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CURRENT TRENDS OF THE IMPLEMENTATION OF INTELLIGENT AUTOMATED TECHNOLOGIES IN THE SPHERE OF RESTAURANT ELECTRONIC BUSINESS

СУЧАСНІ ТРЕНДИ ЗАПРОВАДЖЕННЯ ІНТЕЛЕКТУАЛЬНИХ АВТОМАТИЗОВАНИХ ТЕХНОЛОГІЙ У СФЕРІ РЕСТОРАННОГО ЕЛЕКТРОННОГО БІЗНЕСУ

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The article examines the modern trends of intelligent automated technologies in the restaurant business, which are currently one of the most relevant topics that have attracted the attention of owners and managers of the restaurant business. It has been found that the service quality indicators improve in the service sector thanks to the automation of interaction with customers, which in turn leads to an increase in the level of satisfaction of consumers who are ready to invest in positive emotions. The study analyzes the current state of intelligent automation in the restaurant sector and provides a systematic assessment of the potential of innovative processes. For this, the market of intelligent automation in the restaurant business was analyzed, which creates a basis for future research and strategic planning. It was found that in the modern digital environment, the possibilities of automating work processes in the restaurant business constitute a significant specific weight. This direction, which has largely remained out of academic research until now, is attracting the attention of both the corporate and scientific worlds. It was found that intelligent automation plays a key role in improving the processes of service, management and marketing in the restaurant sector. The application of intelligent technologies will help automate many processes in the restaurant business that were previously performed manually. It is well-founded that thanks to means of intelligent automation, such as mobile applications, kiosks and chatbots, the way of serving guests is changing, and modern software simplifies the management of the restaurant business. The results of the analysis of modern trends of intelligent digitization in the restaurant business and the assessment of the possibilities of their practical implementation will contribute to increasing competitiveness and meeting the needs of the modern consumer of restaurant services. Thus, innovations aimed at the digital transformation of customer service tools have a positive impact on quality parameters, which become a key competitive advantage in the service sector.

Keywords: restaurant business, service industries, electronic business, automated technologies, digitalization, artificial intelligence.

У статті досліджено сучасні тренди інтелектуальних автоматизованих технологій у ресторанному бізнесі, які на сьогоднішній день є однією з найактуальніших тем, що заповнили увагу власників і менеджерів ресторанного бізнесу. З'ясовано, що сфері послуг покращуються якісні показники обслуговування завдяки авто-

матизації взаємодії з клієнтами, що у свою чергу призводить до збільшення рівня задоволення споживачів, які готові інвестувати у позитивні емоції. У дослідженні здійснено аналіз сучасного стану інтелектуальної автоматизації у ресторанній сфері та надається систематична оцінка потенціалу інноваційних процесів. Для цього проаналізовано ринок інтелектуальної автоматизації у ресторанному бізнесі, що створює основу для майбутніх досліджень та стратегічного планування. Виявлено, що у сучасному цифровому середовищі можливості автоматизації робочих процесів у ресторанному бізнесі становлять значну питому вагу. Цей напрямок, який здебільшого досі залишався поза увагою академічних досліджень, привертає увагу як корпоративного, так і наукового світу. З'ясовано, що інтелектуальна автоматизація відіграє ключову роль у вдосконаленні процесів обслуговування, управління та маркетингу в ресторанній сфері. Застосування інтелектуальних технологій допоможе автоматизувати багато процесів у сфері ресторанного бізнесу, які раніше виконувались вручну. Обґрунтовано, що завдяки засобам інтелектуальної автоматизації, таким як мобільні додатки, кіоски та чат-боти, змінюється спосіб обслуговування гостей, а сучасне програмне забезпечення спрощує управління ресторанним бізнесом. Результати аналізу сучасних тенденцій інтелектуальної автоматизації у ресторанному бізнесі та оцінка можливостей їх практичного впровадження сприятимуть підвищенню конкурентоспроможності та задоволення потреб сучасного споживача ресторанних послуг. Таким чином, інновації, спрямовані на цифрову трансформацію інструментів обслуговування клієнтів, мають позитивний вплив на якісні параметри, що стають ключовою конкурентною перевагою у сфері послуг.

Ключові слова: ресторанний бізнес, сфера послуг, електронний бізнес, автоматизовані технології, діджиталізація, штучний інтелект.

Problem Statement. The restaurant business is swiftly adapting to innovations as competition rises and consumers become more demanding. Investigating the problem involves analyzing current trends in the use of intelligent technologies in the restaurant industry and their impact on improving business efficiency and satisfying customer needs. This aspect is pertinent for enhancing the competitiveness of restaurants through the implementation of cutting-edge technologies that facilitate process automation and service improvement. Identifying the advantages and disadvantages of using intelligent automated technologies in the restaurant business will help determine potential avenues for optimizing their utilization. Strategic activity in the hospitality sector should prioritize the immediate satisfaction of customer needs, the creation and promotion of competitive services by expanding their range and markets. Rapid implementation of innovative changes using advanced technologies and digital progress, refinement of the communication model, contribute to attracting customers, enhancing service quality, and increasing competitiveness.

The Ukrainian scientific community has not given sufficient attention to the issue of implementing intellectual automation in the restaurant business, as only a small number of restaurant establishments in Ukraine utilize automation and robotics elements, complicating the analysis of the prospects in this area. Intellectual automation technologies have not yet gained wide application in the domestic market, hindering research development in this direction.

Analysis of recent research and publications. Recent research and publications

have shed light on the possibilities of implementing digitalization elements into the operations of restaurant businesses. Scientists Biletska Ya. O., Sokolovska O. O., and Krivtsova A. S. [1] have made a significant contribution to this discourse. Their collective work has systematized modern innovative technologies for healthy eating in the hotel and restaurant industry and analyzed the impact of intelligent automation processes on the development of the hospitality industry, which aims to meet diverse consumer needs, both individual and collective.

Yatchuk O. M., Nebaboyu N. O., and Kucher M. M. [8], as well as Onufriievich D. R., and Kuklin O. V. [4], have demonstrated that in contemporary conditions, interactive social communication models are vital tools for the successful development of tourism and hotel-restaurant business. This is evident due to clear trends in the growth of users and the share of e-commerce in the overall volume of global trade. Postova V. V. [5; 6] has argued that intellectual automation in the restaurant business contributes to improving customer service processes and enhancing the industry's competitiveness.

The research results of Neilenko S., Fogel A., Gushi Y., and Oliynyk O. [3] confirm that the application of modern trends to the robotization of service processes in restaurant businesses will be possible with active utilization of innovations. Special attention should be given to digital technologies and informational positioning of the hospitality industry in the virtual space.

The current trends in implementing intelligent automated technologies in the restaurant

electronic business sphere are rapidly changing, bringing forth new challenges and problems that may remain unresolved. Some of the problems that may arise when implementing intelligent automated technologies in the restaurant business sector are outlined in Table 1.

Solving the identified challenges may require a combination of intelligent innovation, strategic management and proactive response to changes in the hospitality industry.

Formulation of article objectives (setting the task).

The *purpose* of the article is to determine the advantages and challenges of introducing intelligent automated technologies into the restaurant e-business and to develop recommendations for the successful integration of these technologies into the practice of the hospitality industry.

The *object of research* is intelligent automated technologies of electronic commerce in the restaurant business.

The *subject* of the study is the theoretical and methodological principles of the influence of the application of intelligent automated technologies

on the optimization of business processes in the restaurant business.

The *task of the research* is to highlight the potential of intelligent automated technologies in improving the quality of service and optimizing management processes in the restaurant sector, as well as to determine the prospects for their future development and implementation.

Presentation of the main research material.

Restaurant automation is a term used to describe the use of technology in the restaurant industry to automate various processes. This can cover a wide range of activities, from the use of automated systems for taking orders to the use of robots to prepare food. This approach can be an effective way to reduce labor costs and improve customer interaction [6].

The implementation of intelligent automation in the activities of restaurant electronic business establishments will allow the following operations to be performed (Figure 1).

Recently, there has been considerable interest in robotics and artificial intelligence technologies. Intelligent automation and robotics are already providing significant benefits to institutions that

Table 1

Modern Challenges and Unresolved Issues of Implementing Intelligent Automated Technologies in the Restaurant Electronic Business Sphere

Problem	Essence of the problem	Possible solutions
Implementation cost	Intellectual automated systems can be costly to implement. Restaurants may find it challenging to justify expenses on such technologies, especially for small businesses.	It is necessary to seek ways to reduce costs or stimulate investments.
Integration with existing systems	Many restaurants already have various management systems in place, from cash register programs to inventory management software. Integrating new smart technologies may become problematic due to compatibility issues or integration complexity.	A solution could be standardizing data exchange protocols or developing universal interfaces.
Data security	Implementing intelligent systems may increase the amount of valuable data that needs protection from cyberattacks.	Restaurants should be vigilant about data security measures, including data encryption and the use of secure networks.
Personnel training	Implementing new technologies may require training for staff to ensure they are proficient with the new systems. Inadequate staff training can lead to errors in technology usage and decrease their effectiveness.	Accessible and effective training programs need to be provided for the staff.
Treat of job substitution	The implementation of automated technologies may lead to a decrease in the need for manual labor. This could create social problems such as unemployment or low wages.	Restaurants need to be mindful of the social consequences of their actions and seek ways to balance automation with the needs of their staff.

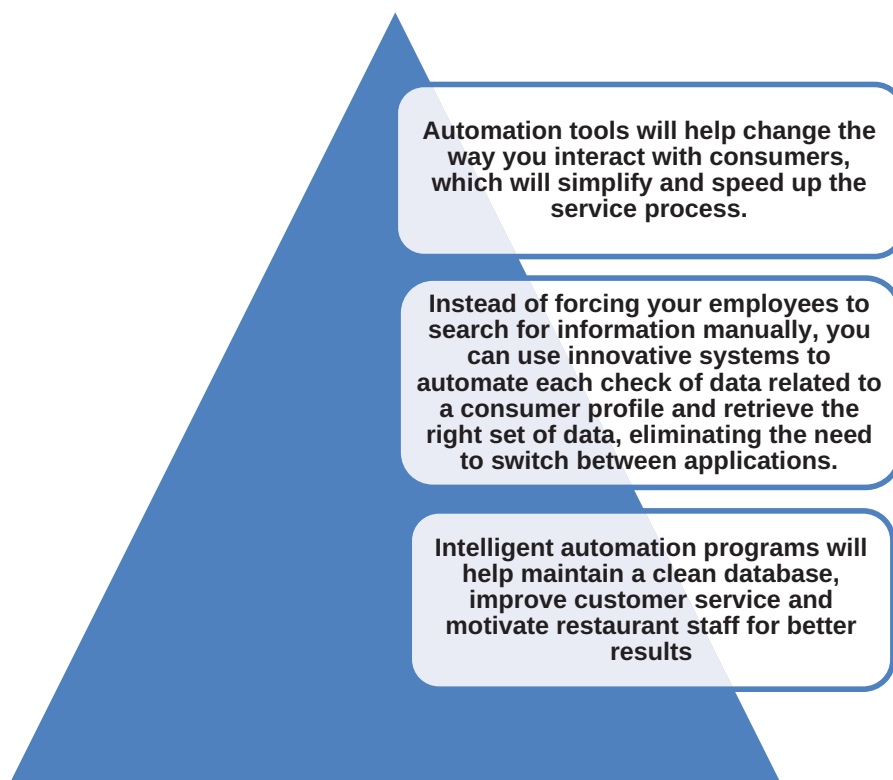


Figure 1. Improving the activities of restaurant electronic business establishments by means of intelligent automation

have implemented them and benefited greatly from it.

Modern business seeks to eliminate the "human factor" wherever it is technically possible, and technology is helping to do so. That is why robotics in restaurants is considered as one of the most effective methods of solving the staffing problem in the future, since there is a high turnover of personnel in Ukraine today. It is not about replacing people with artificial intelligence, but rather about optimizing the most understandable parts of the work of employees. The most optimal modern technologies of intelligent automation, which can be used in establishments of the restaurant business, are systematized in the table. 2.

The proposed technologies will not replace the staff of the restaurant business, but will help increase the efficiency of their work, improve the quality of cooking and service through continuous work.

Among modern means of intelligent automation, an important place belongs to artificial intelligence. Although most imagine the use of artificial intelligence in restaurants as intelligent robots in the kitchen, capable of cooking better than humans, the real point is different. At the current stage of the development of intelligent

automation tools, artificial intelligence should be considered as a promising assistant, which cannot replace a person, but can perform a number of tasks and significantly save the costs of the restaurant owner and free the staff from routine duties [2].

Advantages of using artificial intelligence in the restaurant business:

- cost reduction thanks to the automation of routine processes. Booking and order administration processes can be outsourced to AI. This frees up staff for more important tasks;
- reducing the influence of the "human factor". It is one of the most common causes of problems: from an incorrectly recorded order to errors in preparation or cost calculation. Forming orders through specialized services – for example, the Choice ecosystem – minimizes "human influence";
- service improvement. So far, the complete replacement of restaurant staff by artificial intelligence robots looks a bit fantastic. Therefore, the optimal model of using intelligence is to transfer all routine tasks to it, so that the staff can concentrate on the ideal customer experience;
- expanding the audience. Artificial intelligence technologies strengthen the institution's

Table 2

Modern technologies of intelligent automation in the restaurant business

Type of intelligent automation	Effect for restaurant business	Result
Restaurant management systems (POS)	POS systems allow you to automate the processes of ordering and serving guests.	Includes inventory management functions, sales accounting, statistics management and other useful functions that reduce the costs of the institution.
Mobile Food Ordering Apps	Restaurants can create their own mobile apps that allow customers to order food from anywhere.	Allows restaurants to optimize the service process.
Automated inventory management systems	These systems allow restaurants to keep track of products and inventory, automatically order the necessary items, and detect and eliminate losses.	Allows restaurants to optimize the production process.
Face recognition technologies	The use of face recognition systems allows you to automate the processes of customer registration and identification.	Assists in managing loyalty programs and personalized service.
Internet of Things (IoT)	The use of IoT technologies in the restaurant business allows devices such as refrigerators, stoves and cooking equipment to be connected to the network and collect data about their operation for effective management.	Reduction of costs of the institution.
"Smart" self-service kiosks	Identify the guest by face, offer him to repeat the previous order, and then automatically debit money from the card.	Increase sales and shorten the service process.
Automation of food delivery	Creation of a chatbot-based courier service center, which allows you to automate the management and optimization of the delivery path, and also provides the function of payment by payment cards upon delivery.	Reduction of costs of the establishment.
Interactive tables for restaurants	The table has a touch surface, recognizes the shape of objects, makes it possible to place an order without the need to call a waiter and pay for it there.	Increase in sales and shorten the service process.
Artificial Intelligence	Gives computers the ability to "think" and "understand" in almost the same way that people do.	Performing tasks that usually require intellectual effort.

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marketing strategy: in particular, they help collect customer impressions on various sites and systematize them, as well as analyze existing orders. Based on the received information, you can offer personalized incentives. For example, if the system notices that a certain customer always orders cheese dishes, the restaurant can offer him special discounts on them or even create a unique menu that matches his tastes. This is very valuable both for maintaining a permanent audience and for attracting new visitors [7].

In order to avoid problems with complaints in orders, the modern market of the restaurant

industry is moving towards the integration of sensor systems with artificial intelligence. Instead, it is planned to install them in the kitchen to monitor the sequence of actions of the staff, the operation of the equipment and the accuracy of the filling of orders. The system will "understand" what is included in each order and will signal staff errors.

The advantage of artificial intelligence is its constant learning. Given enough input, it can predict events, trends, and people's reactions. Restaurateurs can use this to track trends and enrich their knowledge of audience preferences.

Even the McDonald's chain was interested

in such a promising niche, which acquired a company specializing in forecasting based on artificial intelligence. By analyzing previous orders and customer preferences, restaurants can use artificial intelligence to recommend dishes, as well as automate inventory management and the food preparation process. Also, AI-based chatbots and virtual assistants can handle common customer queries and complaints.

The implementation of artificial intelligence should be considered as a promising opportunity to invest in a restaurant with numerous benefits over a long period.

Such giants of the restaurant industry as Taco Bell, Chipotle and Domino's are already actively using the possibilities of intelligent digitization to interact with customers through voice and text bots. With the help of chatbots, they take orders, recommend dishes, and answer common questions. The main value of the technology is that not a single unit of personnel is involved to perform these tasks, which is economically attractive for any catering establishment: from a small coffee shop to a restaurant chain. Of course, the owners of mini cafes do not have enough resources to pay the expensive tariff of the AI provider. However, in this case, you can use the free ChatGPT as a chatbot. To do this, it is enough to provide him with basic information about the establishment, menu, opening hours and location. The system will be able to conduct dialogues with customers independently. The main thing is to update the data in a timely manner [4].

The main purpose of artificial intelligence is to analyze the route and the current situation on the road to accurately determine the delivery time for customers and lay the optimal path for couriers.

Another area where artificial intelligence is being used is optimizing the images of establishments to attract customers who search online through the image option. This approach, including the use of Google's image recognition technology, is very promising.

The use of artificial intelligence in the restaurant business is very promising, but it is important to remember that there are already affordable solutions on the market that can optimize management, accounting and marketing processes. For example, the Choice service allows establishments to take orders on-site, for delivery and take-out with convenient management, collect reviews, accept payments, set up a table reservation system and much more. These are opportunities that should be

implemented now, as most customers are ready to use the latest technologies and are happy to take advantage of them.

The era when visiting a restaurant had nothing to do with intelligent technology is over. What used to be the latest, for example, online ordering of pizza with delivery or free Wi-Fi in a restaurant, is now a standard service.

In connection with the growth of requests from customers of the restaurant industry, the need to get the desired product (food or drink) in one click or a few minutes in any convenient way is becoming urgent: in the establishment, with delivery to the door, take-out, etc. In today's world, the way of paying for services in restaurants is also changing: now it can be done with money, cryptocurrency or bonuses accumulated in the application.

Not long ago, all communication with customers in the restaurant industry was done in person, but now websites and mobile apps are replacing it. At the same time, the digital space in which the interaction takes place, its design, convenience, emotionality and gamification become no less important than the interior of the institution itself. Thousands of startups and companies around the world are working to ensure that consumers get what they want faster and more efficiently.

The requirements for the speed of food preparation are also changing. Guests don't want to spend time waiting. Therefore, establishments of the restaurant industry are implementing new approaches to the promotion of their products, namely:

- visualization (video content helps to send messages to guests in a format convenient for them);
- chatbots (some guests are more comfortable communicating using a messenger: instant response at any time; a chatbot can simultaneously serve more than 100 customers, which is beneficial for the establishment);
- voice search (using modern technologies of Apple Air Pods, Google Home and others);
- guest identification system (NFC) (contactless access is among the advantages of this technology) [2].

As most restaurants have adopted a digital strategy, other establishments will have to do the same to keep up with their competitors.

Conclusions. The results of the study allow us to say that the restaurant business in Ukraine remains attractive, despite challenges such as the war and the pandemic. Innovations are becoming a key element in the formation of business

models in this field. Most of the restaurants are already ready for transformation and introduction of new technologies. After the end of the war, economic recovery will encourage investment in the restaurant business, but there is a problem of shortage of personnel. In this regard, automation is becoming more and more popular, as it allows you to optimize service and reduce labor costs. The implementation of intelligent technologies in the restaurant business becomes a necessary step to increase efficiency and competitiveness. Further improvements in the integration of intelligent systems with mobile applications and online ordering platforms will allow restaurants to operate effectively in a digital environment.

Research on the impact of intelligent technologies on ensuring the sustainable development of the restaurant business can reveal new opportunities for reducing waste and optimizing the use of resources. Carrying out a comparative analysis of various intelligent solutions will help to single out the most effective and economically feasible approaches. Studying the psychological aspects of customers' perception of intelligent technologies can help develop interaction strategies that meet their expectations. The general development of intelligent technologies and their implementation in the restaurant business opens wide prospects for innovation and improving the quality of service.

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