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*Commentary*

# Technological advancements in food

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## Abstract

The Food & Beverage Sector can improve the quality of their foods and beverages thanks to new food science technologies. Biotechnology-based food items, such as genetically modified foods, organic crops and food products, and protein-based diets, are examples of new foods.

As the economies of many countries grow, customers are increasingly turning to manufactured foods rather than basics. In fact, the worldwide food processing technology industry is worth several trillion dollars. The food industry employs around 16 million people, according to reports. Recent advancements in food processing and technology are critical not only for meeting rising productivity needs, but also for implementing advanced automation, control, and monitoring methods and approaches. The Food & Beverage Sector can improve the quality of their foods and beverages thanks to new food science technologies.

**Keywords:** Robotics, Digital Twins, Blockchain, Foodborne.

## INTRODUCTION

Biotechnology-based food items, such as genetically modified foods, organic crops and food products, and protein-based diets, are examples of new foods. As a result, the food we eat every day is the result of comprehensive food research, a systematic inquiry of the qualities and compositions of a variety of foods. Food is a fuel, providing the energy needed to conduct everyday duties and sustain normal metabolic processes. There are different ways to think about food, which have been explored at many food events and food conferences.

Some outstanding technologies are already having an impact on the food sector and will continue to do so in the future. As its use becomes more widespread, the sector will evolve to become smarter and more efficient, with overall improvements (Geveke et al., 2017).

### Artificial Intelligence and Advanced Robotics

Despite the fact that artificial intelligence and sophisticated robotics are two separate technologies, they are commonly combined. Robots are controlled by AI and the data it collects, allowing them to be more precise, intelligent, and aware.

Most robots are only capable of doing repetitive and well-defined activities on their own (Howard et al., 2012). They'll either fumble or fail if you throw anything unusual into the mix. When guided by data-based intelligence solutions like as AI or machine learning, however, such robots become far more advanced.

Machinery and robots are used in the food sector to improve operations and maintain quality and efficiency at a low cost. They frequently collaborate with human workers to supplement or improve operations. They also have a number of unanticipated advantages, such as increased worker safety, faster and higher product output, and consistent, trustworthy quality (Lacombe et al., 2007).

JBS, for example, one of the world's largest meatpacking companies, has robotic butchers at its facilities. The robots were employed to slice more difficult foods, resulting in fewer injuries on the job.

**Automation coexists with AI and advanced robots, even combining the two to create a more efficient system. As of 2017, 73 percent of food and beverage production enterprises surveyed had implemented or were planning to implement automation in their facilities.**

Many technologies are designed to replace or improve repetitive jobs by increasing their speed and precision, resulting in a large increase in output without sacrificing quality. It isn't only about hardware, such as replacing a human worker with a robot. It's also done with the help of software. Consider supply chain management software that automates the planning of numerous events and experiences without requiring human intervention.

When many of these technologies are utilised together, their application and usability improves. AI can be used to produce more intelligent automation platforms, just as it can be used to construct improved robotics. Rather than doing rote or simplistic activities, they can be designed to react and participate based on a variety of factors. A drop in product demand, for example, could cause the system to slow output. It could also switch to a different component or ingredient if there is a scarcity someplace.

Automation technologies can be game-changing with the correct controls and assistance. With the world's population growing and needs increasing year after year, food manufacturers will search for any means to streamline operations and increase output, and automation will be a top choice.

### The Use of Digital Twins

In the food manufacturing industry, digital twins are essentially simulated copies or virtual representations of actual systems. That terminology may be perplexing, but consider it a clone that can be altered for testing and analytics. In other words, it is an exact replica of the original system and information, albeit one that is more versatile and less vulnerable. It enables manufacturers and distributors to run simulations by inputting specific data into the system in order to find patterns, recognise outcomes, and so on.

Digital twins in food manufacturing will make their way into product development, testing, post-production, distribution, and practically every other aspect of the business as the systems and controls that support it grow smarter and more computerised. It will become a necessary component for not only understanding what is going on in the market but also keeping up with the supply and demand ebb and flow.

### The blockchain technology

People had been considerably more careful about the foods they ate even before the outbreak. They want to know where their products came from and if they were sourced in a safe, healthy, and environmentally sustainable manner. The issue with such requests is that there haven't been many alternatives for improved visibility within the food supply chain until recently.

Growing health concerns are now a top focus, and awareness is critical. Blockchain technology is the solution, since it provides consumers with the visibility, efficiency, controls, and collaboration that they desire.

Someone might trace a head of lettuce back to its seedling with this food manufacturing technology in place. They can see who grew the plants, where they were grown, and how

the crop was matured. Then they can track it all the way to the retail shelf (Li X and Farid 2016).

How is this even possible? It's all due to technological advancements. Blockchain is a digital ledger, or a comprehensive and digitised record of a certain data collection, in its most basic form. The data is entered into a block, and as more is entered, it is tacked on to the end of that block, resulting in a long, linked record. The word blockchain comes from the fact that every piece of data is visible across the entire chain.

Walmart is employing the technology to monitor the spread of foodborne illness outbreaks. It enables them to not only locate the source, but also the various branches involved, such as where things were sent and who purchased them.

### The Future of Food Manufacturing Technology

While each of the food production technologies mentioned here is highly influential and will have a significant impact on the industry's future, they are far from the only ones making waves. Here are some further examples:

- Drones and self-driving delivery vehicles
- Edible 3-D printing
- Smart or precision agriculture
- High-tech packaging
- Waste disposal and recycling that is more efficient

The lesson is that technology is greatly enhancing the operational efficiency of the food supply chain, from farmers and manufacturers to retail establishments that sell products. There is no right or wrong way to invest in these technologies because they may all be utilised to streamline different processes. The most difficult part will be determining which systems to modernise first, particularly when it comes to providing high-quality, fresh goods on time.

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