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TECHNOLOGICAL TRANSFORMATIONS IN RESTAURANT ACTIVITY THROUGH ARTIFICIAL INTELLIGENCE (AI), LEADING TO COMPETITIVENESS

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Abstract. The article is focused on modern restaurant activity (RA), which relies on innovative technologies and their implementation in production processes through the transformation of production capacities and detailed reengineering of the restaurant product (Polimenov, 2014, pp. 76 – 100). The detailing is to enter the restaurant product and restaurant service through digital transformation with artificial intelligence (AI) and to proceed with the transformation of processes and technologies to achieve higher quality. The possibilities of flexible restaurant activity (RA) are not only to create conditions for the transformation and implementation of innovative techniques and technologies, but also to offer a model (Asuzo et al., 2024) with artificial intelligence (AI) as a guide for the tourism industry towards digital technological transformation (DTT). The specificity of the work of artificial intelligence (AI) is not only to be able to analyze and correctly combine technological processes and transformation flows, but also to preserve the organoleptic (enzyme) qualities of products in culinary production, and to monitor compliance with the standards (Zoran et al., 2021) for a healthy diet. The goals set for artificial intelligence (AI) in the restaurant industry are not only to transform the restaurant business model, but also to implement innovative technological solutions related primarily to reducing costs and increasing efficiency.

Keywords: artificial intelligence (AI); technology; transformation; sensors; competitiveness; restaurant business; organoleptics; healthiness

Introduction

The transformative development of artificial intelligence (AI) in the restaurant industry (RA) is tied to "strategic planning, investment, market share, and net profit," expressed as a percentage of sales, which are directly dependent on quality (Gonzales, 2023). The capabilities of artificial intelligence (AI) in controlling

the quality of the restaurant product are a function of the quality of organoleptic culinary production and service technology and will create an opportunity to adapt to different directions and in niche tourism (Dimitrova, 2019; 2023a; 2025). The aspiration of artificial intelligence (AI) is for a high-quality restaurant product (RP) with full synchronization of all production elements capable of working as a whole. It is important for restaurateurs to understand which factors are essential to transform into a production process and lead to an increase or decrease in the quality of the restaurant product (RP). And how the innovative investments made through artificial intelligence (AI), lead to an improvement or deterioration in the quality of the restaurant product, and how long it will take to recover the costs incurred. Transformative factors through artificial intelligence (AI), which improve the quality of the restaurant product and lead to higher quality/additional revenue, do not always apply to different restaurant products and are related to transformations made in the individual phases of production.

The restaurant industry (RI), like all other industries, is one in which competitive advantage is gained or lost. (Dimitrova 2023; 2025a). As a result of the competitive struggle between two or more homogeneous restaurant products (RP), the market, represented by tourists, prefers the one (Kovalenko et al., 2023), which better serves and satisfies their needs (Dimitrova, 2017; 2018). Artificial intelligence (AI) will predict the economic competitive advantage as a set of costs for the production of restaurant production (RP), which, expressed in monetary form, determine its cost price. This advantage is achieved through artificial intelligence (AI) with analysis and optimization of the volume and structure of the produced culinary production, improving the use of technological resources, increasing labor productivity, improving the system of internal company planning and labor remuneration.

Methods

Training artificial intelligence (AI) to understand the rules, indicators, and requirements, as well as work methods and their skilful application, leads to an increase in quality. Combining factors in culinary processing, norms, rules and skills leads to the provision of quality restaurant culinary products (RCP). Knowledge of these methods is both a prerequisite and an opportunity for accurate assessment, and hence for strengthening or reducing the effects of their action. The complex of requirements in the restaurant industry is specified by regulations, rules, norms and criteria. If we summarize the above characteristics, we can conclude that the quality of each individual restaurant product (RP) is affected by a complex of methods that are important for customer satisfaction.

As a result of the transformation of the restaurant market (Buhalis, 2022), artificial intelligence will transform the products offered in restaurants, with different assortments across fast-food restaurants, pizzerias, Italian cuisine, etc. The technological digital transformation, with the increase in the restaurant material

base, is present and, through artificial intelligence (AI), will enter a higher quality offer of food and beverages, as in catering and entertainment establishments. The prospects for artificial intelligence (AI) are in the lost market share of individual product catering establishments and in the insufficient effective use of the main competitive advantages of the restaurant product in a collision with other similar products. It follows that innovative methods of artificial intelligence (AI) related to competitive advantage should be implemented and are a prospect. As a result of the competitive struggle, artificial intelligence (AI) will oppose two or more homogeneous restaurant products and their culinary production, and the market, represented by the mass of consumers, will prefer the one of higher quality and better satisfaction of its needs. Innovations from artificial intelligence (AI) should not only take into account the advantages of the introduced technology and service, but should also take into account the costs and benefits of the technology (preservation of the nutritional value of raw materials during processing and the organoleptic characteristics of culinary products), and customer reactions to the procedural changes accompanying the innovations. A technology that reduces consumer satisfaction and is not useful, no matter how profitable it is through artificial intelligence (AI) and how much it has reduced production costs, should not be consumed and does not lead to prospects.

Results

Analysis of restaurant operations (RA) by artificial intelligence (AI) is a continuous process and is a key element for improving the quality of the restaurant product (RP) (Polimenov, 2019; 2024). Everything is aimed at the set company goals, the company strategy with maintaining high quality and competitiveness of the restaurant product (RP). Techniques, organizational processes and work methods are under constant control and digital technological transformation (DTT), in order to meet the needs of the consumer. Both technological processes in the culinary production block (CPB) and service technology (ST) are subject to analysis and control. Research and development (R&D) on artificial intelligence (AI) in the global food and beverage market is estimated at 8.45 billion US dollars in 2023 and is expected to grow to 84.75 billion US dollars (see Fig. 1).

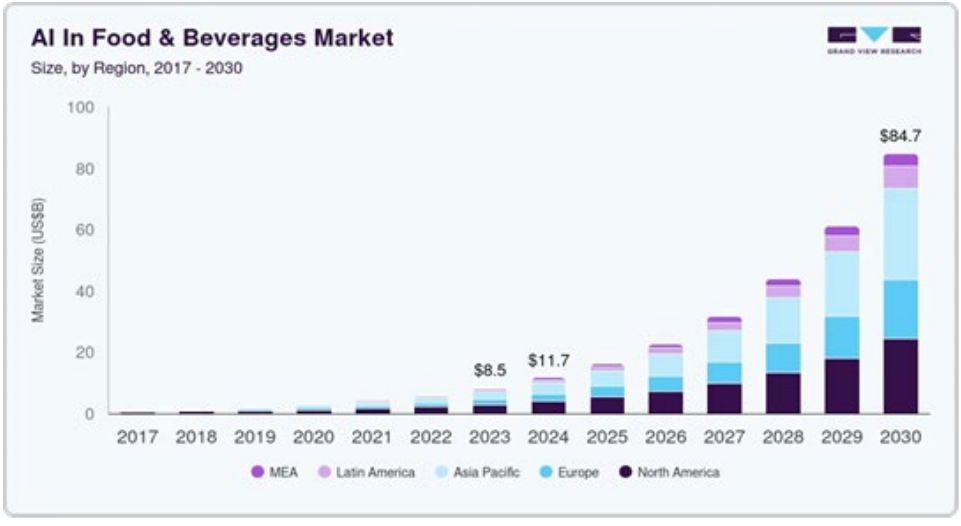


Figure 1. Al In the Food & Beverages Market Size, by Region, 2030 (2030 Projected Market Size: USD 84.75 Billion)
Източник: https://www.grandviewresearch.com/industry-analysis/ai-food-beverages-market-report 2025

By nearly 39.1%, artificial intelligence will sharply increase the efficiency of production processes and reduce errors in the technological process. Reengineering with artificial intelligence (AI) will enable the enrichment of thematic restaurant products and the creation of cutting-edge culinary products directly related to tourists' nationality and organoleptic properties. Artificial intelligence (AI) will monitor the correct use of food products, their hygiene, and significantly reduce waste, and, through blockchain technology, ensure transparency in processes.

The quality management of the restaurant product (RP) is based on the assessments of artificial intelligence (AI) in the reengineering innovation process in the restaurant business (RA), which leads to increased competitiveness. The estimated matrix factors of the production phases by artificial intelligence (AI) and the assessments of the competitiveness of the restaurant product are comparable in terms of quality and price. The obtained coefficients of innovation and the coefficient of competitiveness of the restaurant product (CRP) also determine the coefficient of competitiveness of the restaurant product under the influence of certain innovative factors for a specific restaurant and create conditions for comparability. The conclusions that we can draw from the research are the following:

– artificial intelligence (AI) will implement innovative solutions and factors in production that allow for rapid correction and determination of the competitiveness of the restaurant product;

– artificial intelligence (AI) will improve the quality of the produced culinary products and the service technology through computer vision;

– artificial intelligence (AI) will monitor technological parameters, as a result of which it will adjust the quality and cost of the restaurant product through robotization and automation;

– artificial intelligence (AI) is able to change the potential of the organization of restaurant activities and respond to market demand.

When comparing the results obtained in the study and implementation of artificial intelligence (AI) in different restaurants and the assessment of tourists for the competitiveness of the restaurant product, between two similar restaurant products, it is concluded that restaurant activity (RA) is competitive when applying the innovation model. Of particular importance is the opinion of the consumer, it is also leading when making a decision to proceed with the implementation of artificial intelligence (AI) in the production process.

The trends are through artificial intelligence (AI) to improve the offered culinary product and organization of work in the kitchen block, to improve the service technology and the organization of work in the sales hall, as well as to improve the design, interior and atmosphere in catering and entertainment establishments. The opinion of artificial intelligence (AI) regarding the competitiveness of the restaurant product (CRP) is related to service technology, the safety of culinary production, and quality. Increasingly, artificial intelligence (AI) will inspect the quality of culinary products, detect pathogens, and prevent low-nutritional-value products from entering the culinary production process. Regional international analyses are based on cloud technologies and local analyses and forecasts. Reengineering of artificial intelligence (AI) is aimed at machine learning, computer monitoring, robotics, automation (Tussyadiah, 2020). The Food Safety and Control Report emphasizes the importance of investing in artificial intelligence (AI) not only for operational actions but also for setting criteria for sustainable competitiveness (see Fig. 2).

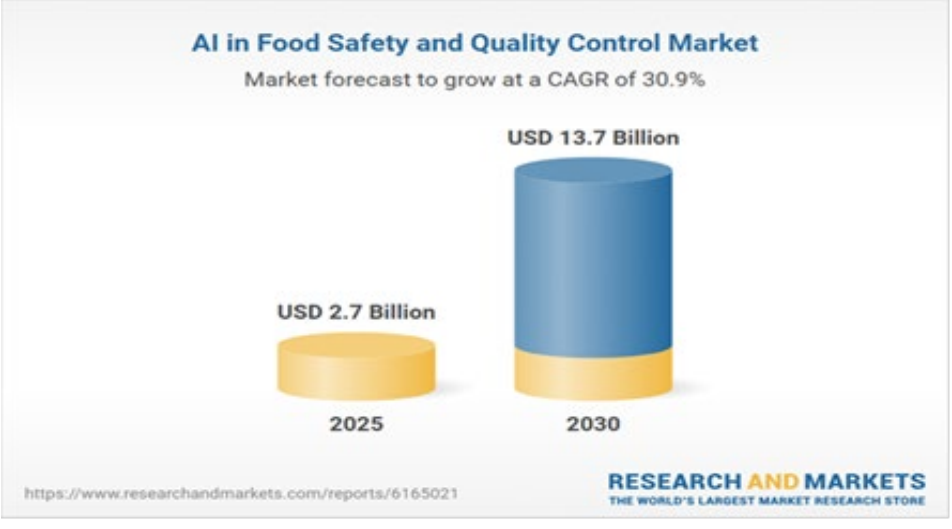


Figure 2. AI in Food Safety and Quality Control Market report has been added to Research And Markets.com's offering
Източник: Dublin, Oct. 01, 2025 (GLOBE NEWSWIRE) https://uk.finance.yahoo.com/news/ai-food-safety-quality-control-103400123.html?guccounter=1

The report comprehensively analyzes artificial intelligence (AI) and its capabilities to monitor food and its safety and, through controlling technology, improve the quality of products offered. Investments in artificial intelligence (AI) for food quality control for 2025 are estimated at 2.7 billion US dollars and are expected to reach 13.7 billion US dollars by 2030. It can be seen that the focus is on the control of operations in service technology, where factor processes must work in a system and be in a consistent relationship to obtain quality service. Technical factor operations can be monitored with artificial intelligence (AI) and a diagram can be drawn up, which is also an effective tool for interlinking processes.

Transforming technological operations through artificial intelligence (AI) will allow the entire service process to be rearranged. This is especially true when offering a high-quality restaurant product, relying on strict criteria and excluding any chaos and jumping to higher levels. With its precision and intervention in organizational and technological processes, artificial intelligence (AI) will stimulate not only business innovations but will also be able to transform and facilitate the multitude of operations in the culinary production unit. In the foreground of transformation is the generalization of the verifiability of the types of operations, their cyclicality and setting a conditionality for detailing and improvement.

Artificial intelligence (AI) will strive to transform technological matrices into new matrix models where, according to the criteria of the offered product, the operations of the service process will be grouped and the management will be modular. Based on the application of the criteria in the transformation of the restaurant product and compliance with the standard, the degree of complexity will be taken into account, and the preservation of nutrients in the produced culinary products will be monitored. Some processes allow for time-consuming upgrades and making creative management decisions, but they definitely require talent. Where operations allow the intervention of the tourist, it is skilful to guide actions, but this also has a degree of prevention and preparation and these processes are strictly individualized due to the complexity of the restaurant product. So when transforming the restaurant business by artificial intelligence (AI), everything would depend on the complexity of the restaurant product where the role of the tourist also has a certain connection with the service and a certain uncertainty related to self-service. We can call the varieties of tourist behavior special and cultural. Certainly, the tourist's knowledge, behavior, and participation are essential for the organization of service and the process itself.

The pace of process transformation in the matrix and the making of management decisions give us a sign and bring us closer to the quality of the restaurant product (CRP). This determines how many operations to save and how many to transform to improve the quality of the restaurant product. Here, knowledge about the implementation of operations and the dexterity of the skills of specialists who are tied in sensory connections with the complexity of application are always important. In matrix models of artificial intelligence (AI), it is important what level of performance is sought and whether the set resource projections will meet expectations.

Standardized operations and the processes in them are typical for a certain category and in them, competency skills can be applied at different levels of the transformation processes. Here, specific technological operations are interconnected and always adapted to mastering the underlying resources when performing technological specialized processes (Nesterchuk et al., 2022). These are the processes in the various culinary production blocks where the complexity of the operations is based on specific requests. Matrix operations are so graded as to bring detailed high productivity and added value. The high quality of the restaurant product is tied to tracking the individual details of specific operations and controlling the factors related to the transformation of processes. It is important in specific actions to transform operations through automation and robotization. All this would reduce the cost of the restaurant product, as the basis is innovations in service technology and technical and technological techniques, rules and software products. The level of customer satisfaction with the restaurant product is in terms of the organization in service technology, management, labor relations, competitiveness, quality.

It is based on maximum productivity in mini ovens with two separate chambers, in which several dishes can be prepared simultaneously while observing different technological methods. The working chambers are controlled by a system of sensor operations, by the technology-Convotherm by Cleveland's easyToUCH technology. The device has a USB input, through which certain menus and technological processes can be easily operated. The system is easy to manage and successfully supported in Windows CE. Cleveland Range, LLC - Mini 2in1 Combi Oven class ovens have the ability to be programmed with 1000 recipes and up to 99 technological operations. The easy-to-use electronic touchpad (high-resolution TFT color touch screen) system (easuToUCH) helps in setting the operating programs and dishes. Achieving aromas and flavors and introducing a fifth taste from artificial intelligence (AI) umami, and monitoring by combining data and algorithms will contribute to enriching the research and related taste (see Fig. 3).

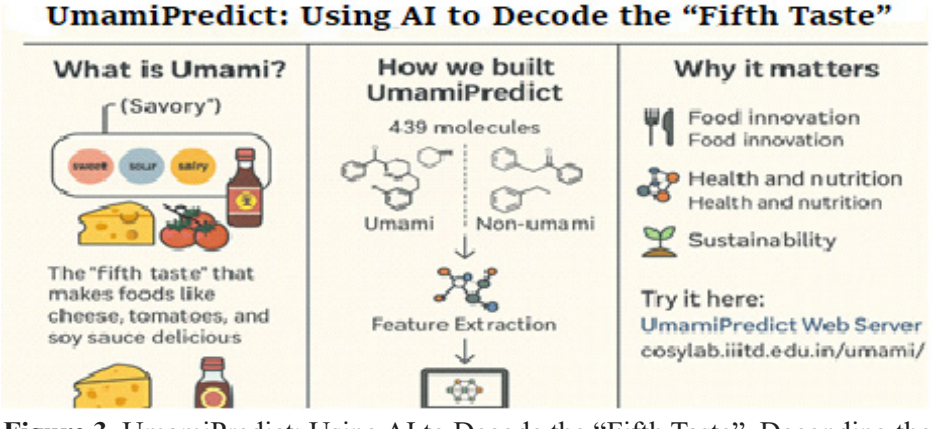


Figure 3. UmamiPredict: Using AI to Decode the "Fifth Taste", Deconding the Umami Taste using Artificial Intelligence.

Източник: Bdgner, G Sep. 26, 2025 https://www.linkedin.com/pulse/umamipredict-using-ai-decode-fifth-taste-ganesh-bagler-amaoc

This fifth basic taste, giving a subtle taste beyond sweet, sour, salty, bitter, is also healthy, rich in capsaicin and helps to clear heavy radicals. High-quality technological processing preserves the nutritional and biological value of the nutrients in the products and does not lead to contamination with mechanical impurities, chemical substances and microorganisms. Production in which there are no undesirable organoleptic, physicochemical, microbiological and enzymatic changes leads to increased demand from the market. Improving the organization of work in culinary production is in the skillful mechanical, heat treatment of products, com-

bining the tastes - sweet, sour, salty, bitter and harmonizing the sense of smell with a certain characteristic for each dish. The arrangement of dishes is also important, which must correspond to sophistication, orderliness, freshness, color harmony, thermal characteristics and aroma.

Discussion

The challenge for artificial intelligence (AI) is to predict the creation of a certain restaurant product and convince tourists that this is the right restaurant product. How will the tourist be aware that the product is processed in a temperature-controlled environment based on evaporation, which protects the food from burning. The application of traditional (Jabeen et al., 2019) and new culinary techniques and technologies by artificial intelligence (AI) is a challenge for restaurateurs and a level of competitiveness. A condition for sale is the cost price and the price of the restaurant product, which is also a function of the cost of labor input or the cost of labor is the ratio of the product's competitiveness to production (science, technology, production relations artificial intelligence (AI). The intervention of artificial intelligence (AI) will allow the offering of a higher quality restaurant product, with better organoleptic indicators and service techniques, for the production of which minimal costs are incurred. Production in which there are no unwanted organoleptic, physicochemical, microbiological and enzyme-chemical changes leads to increased market demand.

Conclusion

Artificial intelligence (AI) as a driver of positive development is also a factor and prerequisite for transforming processes in the restaurant business. Each transformation seeks to reduce production costs through artificial intelligence (AI), science and technology, and to create a continuously renewing creative process. In the restaurant business, processes are continuous and repeatable, which is associated with a progressive and positive impact and is a type of strategy instinct to implement the new. Market gaps are a challenge and recommending restaurant strategies from artificial intelligence (AI) where rapid entry into a specific niche is guaranteed.

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