

Chapter 14

The Future on Your Plate: How Food Technology Becoming a Driver of Sustainability

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ABSTRACT

The food service industry has undergone a seismic shift through food technology (foodtech). This chapter delves into how foodtech has transformed restaurant and food business operations, paving the way for greater operational efficiency, reduced labor costs, convenient and faster service. Customers around the globe have embraced this evolution, readily adopting features like: Automation and robotics. Next is the Greener Practices: Foodtech can introduce environmentally friendly practices like using recycled packaging materials or sourcing ingredients from local, sustainable farms. This empowers customers to make informed choices based on their values which greatly affect sustainability measures as this is a two-way effort. This chapter will delve deeper into the specific food technology practices that contribute to sustainability and explore how these practices translate into higher customer satisfaction. It will showcase real-world examples and discuss the potential challenges and opportunities that lie ahead in this dynamic landscape.

INTRODUCTION

The food service industry has undergone a seismic shift through food technology. This chapter explores how these technological innovations have revolutionized restaurant and food business operations, leading to greater operational efficiency, reduced labor costs, and enhanced customer experiences.

The integration of service robots and automated guided vehicles (AGVs) into restaurants has been particularly impactful, resulting in a significant reduction in labor hours and a boost in productivity (Shimmura et al., 2020). These automated systems have enabled service staff to focus on their core duties, improving service quality while streamlining operations. Moreover, technology-driven solutions have positively impacted customer satisfaction by enhancing ordering speed, convenience, menu design, and order accuracy. AI-assisted food ordering and delivery management systems have further improved business efficiency and customer satisfaction by enabling more effective planning, predicting consumer behavior, and reducing product waste (Liem et al., 2023). However, the introduction of food

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delivery services has yielded mixed results. While they offer convenience to tech-savvy customers, they may not necessarily increase overall demand but rather alter the customer base (Chen et al., 2022). This underscores the importance of carefully considering the potential implications of new technologies on existing business models.”

The global food system is grappling with a complex web of challenges that impact every stage of the supply chain. Food security and safety are paramount concerns, as a staggering one-third of all food produced is lost or wasted annually. This inefficiency is exacerbated by inadequate information sharing, logistical inefficiencies, insufficient infrastructure, and a lack of robust risk management systems (Kiranmai et al., 2021). Furthermore, the global food system is under immense pressure due to a confluence of factors, including increasing population, urbanization, and climate change (Sousa et al., 2024). These challenges are exacerbating existing food security issues and driving unsustainable practices that have severe environmental consequences. To address these pressing challenges, the food industry must embrace innovative solutions. This includes harnessing blockchain technology to enhance food safety, quality, and traceability throughout the supply chain (Tipmontian et al., 2020), leveraging AI and machine learning for supply chain optimization (Pandey, 2022), and building more resilient food systems that can withstand disruptions and adapt to changing conditions (Ababou et al., 2023).

Food technology has advanced rapidly, driven by emerging trends and innovations. New processing technologies prioritize nutrition, safety, and freshness (Akhila et al., 2022). Nanotechnology, for example, offers enhanced bioavailability and stability through nanoemulsions and nano-encapsulation (Thiruvengadam et al., 2018). This interdisciplinary field is poised to revolutionize food production and consumption.

Southeast Asia's food system faces significant challenges hindering SDG progress. Food waste and loss remain a pressing issue due to data limitations and inadequate practices (Ardra & Barua, 2022). Addressing challenges like pandemic disruptions, supply chain complexities, and emerging technologies requires a multifaceted approach, including Industry 4.0 and collaborative partnerships (Lahane et al., 2023). Innovative solutions like biosensors and nexus planning are crucial for a sustainable and resilient food system.

Customers around the globe have embraced this evolution, readily adopting features like: *Automation and robotics*: Kitchen robots tackle repetitive tasks, while self-service kiosks streamline ordering and payment; *Online ordering and delivery*: Third-party platforms and in-house systems offer convenient ways to get food delivered directly to customers; *Data-driven insights*: Restaurants leverage data analytics to understand customer preferences, optimize pricing, and personalize experiences; *Ghost kitchens and virtual restaurants*: Delivery-only concepts offer a wider variety and accessibility of food options. But the impact goes beyond mere convenience. Foodtech also presents a path towards sustainability, which in turn, can lead to increased customer satisfaction. *Reduced Food Waste*, as the smart inventory management systems help restaurants predict demand and order accurately, minimizing food waste, this translates to lower costs and a reduced environmental footprint, which resonates with eco-conscious customers. *Transparency and Traceability*: This empowers customers to make informed choices based on their values which greatly affect sustainability measures as this is a two-way effort.

This chapter will delve deeper into the specific food technology practices that contribute to sustainability and explore how these practices translate into higher customer satisfaction. It will showcase real-world examples and discuss the potential challenges and opportunities that lie ahead in this dynamic landscape.

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