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Gastronomy Four Zero (4.0)

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Abstract: With advancing and changing technology in the world, many progress has been achieved in many areas, a progress which is known as industry 4.0, in which the Internet and communication are involved. In addition to the benefits of technology, it also affects the sustainability of many reasons, such as the limitations of natural resources, population growth, ecologically produced waste, cost and the inability of people to keep up with technology. The sustainability of local products necessitated the promotion of gastronomic sustainability. In our work, this fast change from the gastronomic point of view is taking place from 1 to 4.
Keywords: Gastronomy, Food, Technology, Innovation, Four Zero

INTRODUCTION

Lately, globalization and technological developments have been at the forefront of the increasingly impacted world. These issues are very important to build and develop the future. One of the most important issues in technological developments is developing digital technology. Digital technologies; affecting the formation of new business models and the ability to operate information, data, machines, people and organizations together in a harmonious manner and providing accurate information on what is called "big data" by providing an aid both at the effective and strategic level in the decision-making process [1]. In this process, where technological developments are effective, the world becomes increasingly smaller for people. By means of these developments and globalization, the brands, products and methods have been transformed from a local dimension into a global dimension that everyone can reach [2]. This globalization and technological developments have also been influential in the field of gastronomy. Social expectations are being met with the influence of technological developments in the production stages of food. Local delicacies and local recipes have become a position that everyone can reach with the influence of technological developments.

Scientific and technological developments play a role in creating food and beverage production that responds to the demands of the global marketplace in a more effective, better harmonized, reliable, sustainable way to meet consumer demands. In this context, we have been involved in the process of adjusting the gastronomy to technology.

GASTRONOMY

The technological, social, cultural, economic, artistic, intellectual accumulation that human beings have brought to the fruit by giving labor for thousands of years; nutrition has also affected the eating experience as an aesthetic value beyond being a physical necessity. In other words, food can be used today in all areas of life as a physiological need, a cultural phenomenon, a commercial product, an aesthetic value, a social expression and communication tool [4]. Significant changes and radical transformations have occurred in the historical journey of the meal. The changes in technological, social, cultural, political, philosophical and artistic fields in this period influenced both food and cuisine, contributing to the continuous development [4].

"Cooking" was seen as a revolution, started with the discovery of the effect on the food of fire and played a major role in the unity of the communities. Cooked meals were influenced by migrations, commercial relations and cultures; It has increased its power by adding healthy nutrition to its social

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attractiveness, ensuring the formation of cuisines and cultures [5,6]. Thus, new trends have emerged (Haute Cuisine, Nouvelle Cuisine, Avant-garde, New Global Kitchen, Molecular Kitchen, Nbn Kitchen, Digital Kitchen).

"Avant-garde current" is a trend in which developments in technology, communication, and transportation are influential in the process of universalizing kitchens that break free of the obligation of the chefs to comply with the strict rules of classical cuisine. The emergence of different currents promotes the universalization of culinary cultures and facilitates the accessibility of information and materials [6,7]. The national boundaries, geographical and cultural distances have been abolished in the culinary trends of the multicultural kitchens, and methods, materials, cooking techniques and taste from every part of the world have been gathered in a kitchen and a dish [7].

It is vital not only to cultivate and eat (Gastronomy) together with developing technologies, but to eat healthy, to reach safe food according to population growth and economic characteristics. Manufacturers are finding it difficult to find qualified personnel in terms of increased cost, product diversity, accuracy and reliability. By eliminating this difficulty, the use of methods to support the production-consumption network such as automation systems, robots and social media has become widespread [8, 9]. The use of intelligent nets, which are interdependent, has thus become widespread, and many gastronomic products including bread have begun to change (Figure 1).

Figure 1. Changes in bread technology

DIGITAL GASTRONOMY

Digital technologies; affecting the formation of new business models and the ability to work in a harmonious manner with information, data, machines, people and organizations by providing assistance both at the active and the strategic level in the continuous decision-making process and affecting the correct operation of the information called "large data" [10]. In this process, where technology develops, the world becomes a smaller living space for people. By means of these developments and globalization, the brands, products and methods have been transformed from a local dimension into a global dimension that everyone can reach [11]. These globalization and technological developments have also been influential in food and gastronomy (Figure 2). Local delicacies and local recipes have become a position that everyone can reach with the influence of technological developments.

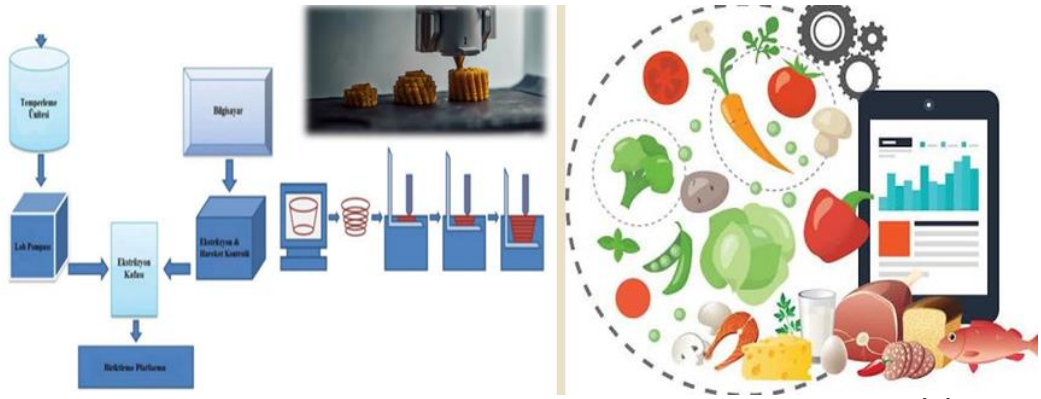

Figure 2. *Digital food and printing, gastronomic communication* [12]

Scientific and technological developments play a role in providing food and beverage production that responds to the demands of the global market with more efficient, better harmonized, more reliable, more sustainable production processes of the consumer's wishes [3]. Today, restaurants have made various innovations in the services they provide by using science and technology in order to make eating and drinking experience unique and extraordinary. These innovations are e-menus and edible menus besides the thematic dinners that make restaurants feel like they are in the same place in different places, to create a multi atmosphere through technology, to create a new atmosphere by combining reality with virtual images, to serve all the senses. For example, using edible paper, some operators are offering gastronomic food-based plates, so the theme becomes interesting and the food and beverage sector is entering a growing customer potential expectation [14-16]. Clients who choose e-menus according to their features and prices, offered in virtual tale with virtual reality, can watch the kitchen image during the preparation of the order without the need of the waiter, change the appearance of the table if they want and play the games on the table [17-20].

The "Industry 4.0", which is expressed in various words like "Digital Transformation", "Digitalizing Industry", "Fourth Industry Evolution", has affected the sectors of our country's economy as well as the whole world [21]. The change in gastronomy is mainly due to the innovations in food and industry. The food industry not only serves as a kitchen, but also affects people in an environmental, social and economic sense. The most relevant digital applications with respect to the issue in industry 4.0 can be described as follows [3,21, 22].

- Internet for Everything (IOT) and Cloud systems
- Additional Production and 3D printing
- Industrial Large Data
- Prefetching technologies (Increased Reality / Virtual reality / Computer vision)
- Automation and Intelligent Robots
- Cyber security

HUMAN-ROBOT COOPERATION AND 3D WRITERS IN GASTRONOMY

Significant developments have been made in human-robot cooperation, one of the decisive principles of Industry 4.0. Besides having the skills that people can not copy by machines, robots have life-enhancing effects. Nowadays, in many new applications besides unmanned - dark intelligent factories, man and machine work hand in hand in Human - robot cooperation.In the simplest case, whipping a cake is used in general kitchen appliances, the mixers are now using technology to produce easier, quicker and more continuous production of products using larger mixer units. Human production; control and follow-up work, the robots do physically tiresome and wrist-based work, so hand-arm vibrations are reduced. Thus, both contribute to their own special abilities [21]. It is known that we will have more life together with the Industrial 4.0 revolution in a wide range of robots, from the industrial sector to the kitchen space and personal use [23].

Cooking is one of the important actions in our lives, and many applications are designed to be a skilled robot chef who can follow product prescriptions, both in the home environment and in the industrial environment. For example; cookie-baking robots can place materials, mix them in the right

order, and pour the prepared mixture into the furnace tray. Equipped with library knowledge, these robots can perform basic tasks such as collecting, placing or pouring an object and work that can be done daily. These robots are effective in saving time [24]. A study on "The Future of Employment" [23, 24] Robotics and digitization In the first place, the restaurant-café waiters were among the most suitable for computerization [25].

In the gastronomy sector, food stamps designed with 3D printers, production presses are being made with raw materials. The predominantly unacceptable 3D culinary art print is presented to consumers with the use of products tailored to individual needs and preferences [25]. With the aid of computers, 3D printer materials, which are called " FOODINI ", are laid down to prepare a lot of food, which is sold as ready-to-eat food, to make it easier and quicker with fresh materials [23].

Unlike these robotic technolo- gies, food printing; It combines 3D printing (3DP) and digital gastronomy techniques to produce food items with customization such as image, color, flavor, texture and nutritional value. 3DP is designed as a digitally controlled construction process that creates a layer of complex solid form in layers and applies staged passes or chemical reactions to bring the layers together (Figure 2). Digital gastronomy is the application of food cooking process knowledge to food production; in this way our eating experiences extend beyond taste to include all aspects of gastronomy [26]. The combination of 3DP and digital gastronomy techniques can digitally visualize everything related to food, thus creating a new field for new food production. Ultimately, with a customized food design in the form of a digital 3D model, the plates will be transformed into a product and will be seen as a gastronomic element [27].

EFFECTS OF 3D PRINTERS

In terms of gastronomy 3D printers require food production first. For this, foodstuffs which are solid, semi-solid or in powder form are used. Once information is entered into the computer environment, the food is divided into categories to know the print; naturally printable materials, non-printable traditional foodstuffs and alternative materials. Various foods are produced using sugar, liquid chocolate, cheese, cream, pasta dough and pasta (Figure 3-6). But 3D prints can not print vegetable and fruit group foods rich in protein-rich meat and vitamins [28]. To counter this problem, edible insect species are mixed with the desired product in powder or liquid form and supported production [28].

Figure 3. The first full meal that can be fully printed by the 3D printer [29]

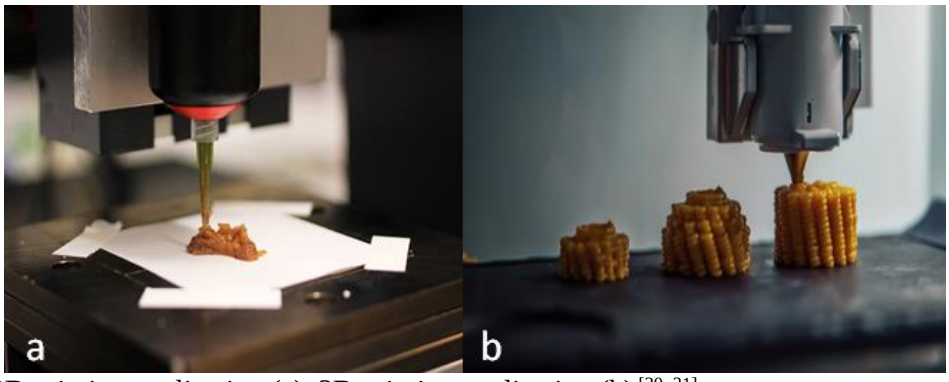

Figure 4. 3D printing application (a), 3D printing application (b) [30, 31]

Figure 5. 3D printing chocolate and confectionery (a), Hamburger (b) [32, 33]

Figure 6. Plate prepared in the first 3D restaurant opened in London [34]

Foods shaped in the kitchen with computers and printers have a complex structure the convenience of the production of gastronomy has changed the way of digitalization and 3D system.In addition, different tissues easily come together to reduce the production period of custom-designed products (birthday cake [36]) and the possibility of obtaining the same product, namely the increase in standardization, affects the views of the operators in this area positively. Thus, the application of standard prescriptions is facilitated. In the future, foods produced from 3D printers will also be involved in healthy food production, and it is thought to be useful for diets that require special nutrition (diabetes, celiac, etc.). Also, with this technology it is thought that it is possible to transform the food components into a new product without harming the food, considering the nutritional type and the customer is thought to be easier and quicker to serve [24,35]. Many companies introduced food cartridges in customized concepts with 3D printers [24, 37, 38]. The concept of digital gastronomy was presented by the Massachusetts Institute of Technology (MIT) with its design and challenges [39]. Along with all these

positive features, the difficulties and reliability problems suggest the sustainability of the currently developing technology in gastronomy. For this, it is necessary to understand the consumption and application potential in the market [24]. The system, which is also considered as an influence system:

- Customized food design (shape, taste and color)
- Personalized nutrition (individual, diet, health, body type)
- Simplification of the food supply chain (short time, reasonable price and easy transport)
- Reshaping of processing technologies (shaping, baking, etc.)
- Process design and digitization (Food data, computer data base, handbook and theoretical calculations)
- Microencapsulation / nanocapsulation for state-of-the-art in-house design
- Chemical image for quality control and food safety
- New biological methods for food safety etc. methods are thought to be able to contribute to gastronomy and cuisine by developing interactions between processes [24, 40].

GASTRONOMY AND SOCIAL MEDIA

In our daily life, everyone became social media users, becoming a sign of food and beverage culture as well as providing communication between individuals and individuals. Businesses are pushing this area with various digital elements in order to attract consumers to this area, not being able to reach customers with traditional marketing communication methods; new markets are created in virtual environments such as the Internet, online or social media, advertisements, visual shows [41]. The use of gastronomic social media has become a daily trend for people to browse, thousands of pages like recipes, blogs, and even bloggers that add fame to their reputation. The best examples are facebook and Instagram cooking pages, YouTube channels, programs and competitions on television.

Previously, the notebooks on which the recipes were written one by one have now moved their place to this digitalization. Thus, different kitchens, different baking and presentation techniques and many tariffs are spreading to people in a short time [41]. Of course, non-social non-social smartphones reach out to consumers through enriched applications on the web, including nutritional recommendations, food traceability, procurement support, and wasted efforts.

RESULT

Despite the fact that there is a simple to confusing path in the field of gastronomy which is trying to keep pace with technological progress, people still accept the process. People, like the slow food movement that is against the fast food trend, have an instinctive approach to protecting natural and local products. However, in the case of technological products, the taste of regional / traditional products is not sufficient for the absence of the touch, which changes our point of view towards technology. For example, it can be said that the bread made with sour fermented bread is not only seen as a show only with 3D printer but as a show, it does not keep the handmade of tulumban made with routine machines which are perceived as traditional taste.So although the transition from one to four in the food industry provides cultural interaction and convenience, as a phenomenon that needs to be developed in terms of applicability and universality, sustainability and acceptability. The process should be developed and the design and manufacturing must be proven by models that are appropriate, reasonable and nutritional enriched. The system should be transformed into a cultural piece. Although there are a large number of food press technologies available today, it seems to be a long way to further develop them for commercial use. The versatility of domestic cooking or catering on the gastronomic journey includes food, sanitary-industry-digital environments to provide consumers with high quality, freshly prepared food items, personalized nutrition, and new flavors, tissues and shapes for users to create entirely new dining experiences.

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