Chapter 14
Sustainable Cooking Solutions Powered by AI and Smart Technologies

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ABSTRACT

This chapter explores the connection of artificial intelligence (AI) and smart technologies with sustainable cooking, in alignment with UN SDGs like Zero Hunger, Clean Energy, Innovation, and Responsible Consumption. The challenges in traditional methods are highlighted with the transformation toward smart cooking. The role of IoT devices, AI meal planning, and energy-efficient tools is mentioned to understand. The real-world experiences are shown in case studies from homes, commercial kitchens, and communities. The chapter also stresses accessibility, ethics, and digital literacy and ends with recommendations for sustainable culinary innovation advancement.

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INTRODUCTION

Sustainability and the Culinary Industry

In the 21st century, sustainability has emerged as a necessary element in all industries, particularly in food production and consumption. The culinary industry, which includes domestic cooking, commercial kitchens, and food service sectors, is a major stakeholder in environmental sustainability as it has direct influence on energy usage, resource consumption, and waste generation (Milindi et al., 2022). Shukla et al. (2025) provide a forward-looking outlook on rural waste management. The FAO's 2024 report on food loss and wastage indicates the significant global problem of food loss and waste and estimates that 13.2% of food is lost during the supply chain after harvest, and 19% is wasted at retail, food service, and household levels. This leads to significant environmental impact, including 8-10% of greenhouse gas emissions globally, and negatively impacts food security and nutrition (*FAO Policy Series: Food Loss & Food Waste*, 2024). This makes cooking a vital part of interventions.

As cooking activities are resource-intensive with electricity or fuel, water, and perishable goods, they increase carbon footprints with inefficient processes (Goodwin, 2023). The problem will aggravate with the design and function of kitchen appliances, various consumer behavior patterns, and supply chain inadequacies. Adding to that, the social dimensions of cooking relating to nutrition, health, and food security are deeply connected to sustainability principles, which affect vulnerable populations (Dickinson et al., 2022).

Sustainable cooking means not just adapting energy-efficient appliances. It includes a systematic structure in mindful meal planning, waste reduction, energy conservation, and dietary shifts to include plant-based options too (Ibe & Kollur, 2024). This transition needs innovative tools along with strategies that are intelligent, smart, scalable, and also adaptable to different culinary environments, from urban kitchens with high technology usage to rural households with restricted resources.

In sustainable cooking, the circular economy helps in minimizing waste by reusing food resources, composting organic scraps, and designing more durable and repairable kitchen technologies. With this, the approach of the traditional linear 'take-make-dispose' model can be shifted to supporting resource efficiency and environmental resilience (Islam et al., 2024).

The Emergence of AI and Smart Tech in Cooking

Due to globalization and technological advancement, Artificial Intelligence (AI), the Internet of Things (IoT), and other smart technologies have reshaped human

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