IMPLEMENTATION OF ROBOTISATION AND APPLICATION OF ARTIFICIAL INTELLIGENCE IN THE HOTEL AND RESTAURANT BUSINESS

Nadiia Sapelnikova,
PhD in Economic Sciences,
Kyiv University of Culture,
Kyiv, Ukraine
sapelnikova1948@gmail.com
https://orcid.org/0000-0002-8792-2037
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Topicality. The research covers a wide range of aspects – from theoretical foundations to practical implementation strategies, with an accent on using promising technologies as catalysts for the development of the hospitality industry. The article provides a thorough analysis of scientific and practical studies and methodologies for the implementation of robotics and artificial intelligence, substantiates current tendencies and challenges of the industry according to current conditions. The organisational and economic mechanisms of robotisation of business processes are studied. Their influence on the efficiency of enterprises is assessed. It is proven that the implementation of robotics and artificial intelligence is a key factor in enhancing the competitiveness of establishments in today's conditions. **Aim and methods.** The aim of the article is to theoretically ground recommendations for increasing the efficiency of implementing robotisation of service and production processes in the restaurant establishments. The research methods are based on general scientific and special methods of cognition, in particular: system analysis, synthesis, comparison, generalisation, statistical analysis, economic and mathematical modelling and expert assessments. **Results.** The interrelationship between robotics and artificial intelligence is determined, types of artificial intelligence and methods of their applying in the hotel and restaurant business are considered. It is established that robotics is a key factor in increasing the competitiveness of establishments in current conditions, ensuring the optimisation of operational processes and improving the quality of service. The study shows that the successful implementation of robotic systems requires a comprehensive approach that covers technological, organisational and managerial aspects of business process transformation.

Keywords: robotics, artificial intelligence, hotel and restaurant business, automation, innovations, management efficiency, competitiveness.

Introduction

The problem formulation. The relevance of this research topic is due to the rapid development of robotics and artificial intelligence technologies, which are actively applied in different sectors of the economy, including the restaurant business. In conditions of increasing competition and enhancing consumer demands for service quality, restaurant establishments are forced to look for new ways to optimise their processes and improve the efficiency of their activities.

Robotisation of service and production processes in the restaurant business allows you to significantly increase labor productivity, reduce operating costs and minimize

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the impact of the human factor on the quality of service. The introduction of robotic systems creates opportunities for standardisation of processes, improving quality control and ensuring a consistently high level of service. The issue of robotics has become particularly relevant during the COVID-19 pandemic, when the necessity in minimising contact between people stimulated the development of contactless service technologies. This tendency continues to influence the development of the industry, forming new standards of safety and quality of service.

State study of the problem. The information base of the study consists of legislative and regulatory acts of Ukraine, official statistical data, scientific works of national and foreign scientists on robotisation and automation of business processes, materials of scientific and practical conferences, periodicals, Internet resources, as well as the results of the authors' own research.

Unresolved issues. In Ukraine, the process of robotisation of restaurant establishments is at the early stage, which creates the need to study international experience and develop effective strategies for implementing automated systems, taking into account local market characteristics. The economic efficiency of robotisation and its influence on the competitiveness of restaurant establishments require detailed research to form substantiated recommendations for optimising investments in business process automation. The organisational and managerial aspects of implementing robotic systems require a systematic approach to transforming business processes and developing personnel competencies, which necessitates the development of appropriate methodological principles and practical recommendations.

Aim and methods

The aim of the article is to research theoretical substantiation of recommendations for increasing the efficiency of implementing robotisation of service and production processes in the restaurant establishments.

The methodological basis of the study is theoretical developments and scientific concepts of the national and foreign scientists in the field of analysing enterprise activities, service technologies and laws of Ukraine.

Research methods are based on the general scientific and special methods of cognition: system analysis, synthesis, comparison, generalisation, statistical analysis, economic and mathematical modelling and expert assessments.

The information base of this article the work of scientists and specialists from Ukraine and the world in the restaurant management field, who study the problems of sustainable development of the hospitality industry under various market conditions, including scientists from Kyiv University of Culture and the Department of Hotel, Restaurant and Tourism Business; Laws of Ukraine; regulatory and legislative acts; resolutions of the Cabinet of Ministers; official information websites; periodic scientific and practical publications.

Research results

In conditions of fierce competition, hotels and restaurants are forced to constantly search for new approaches in order to increase the attractiveness and accessibility of their services. Ignoring the importance of innovative management in the activities of

national hotel enterprises has led to a decrease in their competitiveness, violation of basic principles and methods of management, as well as a deterioration in the quality of hotel services provided. Innovations and robotics act as an incentive for further business development, allowing enterprises not only to occupy leading positions in their market segments, but also to meet world standards of hotel and restaurant services (Barabash, n.d.).

In our opinion, innovative technologies that will change the hospitality industry in the nearest future are very relevant (Fig. 1.4).
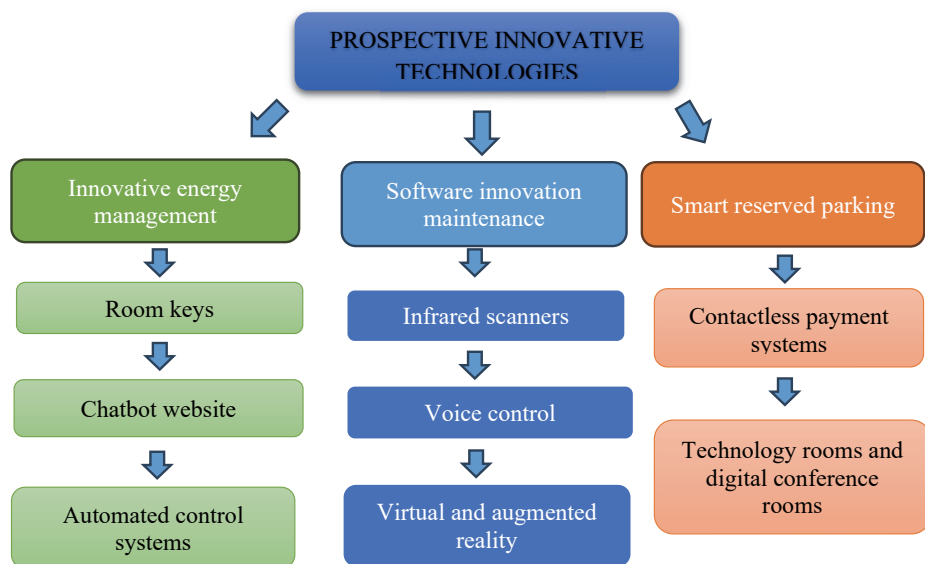

Fig. 1. Promising innovative technologies in the activity of hotel and restaurant enterprises
Source: based on (Shatska & Semko, 2017; Zavadynska, 2018; Kish, 2023;
Iranmanesh et al., 2022; Erdem & Barakazi, 2023).

It is important to take a closer scientific look:

1. *Innovative energy management.* Modern technologies, such as innovative thermostats and occupancy sensors, are able to track changes in the presence of people in the room and respond to them accordingly. Intelligent energy management systems use advanced machine learning algorithms to constantly monitor thermodynamic processes, local weather conditions and peak loads, which allows to optimise energy consumption in real time throughout the year. In particular, these systems can reduce electricity costs in the hotel and restaurant business by up to 20%, ensuring a quick return on investment (from 12 to 24 months) and increasing the resale value of enterprises. In addition to heating, ventilation and air conditioning systems, innovative lighting technologies allow you to automate energy consumption, taking into account changes in occupancy and ensuring more efficient energy use during the year (Zavadynska, 2018).

2. *Software-based innovative maintenance.* As in energy systems, predictive maintenance relies on analysing sensor data to detect potential damage early, preventing serious and costly problems. Instead of waiting for a breakdown, innovative predictive

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technologies help engineers predict maintenance needs, reducing operating costs. For example, monitoring water systems through smart meters can yield savings four years after implementation. By monitoring water lines with smart water meters, hotel and restaurant owners can see savings on water consumption in about 4 years (Kish, 2023).

3. *Smart Reserved Parking.* With smart sensors and dedicated apps, hotels and restaurants can allow their guests to reserve parking spaces before they arrive, reducing parking costs and improving customer convenience (Erdem & Barakazi, 2023).

4. *Digital room keys.* More and more hotels are offering guests access to their rooms via a smartphone app, saving them the cost of printing plastic key cards and the hassle of carrying spare key cards that can become demagnetised or lost (Zavadynska, 2018).

5. *Infrared scanners.* The use of infrared technology allows to minimise service interruptions by automatically detecting the presence of guests in rooms. The scanners also help save energy by automatically turning off lighting and climate control when the room is empty (Erdem & Barakazi, 2023).

6. *Contactless payment systems.* In response to concerns surrounding the COVID-19 pandemic, contactless payment systems have become an important factor in enhancing a certain trust in hotels. They also open up opportunities for accepting cryptocurrency as a means of payment (Kish, 2023).

7. *Chatbots.* Chatbots have become an essential tool for the hospitality industry, providing 24/7 automated responses to customer inquiries and routing more complex questions to the appropriate staff. They allow for improved service and effective use of artificial intelligence for social media engagement (Iranmanesh et al., 2022).

8. *Voice control.* Voice recognition technologies used in rooms allow guests to avoid touching common surfaces such as light switches and thermostats, which is especially helpful for those with disabilities. Voice control also adds convenience for travellers by allowing them to ask the assistant about various in-room services (Parapanos & Michopoulou, 2023).

9. *Tech lounges and digital conference rooms*. The demand for tech lounges and other coworking spaces has increased significantly as more companies offer work-from-home options and many employees embark on freelance careers and become digital nomads. To compete in today's tech-savvy marketplace, hospitality companies will need to provide digital conference rooms for corporate events (Erdem & Barakazi, 2023).

10. *Automated property management systems.* Applying modern property management systems allows hotels and restaurants to automate administrative tasks and integrate multi-functional locations (Kish, 2023).

11. *Virtual and augmented reality.* Virtual reality provides potential guests with 360-degree video of the rooms and other amenities of a hotel and restaurant. Augmented reality allows guests to create personalized environments, including transforming a wall into a forest, a beach sunset or even outer space. The use of such technologies can be key to convincing potential guests to book hotels over their competitors (Lysiuk et al., 2022).

The digitalisation of the restaurant industry has become a major advantage, especially after the pandemic in 2019. The integration of various delivery options plays a key role in ensuring a competitive advantage. Online ordering and mobile ordering apps are increasingly being used by third-party delivery services. Large marketing companies operating in the service sector have recognised the value of takeout delivery for restaurants, which has led to the offer of third-party delivery services to restaurants, as they can no

longer provide these services themselves. Digital technologies and consumer demands have become an incentive for the development of new restaurant formats, focusing on allowing customers to receive food anywhere and at any time. Digital processes accelerated by the pandemic have led to the emergence of restaurants that operate exclusively for delivery, virtual restaurants and ghost kitchens. In some countries, these virtual kitchens are often called satellite or cloud kitchens. Such a concept of virtual restaurants, developed to meet the growing demand for online ordering, has become the basis for new business models and startups. Such restaurants do not offer seating, but are focused only on delivery. QR code menus are digital menus available to visitors who can scan the QR code with their smartphones. All customers have to do is point their mobile device and scan the QR code (this can be done on almost all mobile devices), and they will immediately be taken to the contactless menu (Martynova & Stoiko, 2023).

Among the factors that hinder the development of digital technologies in the hospitality sector, the following can be highlighted (Erdem & Barakazi, 2023; Kish, 2023):

– financial and economic (small and medium-sized businesses have difficulties with investments in digitalisation, and support in the form of benefits and incentives is absent);

– regulatory (there is no clearly defined legislation that would regulate the transition to the digital space, in particular regarding the protection of personal data, the authenticity of accounts and information);

– general instability (financial and political capabilities of different regions for the digitalization of the country differ significantly);

– investment deficit (limited access to high technologies, sanctions and restrictions on the import of solutions);

– low standard of living (lack of opportunity to purchase modern gadgets and use paid content or roaming while travelling);

– digital illiteracy (a significant part of the population does not have sufficient knowledge about digital capabilities).

At the same time, based on the analysis of scientific and practical literature, it is appropriate to identify factors that contribute to the development of this industry and digitalisation processes. These include the following:

– isolation from technology transfer, which forces businesses to use national developments;

– the effect of a "low base", which allows for significant optimisation of business processes through modernisation;

– perspectives for changing business models, which provide for the emergence of new services and opportunities for adaptation.

Constantly and recently at the increasing pace, the hospitality industry is starting to make the most of technological opportunities. The most interesting technology now is the analysis of reviews through the offer that hotel customers provide after visiting the hotel, which can at the same time be the basis for booking future rooms. Today, 70% of users select hotels based on reviews and ratings. Thus, leading Internet portals conduct a thorough analysis and monitoring of user preferences and provide them with useful information, promotions and discounts. Today, hotels are fighting for a positive assessment, the so-called reviews: the user enters the site, chooses the hotel he liked, writes a comment.

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Social networks have a significant impact on the foreign trade activities of hotels. Guests, communicating on platforms such as Twitter and Facebook, get a unique opportunity to book a room using modern gadgets. In connection with this, the main trend for hotels that promote themselves through social networks is the development and implementation of unique presence strategies. This allows hotels to understand the competitive environment in a better way. For example, hotels actively use specialised mobile applications that create convenience for customers, increasing accessibility and comfort for guests using them within the institution. Thus, statistics show that in the hospitality industry, the mechanisms for providing hotel services mainly involve the above-mentioned analytics of the use of Internet transactions (Rybalchenko et al., 2022).

The transition to a new level of economy, which involves the integration of automation and artificial intelligence into all aspects of activity, including service processes, distribution and exchange of goods and services, as well as relationships between market participants, is causing significant changes in the structure of many spheres. Of particular importance is how these technologies affect the restaurant sector, which is traditionally a part of the service sphere. Artificial intelligence and robotics technologies have great potential for optimising work processes, in particular through order automation, inventory management, improving the quality of service and analysing customer needs. They allow restaurants to significantly reduce costs, reduce human errors and increase the efficiency of management processes (Erdem & Barakazi, 2023). However, in spite of all the advantages, these technologies have not become a mass national trend in Ukraine, especially in the restaurant services market. One of the reasons for this is economic constraints and the lack of capital in most Ukrainian restaurants to implement such innovations. Additionally, unlike foreign competitors, which have a much larger amount of capital and better conditions for investing in the latest technologies, Ukrainian enterprises face serious limitations. Thus, the restaurant business in Ukraine often faces the lack of specialised government programmes that would support automation and technological modernisation of the industry. This poses a direct threat to the fact that national restaurants are gradually losing competitiveness.

Moreover, the use of artificial intelligence and robotics technologies allows foreign competitors operating in the Ukrainian market to quickly adapt to changes, increase the efficiency of their business processes, and thus, significantly increase their market share. Particularly, automated service systems allow reducing personnel costs, increasing the accuracy of order fulfillment and speed of service, as well as increasing the level of customer satisfaction, which is important for maintaining consumer loyalty. This situation increases the risks for national restaurant enterprises, since the failure to use such technologies can lead to a significant decrease in competitiveness, loss of market share and, in extreme cases, to bankruptcy. Given the limited financial resources of many restaurants, they are not able to modernise their own processes or automate work processes at the same level as their foreign competitors. Therefore, for many restaurants, the issue of business automation becomes one of the key to survival in the market. In addition, the situation is complicated by economic instability and constant financial fluctuations, which can limit opportunities for investment in innovative solutions. In conditions where most enterprises in the restaurant industry are limited in capital, they cannot adapt in time to changes that will require significant financial costs. And this is only exacerbated by the lack of support from the state in the form of benefits or subsidy programmes for such enterprises.

The restaurant business of Ukraine has also been significantly affected by the COVID-19 pandemic, which has had a serious influence on all sectors of the economy. The pandemic has led to significant financial losses, as the increase in the number of diseases and the introduction of quarantine restrictions have made it difficult for businesses to operate. In particular, in early 2020, restaurants were forced to cease operations due to the introduction of government restrictions, which led to the closure of many establishments, a significant decrease in attendance and large financial losses (Parapanos & Michopoulou, 2023). Even after the lifting of quarantine restrictions, many restaurants were unable to return to their previous level of income due to changes in consumer behaviour. People have become more cautious about going out in public places, which has increased a necessity in safety and social distancing. Establishments have become limited in the number of places for visitors, which has made it difficult for restaurants to operate normally and reduced revenues. Moreover, social restrictions on in-person services forced most establishments to switch to delivery or takeout only, which further created difficulties for restaurants that did not have a proper infrastructure to provide such services. These changes in customer behaviour, who became more cautious and less inclined to visit restaurants after the pandemic, created additional uncertainty for the development of the restaurant business in Ukraine. Since the government did not provide sufficient support, and many restaurants were unable to adapt to the new conditions, the situation for them remained tense. Therefore, forecasts for the future of the restaurant industry remain pessimistic, especially for small and medium-sized businesses that do not have sufficient resources to quickly adapt to new realities and technological changes.

In 2022, the war added to this crisis situation. Since the beginning of the war in Ukraine, about 7 thousand restaurants and cafes have closed, and more than 2 thousand new establishments have opened. This was reported by Olga Nasonova, co-founder of the National Restaurant Association of Ukraine. The market decreased by approximately 25% compared to February 2022. In some regions, the market decline was more than 50% (Kharkiv, Mykolaiv, Zaporizhzhia, Luhansk regions). At the same time, positive dynamics are observed in the western regions. In Lviv and the region, the number of restaurants and cafes increased by approximately 30%, in Ternopil, Zakarpattia, Chernivtsi, Ivano-Frankivsk regions there is an increase of approximately 20%. By the beginning of summer, the market decline was more significant. But since June, restaurants began to open in Kyiv, as well as in the western regions, a total of more than 2 thousand establishments. The restaurant market in Lviv has developed most intensively – over 500 new establishments in the region since the beginning of the war (*V Ukraini*, 2022).

In current business conditions, national enterprises of the hotel and restaurant business should ground on the latest approaches to their successful development, completely new business models, new products and services. Therefore, the stable dynamic development of enterprises depends on their innovative potential. At the same time, it is not so much the possession of this factor as the ability to use it effectively that is important.

For the successful development of the hotel and restaurant business of the region, it is necessary to apply a number of coordinated measures. First of all, it is important to elaborate a concept for the development of recreation and tourism in the area of accommodation, which will not only improve the attractiveness of the region for tourists, but also stimulate the development of related industries. In addition, it is necessary to pay attention to the development of infrastructure, in particular transport communi-

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cations and attract investors to finance these projects (Erdem & Barakazi, 2023). This will not only improve convenience for tourists, but will also contribute to the growth of economic activity.

Particular attention should be paid to strengthening competitive advantages, which can be achieved by improving the quality of the tourist product. This includes not only improving the level of service but also expanding the range of services, including the use of innovative technologies to work with individual clients. In order to optimise the work of the hotel and restaurant business, it is advisable to deepen marketing research, which will allow you to better understand consumer needs and quickly respond to changes in the market.

Another important aspect is the improvement of the organisational structure of enterprise management in this area. It is important to implement corporate principles and forms of management, which will contribute to increasing work efficiency and reducing costs. The activation of investment policy in the hotel and restaurant sector will allow attracting the necessary financial resources for the development and modernisation of the business.

No less important is information, advertising and exhibition activities, which should be carried out both on the national and international markets. This will increase the awareness of the region and its tourism opportunities. Additionally, attention should be paid to the preservation and rational use of natural resources, which will not only preserve the ecological balance, but also enhance the sustainability of enterprises.

Of great importance is the preservation and development of human resources in the hotel and restaurant business, which involves active work on creating a system of training and retraining of the staff. This will allow to improve the qualifications of employees and ensuring the proper level of service. Finally, capitalisation and corporatisation of hotel and restaurant management will improve financial stability and ensure their effective functioning in the face of competition and market changes.

Conclusions and discussion of results

The analysis of the literary sources and practical observations makes it possible to draw the following conclusions:

1. Currently, technologies are developing rapidly. More and more technology companies are interested in the development of artificial intelligence and robotisation of processes. This allows the introduction of modern innovative technologies in the restaurant industry and the hospitality industry in general, requires a revision of the approach to managing the organisational workflow of the enterprise and optimising business processes to ensure competitiveness in the hospitality market.

2. The relationship between robotics and artificial intelligence is determined, types of artificial intelligence and methods of their application in the hotel and restaurant business are grounded. It is established that robotics is a key factor in increasing the competitiveness of establishments in modern conditions, ensuring the optimisation of operational processes and improving the quality of service. The study showed that the successful implementation of robotic systems requires an integrated approach that covers technological, organisational and managerial aspects of business process transformation.

In conclusion, it can be stated that taking into account the processes of decentralisation and deregulation taking place in Ukraine, a holistic management system is nec-

essary that meets modern and promising requirements of dynamic development and is implemented at different levels – state, regional, individual business and enterprise.

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УДК 640.4:004.896

Надія Сапельнікова,
кандидатка економічних наук,
Київський університет культури,
Київ, Україна
sapelnikova1948@gmail.com
https://orcid.org/0000-0002-8792-2037

ВПРОВАДЖЕННЯ РОБОТИЗАЦІЇ ТА ЗАСТОСУВАННЯ ШТУЧНОГО ІНТЕЛЕКТУ В ГОТЕЛЬНО-РЕСТОРАННОМУ БІЗНЕСІ

Актуальність. Дослідження охоплює широкий спектр напрямів – від теоретичних основ до практичних стратегій впровадження, орієнтованих на використання перспективних технологій як каталізаторів розвитку індустрії гостинності. У статті наведено ґрунтовний аналіз наукових і практичних досліджень і методологій впровадження робототехніки та штучного інтелекту, обґрунтовано тенденції та виклики галузі відповідно до сучасних умов. Досліджено організаційно-економічні механізми роботизації бізнес-процесів та оцінено їх вплив на ефективність діяльності підприємств. Доведено, що впровадження робототехніки та штучного інтелекту є ключовим чинником підвищення конкурентоспроможності закладів у сучасних умовах. **Мета дослідження** полягає в теоретичному обґрунтуванні рекомендацій щодо підвищення ефективності впровадження роботизації процесів обслуговування та виробництва в закладах ресторанного господарства. **Методи дослідження** базуються на загальнонаукових і спеціальних методах пізнання: системному аналізі, синтезі, порівнянні, узагальненні, статистичному аналізі, економіко-математичному моделюванні та експертних оцінках. **Результати.** Визначено взаємозв'язок між робототехнікою та штучним інтелектом, а також розглянуто види та методи застосування штучного інтелекту в готельно-ресторанному бізнесі. Встановлено, що робототехніка є ключовим чинником підвищення конкурентоспроможності закладів у сучасних умовах, забезпечення оптимізації операційних процесів і покращення якості обслуговування. Виявлено, що успішне впровадження роботизованих систем потребує комплексного підходу, який охоплює технологічні, організаційні та управлінські аспекти трансформації бізнес-процесів. **Висновки та обговорення.** Стверджується, що в контексті децентралізації та дерегуляції в Україні актуальним є створення цілісної системи управління, здатної відповідати сучасним і перспективним вимогам динамічного розвитку та функціонувати на різних рівнях – державному, регіональному, окремого бізнесу та підприємства.

Ключові слова: робототехніка, штучний інтелект, готельний і ресторанний бізнес, автоматизація, інновації, ефективність управління, конкурентоспроможність.