


# Chapter 12

## Recent Advances in the Utilisation of Artificial Intelligence in the Food Industry

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### ABSTRACT

*Global population growth raises food security concerns. AI, like computer vision and ML, revolutionizes agriculture. It monitors crop health, predicts yields, and automates tasks. Mobile apps diagnose crop diseases swiftly, boosting productivity. AI-driven machine vision improves food processing by flaw identification and quality control. AI sorting enhances item classification, increasing productivity. In beer production, AI ensures fermentation quality. It optimizes distribution, predicts demand, and reduces waste. AI detects contaminants for food safety. Chatbots offer personalized recommendations. Data privacy and ethics matter, requiring explainable AI (XAI) and legal frameworks must be addressed despite these advancements. AI promises a secure, efficient, and sustainable food ecosystem.*

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## **1. INTRODUCTION**

Artificial Intelligence (AI) has revolutionized the food industry in a variety of ways. AI technologies like data analytics, machine learning, and computer vision are being utilized to boost and enhance relationships with stores, sales reps, and consumers, improve accuracy in food processing, and enhance food safety standards. AI is also being used to sort food (Goyache *et al.*, 2001), manage the supply chain (Addanki *et al.*, 2022), and ensure employees follow personal hygiene standards (Stoitsis *et al.*, 2023), identifying proteins for healthy foods and creating food recipes (Ramirez-Asis *et al.*, 2022).

The food industry will benefit from AI's capacity to work and adapt like human beings to carry out a number of duties swiftly and in an instantaneous fashion, including sanitation, guaranteeing cleanliness, making food and drink, identifying possible hazards during manufacturing, and distinguishing food based on various variables. (Mavani *et al.*, 2022). Given the continually increasing global population, leveraging technology within the food production ecosystem is imperative to ensure food security for all. Artificial Intelligence (AI) has emerged as a vital tool in addressing poverty by enhancing agricultural practices and boosting food production (Kutyauripo *et al.*, 2023).

The scientific field of artificial intelligence (AI) aims to create intelligent systems that mimic certain aspects of human behaviour using methods that are inspired by natural processes. It is a new tool in the food industry for processing different kinds of foods using robots or machines. (Addanki *et al.*, 2022)..

Artificial intelligence has ushered in significant advancements in agriculture, spanning crop cultivation, harvesting, and marketing (Ivanov & Webster, 2023). As a sophisticated technology, AI offers a viable alternative to human intelligence for problem-solving and decision-making. When integrated with the Internet of Things (IoT), AI becomes a powerful tool that can be harnessed across the entire food system, encompassing agriculture and managing food waste (Palacios *et al.*, 2019). Numerous facets of the food industry, including production, processing, distribution, and even consumer experience, have the potential to be revolutionised by AI applications. This chapter examines recent developments in AI usage in the food industry and their effects on various sectors.

## **2. ARTIFICIAL INTELLIGENCE IN THE FOOD INDUSTRY**

AI is vital in the food industry, playing a key role in production, processing, quality control, and various aspects like manufacturing, packaging, and cleaning. The illustration in Figure 1 demonstrates how AI is beneficial in the food industry.

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