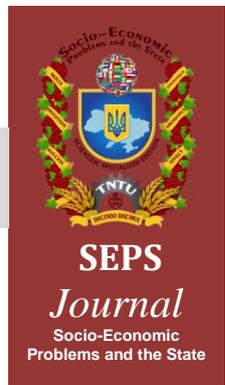


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INDUSTRY 4.0: STATE, PROBLEMS, PROSPECTS OF HORECA IN UKRAINE

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Abstract: Globalization has a profound effect on the structures of many spheres with all its dimensions. Therefore, various progressive trends affect the modern trends of our life. Current and future trends can be considered by factors such as emergency situations (pandemic, etc.), technology (Industry 4.0, etc.), the phenomenon of sustainable development (environmentally friendly practices, etc.). In this context, the hospitality and catering industry attracts attention both with its new trends and the prospects of digital transformation in the future innovative development. Modern HoReCa business requires the implementation of various aspects of sustainability, innovation and new approaches in communication with consumers, as well as the implementation of new trends, which are caused by both the Covid-19 pandemic and the consequences of Russia's military aggression in Ukraine. For the business of the service industry, it is very important to know both yourself and your customers, and in the current period to be aware of the dynamics of the future market. In 2023, the hospitality industry is taking bold steps, including in Ukraine, where possible. The top trends show that business owners want and are finding innovative ways to improve the guest experience inside and outside the establishment. Businesses should develop strategies in this direction with the awareness of their strengths and weaknesses. In order to identify the strategies that will shape the service industry in 2023 and the following years, Internet research and forecasting by leading businessmen are carried out and analyzed. And even HoReCa enterprises are not in the first ranks of "the fourth great upheaval in production", and the entire economy of Ukraine is now directed to military defense against the enemy, that time is not far when it will reach the same level with others in innovative development. In this context, this investigation is aimed at holistic assessment of trends and forecasts in the hospitality and catering industry, contribution to the literature and offering suggestions to relevant stakeholders.

Key words: Industry 4.0, HoReCa, innovation, digital technologies, technologies, trends, sustainable development.



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1. Introduction.

The tendency of application of the latest achievements in computer information technologies and innovation in various spheres of business is officially called Industry 4.0. It fixes the width and depth of changes covering this area. McKinsey [3] called it “the fourth great upheaval in modern production”, comparing the changes with the revolution in 1970s, outsourcing in 1990s and automation in 2000s.

If Industry 3.0 is characterized by automation and computerization of production, the widespread use of personal computers and electronic equipment, then the Fourth Industrial Revolution, or as it is also called Industry 4.0, should combine the achievements of its predecessor into a single entity. That is, all production of goods and services, which automatically worked separately, at present, should become a part of one global network. It can be confirmed that Industry 4.0 is to some extent the evolution (continuation of 3.0) [13].

In [1] it is stated: «Nowadays, the digitalization of economy is being talked about all over the world. We hear about digital technology, digital data, digital media, digital transformation, digital marketing, digital business, digital management. Everyone is eager to become digital. But which way to choose? Why is it important to have digital transformation strategy? Now we know that mobile devices are the future of everything. With the occurrence of the Internet of Things and mobile devices, our lives and habits are changing».

2. Analysis of the latest research.

The hospitality and catering industry is a diverse and highly competitive industry. Competitors in this industry include individual bakeries, cafes and restaurants, coffee houses, pizzerias and fast food networks, as well as luxury and exquisite restaurants that offer the customers a wide range of dishes. The hotel industry is considered to be one of the most attractive businesses and is actively developing.

The hospitality and public catering industry in Ukraine is unable to move even by large-scale digital transformation efforts. Therefore, at present it can be stated, and there is no other way to say it: HoReCa economy is not ready to operate with artificial intelligence, and this unpreparedness can become a threat to its existence.

For four years Ukraine has been living in uncontrolled crisis, and Covid-19 and aggressive war of Russian fascism have stopped the innovative development of the hotel and restaurant business.

Automation of restaurants is not a new process at all. The output of various software products has started together with the active development of Internet in the nineties. But nothing stands still. New times generate new technologies. New technologies promote the search for new solutions. Nowadays, various mobile devices are gaining a widespread application in all spheres of everyday life [7, 9-11].

For the present, the introduction of POS systems, which combine the cash register, the inventory management system, the reporting and analytics tool, and the employee management platform, is on the agenda of hospitality and catering industry in Ukraine. Combination of all of these features in one tool simplifies the technology requirements of business owners while providing the interconnected system that gives the restaurant a great chance for long-term success. In other words, it is the service promoting automation of a number of business processes that take place in the restaurant or canteen, cafe or bar. Only after that it will be possible to think about the fourth revolution. And yet restaurateurs do not see themselves as Industry 4.0.

The investigation of the restaurant service market by computer company myservername.com showed the peculiarities of the requirements for the restaurant POS system among restaurant business owners (Table 1 and Fig. 1).

Table 1 Requirements for the restaurant POS system among the restaurant business owners

Requirements for POS system	% of restaurant owners
Inventory management	48
Sales reports tracking	33
Employees management	22
Tablet compatibility	17
Receipt print	15
Building the menu	13
Accounting integration	12
Easy to use	11
Credit card for processing	9

Source: [5]

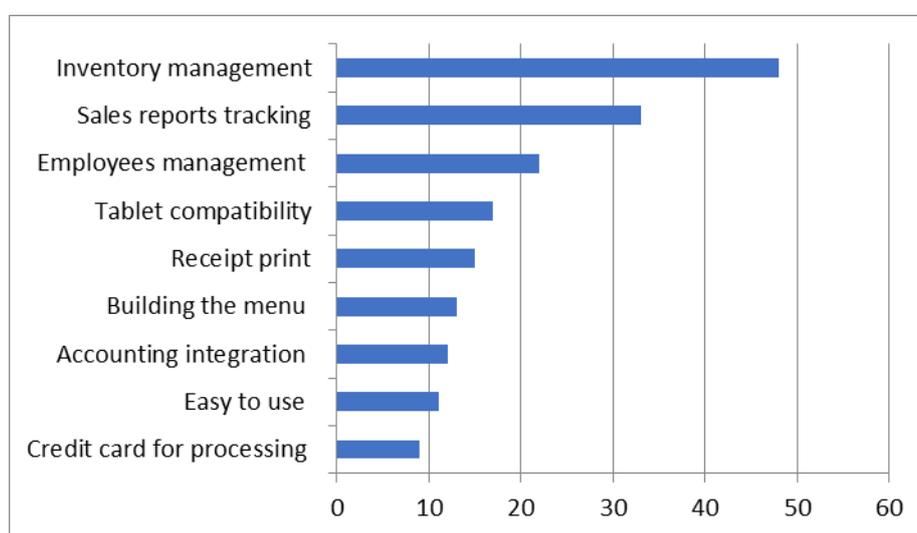


Figure 1. Diagram of the importance of requirements for the restaurant POS system

Source: [5; 6]

This investigation shows that inventory management is the main function and is required by 48% of restaurant owners. Besides, sales reports tracking (33%) and employees management (22%) are among the main requirements.

Nowadays, this approach is considered to be absolutely archaic for economically advanced countries.

The implementation of digital innovations in hospitality industry corresponds to the new trends, increases management efficiency, and reduces costs. Customers increasingly wish to pay their bills from their mobile devices. According to the same survey, 27% of restaurant customers prefer to pay for dinner without cash. Gadgets with special software make it possible for the waiter to accept the order, send it for execution and generate the bill in a few clicks and becomes the universal service solution.

How do the restaurants and hotels use digital technological solutions and why are some of them still held back from new technologies? Is it worth encouraging the digitization of their business, which is still working mostly on analog solutions? These issues are required to be solved keeping pace with Industry 4.0, as the industry can lag behind in its overall social development [7].

3. Previously unsolved parts of the overall problem.

National Strategy of Industry 4.0 (Project for the Cabinet of Ministers of Ukraine with the support of the OSCE Coordinator in Ukraine)” characterizes the status of institutional and macroeconomic environment of Ukraine as follows: Ukraine has the biggest problems in the sphere of inflation, corruption, political instability, tax regulation, as well as access to financial resources. In order for Industry 4.0 to exist, there should be “Industry” (developed modern industrial production) - yet Ukraine has not demonstrated growth in this part of economy. Accordingly, in order to change the state of affairs, the government should both improve general economic factors and solve the problems of industrialists much more purposefully [8].

4. Presenting main material.

The manufacturing industry has standardized its thinking for this trend, developing the following four key principles to adapt to these changes: compatibility, information transparency, technical assistance and decentralized solutions. Revolutions in the manufacturing (processing) industry have been observed by mankind for decades, and even centuries, and they can be pointed out and characterized.

That is, summarizing the above mentioned, we can state that production has never declined, but simply experienced revolutions, remaining sufficiently calm to maintain growth. A large decline in real production has almost never been observed. The processing industry perfectly adapts to technological disruptions and accepts them.

The service industry, on the other hand, is less resistant to technological revolutions. Many enterprises are still struggling with “digital transformation” started in the 1990s. At present we are on the threshold of artificial intelligence (AI) revolution which will be much more destructive. Even massive digital transformation efforts are failing. There is no other way to say it: the service economy is not ready to deal with artificial intelligence, and this lack of readiness is the threat to existence.

The current status of digital revolution to a great extent confirms the theory of “digital vortex”, which has been proposed by the specialists Cisco Company (2015), as the inevitable movement of various industries to the “digital center”, where products, value chains, and business models are digitized as much as possible. The authors of this theory developed the methodology for determining the potential of digital breakthroughs in the economy sector, as well as applied it to 12 investigated sectors of the economy based on interviews with approximately one thousand top managers of companies in 13 countries (Australia, Brazil, Great Britain, Germany, India, Italy, Canada, China, Mexico, the USA, France and Japan). According to the results of this investigation, industries are subject to digital changes in various degrees: the closer to the center of the industry, their participation will be faster and wider in the digital vortex. Certainly the high-tech industry will be at the heart of the “digital vortex”, mass media and the entertainment industry will take the second place, and retail trade will be the third. The tourism and hospitality industry will take the seventh place in the ranking of potentials for digital transformations [2].

In order to meet new trends requirements, as well as to improve management efficiency and reduce costs, restaurants should automate processes and implement digital solutions. Customers increasingly wish to pay their bills from their mobile devices. According to the same survey, more than 27% of restaurant visitors prefer to pay for dinner without cash. Gadgets and special software make it possible for the waiter to accept the order, send it for execution and generate the bill in a few clicks, becoming the universal solution to all problems.

It goes without saying that hotels or restaurants with robotic management and service have already appeared in the most technologically advanced countries. The results are not so unambiguous yet. Some hotels have returned their staff completely or partially. In addition,

despite the thematic direction of the hotel related to robots, guests admitted that robots annoyed them during their vacation.

On the basis of carried out analysis, we can make the following conclusions:

- at the current stage, the hospitality and catering industry as a whole lags far behind production in the implementation of automation and robotics tools;
- the speed and growth potential of this market in the service sector is much higher compared to the industrial production sector;
- the hospitality industry is one of the most highly efficient service industries, and has a huge potential for digital technologies.

Very often IT companies collaborate with service companies on their first AI project. Due to the participation in such kinds of work, you can see the most common obstacles, risk factors and general misunderstandings at an early stage. How should service enterprises be adapted to perceive and actively implement the revolution called Industry 4.0?

Five trends, which should become the main principles of success in the implementation of HoReCa services by businesses in the context of Industry 4.0 are proposed.

1. Transformation of employee culture.

AI will force employees not to think of IT as tools that support their work, but as tools that work together with them. This requires more than simply the instruction manual or memo. Employees need internal experience of change which inspires them to accept the future of their work, or their activity. But the best way to prepare the culture of service workers for AI is to apply AI projects to employees' lives. Small, discrete pilot projects are the low-risk way to gain organizational AI awareness and competence. Whether it's a small function in the applied mobile app, or voice intelligence that connects employees to recording systems, these pilot projects should create culture for AI occurrence in service-oriented enterprises.

Under the conditions of high competition in the hotel and restaurant business, management is constantly faced with the need to maintain the individual approach to the guest on the basis of innovative marketing tools. Artificial intelligence is the key for achieving such mega-personalized services, it can respond to the guest's search queries, access the Internet, and make the most relevant suggestions based on the guest's preferences and history of his/her stay at the restaurant or hotel.

2. Practical vision of business owners.

It is almost impossible to develop corporate vision for AI revolution if managers do not use AI. For this reason, most managers understand how artificial intelligence will affect the economy, but do not understand how it can and will affect their important business processes. Having a series of pilot projects, businessmen can start to formulate practical, high-resolution vision of how this technology can be expanded in their own business. While in service businesses there is still the tendency to see technology as a purchase rather than a strategy, it is becoming increasingly clear that with artificial intelligence such short-sighted thinking is not justified. Thus, it should be noted that many enterprise managers have not yet adapted to the possibility of digital transformation or to the conceptual breakthrough it implies.

First of all, business leaders of the service industry should form their own understanding or strategic vision of digital opportunities that can support their business and its competitiveness. Managers and employees of the hotel or restaurant business will have to change their approach to work, should be able to forecast tomorrow's trends and respond to them faster, than competitors, accelerating the decision-making process. This requires the reduction the number of organization levels, as well as the development of innovative entrepreneurial thinking.

3. Management and protection of information and data.

This is the big uncertainty for businessmen that ceases most AI projects. We are still in the Wild West concerning Big Data understanding. Most enterprises understand Big Data, but

they do not have policies that govern the use of their data. AI works on data. Therefore, investing in modernized management strategies can be difficult. Most managers simply predict risk, risk, and once more risk. And it is hard to blame them. But it is important for service businesses to realize that management is protection against AI risks of and the risks of AI non-use. Doing nothing is the most harmful option for service business.

4. Wide expansion of AI.

Eventually, businesses will see that AI fundamentally changes the way they do business. This will be exciting and inspiring, but now you can't just take a break and observe others. It is stated in [4] that: "Don't underestimate its impact in a service economy that has a track record for fumbling with new technologies". Soon, competitors will work with much greater speed and precision than others. Narrow places will occur since the units, which work with artificial intelligence, will work with units working with outdated software. At this stage, it is important to start the active expansion of artificial intelligence at the whole enterprise - from economic systems to applications for individual business units. And when the enterprise standardizes a single stack of artificial intelligence, at a certain moment the business will prevail its competitors in everything.

5. Construction of the service personalization principle.

Under the conditions of high competition in hospitality industry, businessmen and managers constantly face the problem of the need to maintain individual approach to the guest on the basis of innovative marketing tools. Artificial intelligence is the key to the achievement of such mega personalized services. There is a shift from interactive to predictive due to AI that can respond to the guest's search queries, go online and make the most relevant offers based on the guest's preferences and history of his/her stay at the hotel or restaurant.

Algorithms of the platform can provide owners with the opportunity to send necessary messages and relevant information. For example, it can be a birthday greeting to a guest or something else. Therefore, the main task of the digital strategy is to collect, process, analyze and synthesize data, in accordance with the privacy policy, in order to understand the guests better and interact with them. The real interest in the application of digital technologies in HoReCa is due to the fact that on their basis it is possible to transfer the usual communication mechanisms for digital environment, which makes it possible to use traditional schemes on qualitatively new digital basis [12].

The introduction of new technologies in the field of hospitality is determined by the speed of change in business nature, including the demand for tactical business management and dynamics of changes in consumer requests under the influence of more accessible information. These new methods of the work organization are necessary to support culture where business will develop actively, and keep up with the constant changes in consumer habits of the customers.

At present it should be clear that AI is not a technology. It is concerned with business culture, policy, strategy and vision. In the service industry, where a great part of the created values is the result of human collaboration, communication and creativity, one should have a human view of AI. Leaders who treat these technologies as tools, things to be bought, like office supplies, will bring their organizations to dangerously weak positions in their markets. AI forces businessmen to use more human-centered approach to their service businesses. It makes them to take into consideration culture, politics and all the other intangible systems guiding the workforce organization and go together towards common goal. The impact of AI on the service economy should not be underestimated as it has experience in new technologies application.

In order to function in digital economy, the hotel and restaurant business should undergo the stage of transformation for the solution of all necessary changes. Technologies are the basis of Industry 4.0; business transformation is impossible without them. The most advanced technologies which will change business-models of companies or entire industries

include: Internet of Things (IoT), artificial intelligence, robotics, digital economy, 3D printers, augmented and virtual reality (AR and VR). The digital platform acts as the catalyst of economy, the introduction of which in any industry makes it possible for managers to solve the optimization, quality and safety problems of operational processes quickly and effectively, results in significant reduction in costs and acceleration of production cycles, which makes production more flexible and competitive.

It is noted by McKinsey Digital [14] that robots will not be able to replace people completely, but they will change the appearance of workplaces. About 60% of professional activities, using available existing technologies, can be automated by 30 percent. However, less than 5% of occupations can be completely automated.

Robotization should take place en masse for customer service, where the main competitive advantage of the company is speed of service or price (fast food, retail, bed and breakfast, etc.). But for many market segments, optimal solutions (appearance, interface) that should provide simplicity and comfort in application of robots, has not been completely found and developed yet.

In order for robots to be able to compete with humans in individual customer service, the logics of their behavior and control should reach a new level of complexity. Therefore, hoteliers and restaurateurs should make strategic decisions about the problem where and when to invest in technology modernization. This process starts from understanding whether the innovation is an important step in creating the unforgettable positive experience for guests or it is just for their admiration.

Digital technologies should be considered as a holistic approach to thinking that covers all processes of the organization, including communication and service supply. If we succeed in “thinking digitally”, for example, integrating the support of digital processes at all levels, we can experience long-term success and keep competitors at a distance. Data, information and knowledge are the new success factors resulting in new market opportunities and business models due to their intelligent combination with network operational performance and service supply.

Promising opportunities and created unique ideas propose the entrepreneurs potential for successful development of their business. Business model design, software and hardware component architecture planning, as well as storage of individual data, information, and knowledge components form the core of a new digital entrepreneurial approach [8].

5. Conclusion.

Industry 4.0 slowly but confidently penetrates the markets of hospitality industry of Ukraine. Startups and digital innovation projects of the leaders of high-tech industry show others the beginning of digital transformation of processes at enterprises of hospitality industry, the purpose of which is to create more comfortable and effective relationships both within the company and with the company’s customers. Transformation affects all aspects of business, from strategic goals to infrastructure. Therefore, the implementation of Industry 4.0 at the enterprises requires deep understanding, interaction, purposeful work of business and management leaders, and well-grounded strategy.

This process cannot be simply the goal at any cost and must not discard the values acquired by the company. The basis of transformation is the rule of constant improvement and awareness of the need for improvement. Companies that fail to transform will struggle for survival. On the threshold of a new industrial revolution, hospitality industry enterprises face conscious need to find the perfect balance between traditional and digital styles, developing their own “roadmap of digitalization”.

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Анотація. Глобалізація глибоко впливає на структури багатьох сфер з усіма її вимірами. Тому різні прогресивні тренди впливають на сучасні тенденції нашого життя. Поточні та майбутні тенденції можна розглядати за такими факторами, як надзвичайні ситуації (пандемія тощо), технології (індустрія 4.0 тощо), явище сталого розвитку (екологічно чисті практики тощо). У цьому контексті індустрія гостинності та громадського харчування привертає увагу як своїми новими тенденціями, так і перспективами цифрової трансформації у майбутньому інноваційному розвитку. Сучасний бізнес HoReCa вимагає впровадження різноманітних аспектів стійкості, інновацій та нових підходів у спілкуванні зі споживачами, а також впровадження нових трендів, які зумовлені як пандемією Covid-19, так і наслідками військової агресії росії в Україні. Для бізнесу індустрії послуг дуже важливо знати як себе, так і своїх клієнтів, і в поточний період усвідомлювати динаміку майбутнього ринку. У 2023 році індустрія гостинності робить сміливі кроки, у т. ч. і в Україні, де це можливо. Найпопулярніші тенденції свідчать про те, що власники цього бізнесу хочуть і знаходять інноваційні способи покращити враження гостей у закладі та за його межами. Бізнесу варто розробляти стратегії в цьому напрямку з усвідомленням своїх сильних і слабких сторін. Щоб виявити стратегії, які сформуєть індустрію послуг у 2023 і послідуєть роки, проведені і проаналізовані пошукові інтернет-дослідження і прогнозування провідних бізнесменів. І хоч підприємства HoReCa не стоять в перших рядах «четвертого великого потрясіння у виробництві», та й уся економіка України зараз направлена на військовий захист від ворога, недалекий той час, що вона стане на рівень з іншими в інноваційному розвитку. У цьому контексті це дослідження має на меті цілісно оцінити тенденції та прогнози в індустрії гостинності та громадському харчуванні, зробити внесок у літературу та запропонувати пропозиції відповідним зацікавленим сторонам.

Ключові слова: індустрія 4.0, HoReCa, інновації, цифрові технології, гостинність, клієнт, технології, тенденції, сталий розвиток.

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at

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