredient utilization, leftover management, and waste segregation can be grouped into major categories. If appropriate, correlation analysis can be used to examine the relationship between sustainability knowledge/training and food-waste reduction behavior. Statistical software such as SPSS can be used for data entry, coding, descriptive analysis, reliability testing, and correlation analysis. A Cronbach's alpha test may also be applied to assess the internal consistency of the questionnaire items.

FINDINGS

The expected findings indicate that sustainable food-waste reduction practices can play an important role in improving the environmental performance of training kitchens and developing responsible behavior among culinary and hospitality students. Students who receive regular instruction about food waste are expected to demonstrate greater awareness of the environmental and economic consequences of unnecessary food disposal. This expectation is supported by recent evidence showing that training and sustainability

education can improve food-waste knowledge, awareness, competencies, and behavior. The findings are also expected to show that food planning and proper storage are important practices for preventing waste before ingredients become unusable. Students who follow appropriate stock rotation, storage procedures, date-labeling practices, and quantity planning may report lower levels of avoidable food waste. Similarly, accurate portion control and standardized recipes can help prevent overproduction during practical kitchen activities. These practices are consistent with recent research showing associations between meal planning, proper food storage, and reduced food wastage in the Pakistani hospitality sector. Another expected finding is that students' practical skills influence their ability to reduce food waste. Careful cutting techniques, effective use of edible portions, appropriate preparation quantities, reuse of suitable ingredients, and responsible handling of surplus food can reduce the amount of material discarded during practical classes. Recent hospitality-education research emphasizes that food-waste avoidance requires a combination of knowledge, attitudes, and practical skills rather than knowledge alone.

CONCLUSION

Sustainable food-waste reduction practices in training kitchens are important for both environmental sustainability and professional culinary education. Training kitchens are not simply places where students learn cooking techniques; they are environments in which future hospitality professionals develop habits, attitudes, competencies, and professional responsibilities. Consequently, food-waste prevention should be integrated into everyday practical education rather than addressed only as a separate theoretical subject. The literature demonstrates that food waste can be reduced through a combination of accurate purchasing and forecasting, appropriate storage, stock rotation, careful preparation, portion control, menu planning, surplus management, segregation, recycling, and composting. The study further concludes that education and practical training are central to developing sustainable kitchen behavior. Students require knowledge about the environmental and economic consequences of food waste, but they also require practical skills that allow them to prevent waste during real kitchen activities. Training methods such as demonstrations, mentoring, hands-on coaching, measurement, feedback, and reflective learning can help students transform sustainability knowledge into practical behavior. Recent research supports the importance of professional training, culinary competencies, and experiential learning in food-waste reduction. Training institutions can strengthen food-waste reduction by establishing clear kitchen policies, measuring food waste regularly, teaching students to record discarded ingredients, using standardized recipes, encouraging portion control, improving inventory management, and providing separate waste containers. Teachers can also include food-waste reduction as part of practical assessment so that students understand that sustainability is an element of professional culinary competence.

REFERENCES

- Akogul, E. (2026). Corrigendum to “Cognitive and affective links of food waste–reducing behaviors in training kitchens: An integrated analysis based on structural equation modeling and fsQCA”[*J. Hospit. Tourism Manag.*(2026) 101493]. *International Journal of Gastronomy and Food Science*, 101526.
- Alam, M. F., Miraz, M. H., Ahmed, B. T., Hasan, M. T., & Qader, K. (2026). Sustainable food management and waste reduction strategies in the hotel industry. *Discover Sustainability*.
- Cardenas, M., Schivinski, B., & Brennan, L. (2024). Circular practices in the hospitality sector regarding food waste. *Journal of Cleaner Production*, 472, 143452.
- Minelli, A., Nayak, N. P., Piramanayagam, S., Michelson, E., & Jarjoura, G. (2026). Sustainable Food-Waste Management Through Academia–Industry Partnerships: Extending Experiential Learning Through Participatory Co-Creation Approach. *Tourism and Hospitality*, 7(6), 168.
- Morley, A., Vargas, V. R., & Hernandez-Diaz, P. M. (2025). Investigating the potential contribution of hospitality and food service SMEs to address food waste in the SDGs. *Discover Sustainability*, 6(1), 1376.
- Mutanda, G. W., & Nhamo, G. (2026). Traditional, Indigenous and Local Knowledge Systems: A Bibliometric Analysis Interfacing Response to Climate Action (SDG13). *African Journal of Inter/Multidisciplinary Studies*, 8(1), 1-18.
- Teng, C. C., Lin, Y. M., Cheng, Y. J., & Yang, T. C. (2025). How CSR practices and employee resilience transform hotel service innovation and well-being: The role of job and leisure crafting. *Tourism and Hospitality Research*, 14673584251395669.
- Luo, Y. (2024). The political effects of sustainable development goals on sustainable consumption and production efforts of United Nations Environment Programme.
- Suastini, N. M., Sihombing, I. H. H., & Indrayani, I. G. A. P. W. (2025). A Perceptions of Tourism & Hospitality Students Toward a Hospitable Service Mindset: A Preliminary Investigation. *Global Business & Finance Review*, 30(4), 13.
- Gille, M., Tropmann-Frick, M., & Schomacker, T. (2024). Balancing public interest, fundamental rights, and innovation: The EU’s governance model for non-high-risk AI systems. *Internet Policy Review*, 13(3).