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DIGITALIZATION IN THE FOOD INDUSTRY SYSTEM

The food and beverage industry is undergoing a digital transformation. From large corporations to smaller, more agile brands, companies are using digital technology to collect more data about their workflows and ensure safety and quality in food processing, packaging and distribution. They use this information to transform their production systems and rethink how employees, processes and assets work in a new environment.

Data is at the heart of this digital revolution. Manufacturers use smart sensors to understand how their equipment is performing, and they collect data in real time to monitor energy consumption and evaluate the performance of products and services. These data points help manufacturers optimize production by providing and improving food safety control.

During the pandemic, the food industry has been challenged more than ever, from rising demand to disruptions in supply chains. This disruption has led to a full-scale digital transformation of the food industry. Faced with challenges on all fronts, food companies have stepped up their digital transformation efforts. These efforts are focused on streamlining processes, maximizing efficiency and increasing supply chain resilience. The goal is to overcome the challenges caused by the pandemic and prepare for new opportunities. This article explores the overall impact of digital transformation on the food and beverage sector and its contribution in ensuring the safety and quality of food products. [1]

Digitization is addressing many challenges in the food and beverage sector, from providing food products that meet tight schedules, to the desire for greater traceability along the supply chain, to the need for real-time information on process control at remote facilities and for goods in transit.

Digital transformation is at the heart of everything from maintaining food safety and quality to producing the vast quantities of food needed to feed the world's population. The digitization of the food and beverage sector includes the application of technologies such as smart sensors, cloud computing and remote monitoring.

In the past few years, consumer demand for healthy and hygienic food and beverages has grown exponentially. Various manufacturers are optimizing their services for consumers and business partners to stand out in the evolving industry. Tech companies are developing AI-powered machines to detect anomalies in food, that comes from farms. In addition, the growing number of plant-based consumers are looking for a high level of sustainability from the production to the shipment cycle. This level of sustainability is only possible thanks to advances in digitalization.

Food and beverage manufacturers are using automation and modern manufacturing technologies to optimize their production, packaging and delivery

systems. The following sections discuss recent technological developments and their impact.

One of the biggest challenges among food and beverage manufacturers is maintaining product temperatures from farm to fork to ensure that the product is safe to eat and maintain its quality. According to the US Centers for Disease Control and Prevention (CDC), in the US alone, 48 million people suffer from foodborne illness each year, and approximately 3,000 people die from foodborne illness. These statistics show that food manufacturers have no margin for error. [2]

To ensure a safe temperature, manufacturers use digital temperature monitoring systems that automatically record and manage data throughout the production lifecycle. Food technology companies use Bluetooth low energy devices as part of their safe and intelligent cold chain and construction solutions.

These proven Bluetooth temperature monitoring solutions can read data without opening the cargo package, providing delivery drivers and recipients with proof of destination status. The new data loggers accelerate product release by providing intuitive mobile apps for hands-free monitoring and control, clear alarm data and seamless synchronization with the recording system.

Seamless one-touch data synchronization with the recording system means the courier and recipient avoid managing multiple cloud logins. Secure reports can be easily shared via apps.

Innovations in robotics technology have enabled the automation of food processing, which improves the overall quality of the final product by preventing food contamination during production. Recent studies have shown that approximately 94 percent of food packaging companies already use robotics technology, while one-third of companies , engaged in the food industry, uses this technology. [3]

One of the most notable innovations in robotics technology is the introduction of gripping robots. The use of gripping technology has simplified the processing and packaging of food and beverages, as well as reduced the risk of contamination (with proper sanitation).

Leading robotics companies produce large grippers to facilitate more efficient automation of the food industry. These modern grippers are usually made in one piece, simple and durable. Their contact surfaces are made of materials approved for direct contact with food products. Vacuum-type gripper robots are capable of handling fresh, unpackaged and delicate products without the risk of contamination or damage to the product.

Robots are also finding their place in the food industry. In some segments, robots are used for automated cooking and baking. For example, robots can be used to bake pizzas without human intervention. Pizza startups are developing a robotic, automated, contactless pizza machine that can make a completely baked pizza in five minutes. These robotic machines are part of a "food truck" concept that can consistently deliver large quantities of fresh gourmet pizza faster than a conventional counterpart. [4]

Digital sensors have become extremely popular due to their ability to monitor the accuracy of automated processes and improve overall transparency. They monitor the food production process from production to distribution, thereby improving supply

chain visibility. Digital sensors help ensure that food products and raw materials are consistently stored in optimal conditions and do not end before they reach the customer.

There is a large-scale implementation of food labeling systems to monitor the freshness of products. These smart labels contain smart sensors that show the current temperature of each item and its compliance with storage requirements. This allows manufacturers, distributors and customers to see the freshness of a particular product in real time and receive accurate information about its actual expiration date. In the near future, smart containers will be able to self-assess and regulate their own temperature to stay within established food safety guidelines, helping to ensure food safety and reduce food waste. [5]

Digitization of the food and beverage industry is gaining momentum and will not slow down anytime soon. Automation improvements and optimized digital solutions have the potential to have a significant positive impact on the global food value chain by helping businesses stay compliant. The world needs greater safety and sustainability both in production and in consumption, and the progress of digital technologies will help.

References

1. Tkachuk G.O. The concept of safety of transformative transformations at food enterprises of industry // Information society: technological, economic and technical aspects of development (issue 43): materials of the international scientific internet conference on November 14, 2019. URL: <http://www.konferenciaonline.org.ua/arhiv-konferenciy/arhiv-konferenciy14-11-2019>
2. Castells M. The Rise of the Network Society, The Information Age: Economy, Society and Culture, Vol. I. / Castells M. Cambridge, MA; Oxford, UK: Blackwell (second edition, 2000). 306 p.
3. Irtysheva, I., Stehnei, M., Popadynets, N., Bogatyrev, K., Boiko, Ye., Kramarenko, I., Senkevich, O., Hryshyna, N., Kozak, I., Ishchenko, O. (2021). «The effect of digital technology development on economic growth». International Journal of Data and Network Science. no. 5, pp. 25-36.
4. Irtysheva, I., Stehnei, M., Popadynets, N., Danylo, S., Rogatina, L., Bogatyrev, K., Boiko, Ye., Hryshyna, N., Ishchenko, O., Voit, O. (2020). «Business process management in the food industry under the conditions of economic transformations». Management Science Letters: journal. vol. 10, pp. 3243-3252.
5. Statystychnyj zbirnyk «Sil's'ke hospodarstvo Ukrainy-2022». (2023). [Statistical collection «Agriculture of Ukraine-2022»]. In Prokopenko O. (ed.). Kyiv. Ukraine.