

INNOVATIVE TECHNOLOGIES IN CREATING HEALTHY FOODS

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ABSTRACT: *FOOD TECHNOLOGY PROVIDES SKILLS IN THE PRODUCTION, PROCESSING, REFINING, PRESERVATION, STORAGE AND DISTRIBUTION OF FOOD. THE FOOD SYSTEM ITSELF NEEDS TO BECOME MORE INNOVATIVE AND MORE EFFICIENT. FOOD TECHNOLOGIES RESPOND TO CHALLENGES SUCH AS: REDUCING MORBIDITY AND MORTALITY, AS WELL AS FOOD AND ENVIRONMENTAL SECURITY. SPECTACULAR RECENT DISCOVERIES IN THE FIELD OF BIOENERGY, BIOREMEDIATION, GENOMICS, BIOINFORMATICS HAVE MADE BIOTECHNOLOGY THE KEY TO SOLVING SOME OF THE MAJOR PROBLEMS FACING HUMANITY, AS WELL AS AN ECONOMIC VECTOR THAT WILL MAKE ITS MARK ON FUTURE DEVELOPMENT MODELS. .*

KEYWORDS: *FOOD TECHNOLOGIES, INNOVATION, BIOTECHNOLOGY, FOOD SECURITY, SUSTAINABLE DEVELOPMENT.*

Introduction

The human body's immune system is the first line of defense against pathogens and attacks from the outside world, fighting bacteria, viruses and parasites. But in order to function well, the immune system needs different micronutrients that are often lacking due to diets or certain disorders. To address these deficiencies, vitamin / mineral supplementation and dietary supplements may be required⁷.

Today there is a growing demand for herbal foods. There is a shift from traditional cuisine to the emergence of increasingly innovative start-ups in the field of food technology. More and

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⁷ Food supplements are concentrated sources of nutrients, ie vitamins and minerals, substances for nutritional or physiological purposes or plants and herbal preparations that aim to compensate for deficiencies in a person's regular diet.

more advanced biotechnology research creates the premises for an agri-food revolution. Food technologies are playing an increasing role in achieving healthy foods. Also, the production of various food supplements to strengthen people's immunity is closely linked to new food technologies⁸.

On the other hand, food packaging must keep pace with new foods, and the role of food technologies is crucial.

The public is better informed and its demands are growing. More environmentally friendly solutions are needed to reduce materials that have a negative impact on human health.

This demand is reflected even in the recently adopted European legislation. The only option is to find greener solutions for this sector. Biotechnology experts use their knowledge to create healthier products. Their objective is to integrate new technologies in the realization of ecological products, with the role of disease prevention and health strengthening. Thus, the new technology of structuring fats to reduce the content of saturated fatty acids and caloric content does not compromise the texture of the final product. To this end, Omega-3 fatty acid-rich cell-based fats have now been created that are not intended for consumption as such, but are added to other foods, such as laboratory-made meat, to improve flavor and texture. .

By 2050, there are expected to be 10 billion people on the planet. If we take these predictions into account, there will not be enough food for everyone. Food technologies are also a viable solution for the expected food crisis.

The example of creating new types of vegetable meat, superior to traditional meat, is a great challenge for specialists. Thus Heura⁹ vegetable meat requires 94% less water than the same amount of veal. While 1 kg of beef requires 20 kg of cereals, the same amount of Heura meat needs only 0.5 kg of soy.

The advent of the 3D printer that prepares food is no longer a novelty. Such a printer can prepare a complete dish, such as pizza or pasta, or it can be used to create complex patterns on cakes or on a plate.

Technological innovations in food will be based on smart business or industry 4.0, food security and sustainable development.

Homicide technologies in the field of food

Homicidal technologies will be increasingly present in the field of food and health, due to the benefits and differentiation they can bring to the industry¹⁰.

The contribution of this research will lead to the creation of personalized diets that promote physical and mental health for everyone. In a society where consumers are increasingly aware of the importance of health and demand functional foods, proteomics will play an increasing role. It

⁸ Mihaela Păunescu, Technologies and installations in the food industry, Marix Rom Publishing House, Bucharest, 2009

⁹ <https://www.heurafoods.com/>

¹⁰ Homicidal technologies are high-throughput techniques that allow the study of a large number of components in the analytical results of a sample. These include research areas such as genomics, transcriptomics, proteomics or metabolomics.

focuses on the intense study of proteins: their structure, function and diversity. At this stage, to reduce the pressure that currently exists on certain sources of animal origin. there is a growing emphasis on the search for new sustainable sources of protein that meet different consumer profiles, such as vegans or vegetarians.

There are many applications in the food sector, such as: for the design of new products with added functional ingredients; or for the study of the protein richness of protein-rich products that appear on the market, such as those incorporating insects, microalgae or wood, among others.¹¹

For a consumer increasingly concerned about product safety, the search for systems that guarantee safety and quality standards on all links in the chain is accelerated.

Added to this is the need for transparency that provides consumers with accurate information about the product and its origin.

Cognitive technologies, ie technologies that work with data such as artificial intelligence or machine learning, provide comprehensive and integrated support to the problems of the food industry.

Food safety / Food security

Ensuring food security means ensuring that food is available where it is needed¹².

Food security refers to the availability and access to food. A household is considered safe in terms of food when its occupants are adequately fed and not afraid of hunger. The World Food Summit (FAO) defined:

"Food security exists when all human beings have, at all times, physical and economic access to sufficient, safe and nutritious food to enable them [...] to lead a healthy and active life."

The food security study includes the entire food chain, from production to marketing and consumption.

In order to capitalize on science and technology for the various components of food security, the food system itself needs to become more innovative.

There are already fast and reliable methods that allow early detection and even prediction of hazards that compromise the quality and safety of a food. In this area the technological solution is multimodal combined inspection because it is able to anticipate and prevent various hazards due to the combination of different technologies.

The technologies are used in synergy and provide a more complete picture of food inspection, which will allow food companies to anticipate risks, save money (from waste) and protect the consumer¹³.

¹¹ Balc, G., Sugar, I., Radu, Gaspar, F., *Machines and installations for the food industry*, Vol. II, RISOPRINT Publishing House, Cluj-Napoca, 2016

¹² <https://www.oecd.org>

¹³ P. Cârlescu, *Processes and operations in the food industry*, vol. I, PIM Publishing House, Iași, 2018

Convergence of emerging technologies

The convergence of several emerging technologies, such as synthetic biology, artificial intelligence, tissue engineering, 3D printing, drones and robotics, can have a profound impact on the future of food production and food security. Many of these applications are currently in the research and development or demonstration stage in developed countries. However, these technologies could change the future of food production, either individually or in converged applications.

Once biology has become an information technology, it is possible to develop certain foods outside the conventional model of making animal products in the laboratory. Some companies make meat products and cheeses directly from plants, while some researchers rely on advances in tissue engineering to print meat in three dimensions. Laboratory meat uses less soil and water and could emit less greenhouse gases. However, if these advances reach an industrial scale, they could have consequences for agricultural production from animals in developing countries.

Big data and the Internet of Things, drones and artificial intelligence can be an important stimulus for precision agriculture, which requires fewer agrochemicals for existing agricultural processes. Some companies use an innovative method of genetic sequencing, along with machine learning, to detect soil quality and help improve crop quality¹⁴.

Robots are increasingly automating agricultural work through ecological and economic control of invasive plants on crops.

Beyond rural areas, Big Data and the Internet of Things allow for urban agriculture, inland agriculture and vertical agriculture, which in some cases can improve agricultural productivity and reduce water waste at the same time. With minimal or negligible requirements for pesticides, herbicides and fertilizers. A number of these technologies (sensors, artificial intelligence, imaging and robotics) can be combined to allow precision automatic cultivation. The potential effects of these converged technologies are still poorly understood, hence the need for effective mechanisms to evaluate them.

The growing technological convergence and the destabilizing nature of new, current and future technologies indicate the need for a global initiative capable of systematically bringing together experts from different disciplines to discuss food technologies and their potential consequences for society, the economy and the environment. This global initiative should ideally carry out prospective technological assessments and analyzes in order to estimate the immediate and long-term consequences of new technologies for food security.

¹⁴ K.B., Simpson, et al. *Food Biochemistry and Food Processing*, Wiley-Blackwell Publisher, 2012

Conclusions

Starting from the use value of the products to be obtained, the technology is studied in correlation with the level of quality that must be ensured for the finished products, taking into account the economic considerations and the social impact. Therefore, simultaneously with the evolution of the company, it was necessary to optimize the production processes in order to ensure and improve the total quality of the products. Thus, new technologies have emerged, with a lower and lower degree of pollution, which require lower energy consumption.

The main conclusions that emerge are the following:

- Promoting a culture of exchange for not only success stories and best practices, but also major failures and challenges in general, and food technology innovations in particular;
- Creating networks comprising academic structures, research institutions and think tanks that carry out development and innovation activities in the field of food technologies;
- Explore ways to conduct international activities for the evaluation and prospective analysis of current, new and future technologies and their implications for food security.
- Recent and future technologies, including synthetic biology, artificial intelligence and tissue engineering, may have implications for the future of food. Unlocking the potential of these technologies for food security requires investment in research and development, human capital, infrastructure and knowledge exchange.

A crucial next step in creating a healthier and more sustainable food system is to build innovative system-wide approaches that strengthen industry and community efforts, improve individual behavior and align food policies with new health requirements.

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